GreenMech
The Professionals' Choice

CHIPMASTER 220 TMP

OPERATORS MANUAL

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IMPORTANT NOTICE

TENSION OF HYDRAULIC DRIVE BELTS MUST BE CHECKED AND RESET AFTER THE FIRST 2-3 HOURS OF OPERATION OF 220TMP ONLY.

FAILURE TO DO SO MAY INVALIDATE WARRANTY.

INSTRUCTIONS TO CHECK AND RESET TENSION ARE DETAILED IN SECTION 6.6a and 6.9a.

SECTION:

INTRODUCTION

This manual explains the correct operation of your machine. Read these instructions thoroughly before operating and maintaining the machine. Failure to do so could result in personal injury or equipment damage. Consult your GreenMech supplier if you do not understand the instructions in this manual.

CAUTION! This symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury to yourself or others, and carefully read the message that follows.

We recommend that you keep this manual with the machine in the box provided. Note in the box given the serial number and quote it in any communications. This is important when ordering spares. Remember to include all numbers and letters.

VIN number……..

Serial Number.....

Write in the number!

This manual covers the following models.
Engine driven: CM220MT55, CM260MT70
Tractor mounted: CM220TMP
With following options where applicable.
360˚ turntable: Adjustable drawbar

This Manual is written generally for engine driven models. Tractor mounted models share many of the same features. Instructions specific to tractor mounted models may be found within the text.

The information in this manual is correct at the time of publication. However, in the course of development, changes to the machine specification are inevitable. Should you find any information to vary from the machine in your possession please contact your GreenMech dealer for up to date information.
The manual may contain standard and optional features and is not to be used as a machine specification.

PURPOSE

CAUTION! This machine is designed solely to chip wood and must not be used for any other purpose. The machine should only be used by trained operators who are familiar with the content of this instruction manual. It is potentially hazardous to fit or use any parts other than genuine GreenMech parts. The company disclaims all liability for the consequences of such use, which in addition voids the machine warranty.

Fig 2.1 CM models Main Features

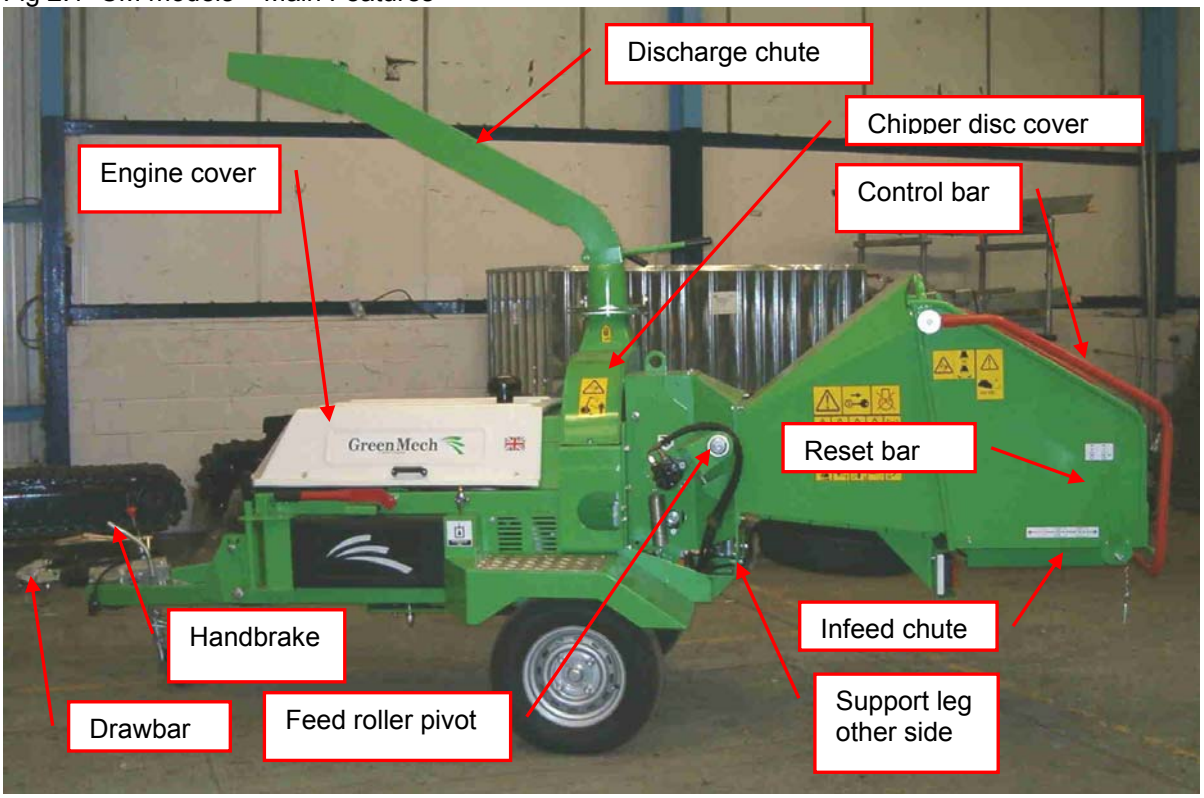


Fig 2.2 Tractor mounted (TMP)

Fig 2.3 360 CM220MT55-360 with turntable

TECHNICAL SPECIFICATION CM220	MT55	MT55-360˚	TMP
Max Capacity	220mm (9-inch diameter)		
Chipping Disc	730mm x 30mm		
Speed	1565 rpm		540 pto
Chipping Blades	6 Discs – 3300 cuts/min		
Feed Rollers	2 x Hydraulic & Spring Tensioned		
Power Control	No-Stress Electronic Feed Roller Controller		
Power Unit	Isuzu 4 cyl 55hp		Tractor 60-80hp
Length (work position)	4450mm	4700mm	2700mm
Length (transport)	4034mm	4182mm	2200mm
Width	1440mm	1420mm	1340mm
Height	2720mm	2996mm	2450mm
Weight	1380kg	1600Kg	860Kg

Noise
Noise levels vary depending on type of material being processed. Also duration of operation is variable. Noise emission tests have been carried out and the guaranteed sound power level is displayed on the CE plate as follows: **Lwa 120dB**
Minimise noise by switching to idle or stopping the engine whenever chipping is not in progress.

⚠ CAUTION! Operators must wear appropriate ear protection. Bystanders must be kept away from proximity of machine.

Lifting Points
There is a central lifting point by the chipper disc cover and two front lifting points at the front corners of the machine.

⚠ CAUTION! Lift with extreme care. The machine may tilt because the lifting points may not be directly over the centre of gravity.

Drawbar and hitch (Road Tow model)
Ball type hitch with overrun brake and safety cable.

⚠ CAUTION! Ensure that the towing vehicle is correctly suited to the trailer weight and drawbar (nose) loading. If necessary check with national vehicle legislation.

3.1 ENSURE:

3.1.1 All Operators must be fully trained in the use of their machine.
(Certificated Operator training courses are available on request.)
3.1.2 The Operators Manual is read and understood.
3.1.3 The enclosed HSE guidance notes are read and understood.
3.1.4 The machine is positioned on level ground and the machine must be level with the infeed chute at no less than 600mm (23.62 inches) above ground level (fig 3.4.3).
3.1.5 When the unit is detached from towing vehicle (MT models) the handbrake is applied and if necessary the wheels are chocked.
3.1.6 The rear support leg is lowered when using the machine.
3.1.7 All guards are fitted and in good condition.
3.1.8 Blades are in good condition and secure.
3.1.9 All blades are sharpened or replaced in “Sets”.
3.1.10 All fasteners are checked regularly for tightness.
3.1.11 Only “WOODEN” materials free of nails etc., are fed into the machine.
3.1.12 Correct First Aid Kit including large wound dressing is available on site.
3.1.13 Fire extinguisher is available on site.

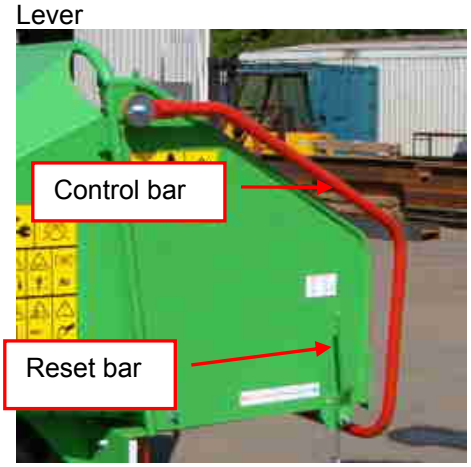
3.2 NEVER:

3.2.1 Work on the machine until the chipper disc is stationary and engine or PTO has stopped.
3.2.2 Operate the machine without protective clothing (Eye protection, Earmuffs, and Gloves), or high visibility clothing when working on roadside.
3.2.3 Operate with loose articles of clothing, including loose cuffs on gloves.
3.2.4 Work under a raised component without adequate safety support.
3.2.5 Operate the machine with untrained personnel or with individuals present who are not involved in the chipping operation.
3.2.6 Leave the machine unattended with engine running at full operating speed. (See section 4)
3.2.7 Put any part of your body into the infeed chute while the machine is running.
3.2.8 Operate the machine whilst under the influence of alcohol or drugs.
3.2.9 Operate inside a building or confined space.
3.2.10 Climb on the infeed chute.

3.3 ALWAYS:

3.3.1 Check machine before starting (see Section 4 Preparation and Section 5.1 Operation: Pre-work checks).
3.3.2 Be aware of potential hazards in the work area, i.e. uneven ground, tree roots, obstructions and type of materials being fed into the machine.
3.3.3 Feed from the side.
3.3.4 Have a second trained operator within easy reach of the machine.
3.3.5 Maintain strict discipline at all times.
3.3.6 Service machine at specified periods. (see Section 6: Routine Maintenance).
3.3.7 Note direction of discharge chute and if necessary note the wind direction to prevent debris from being blown into highway or where it could affect members of the public.
3.3.8 Remove key before doing any maintenance.

Fig 3.4.1 Control Bar and Reset Lever

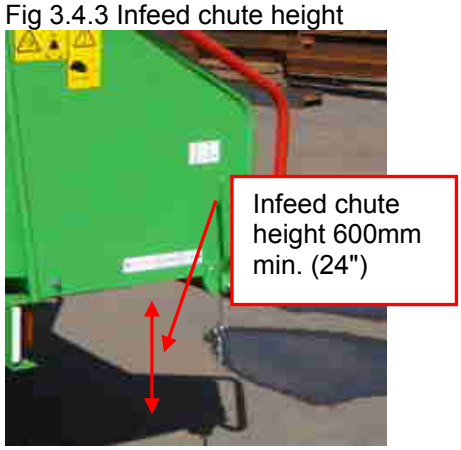


Control Bar positions
Nearside
STOP FEED OUT FEED IN

FEED IN FEED OUT STOP
Offside

Fig 3.4.2 Engine Stop Switch - (start key)

Fig 3.4.3 Infeed chute height



3.4 Safety Controls and Switches

3.4.1 Emergency Stop/Control Bar (fig 3.4.1)

In the event of an emergency, push the emergency stop bar to STOP the feed rollers. This will lock in position

3.4.1.1 Once the emergency has been rectified the following sequence should be carried out:
3.4.1.2 To restart rollers pull the reset lever whilst pulling the control bar towards the Feed In position.
3.4.1.3 Should the stop bar be tripped accidentally in normal working conditions i.e. NOT an emergency, then the rollers can be recovered by performing the above sequence.
3.4.1.4 To reverse the rollers (Feed Out) push the control bar into the middle detent. To regain forward (Feed In) pull the control bar away from the chipper. It is not necessary to use the reset bar.

3.4.2 Engine stop switch

3.4.2.1 To stop the engine, turn the start key anticlockwise to the '0' position. (fig 3.4.2).

⚠ CAUTION! Do not restart engine until hazard has been removed.

3.5 Control cut-outs

Cut-outs are installed to stop and prevent restarting due to specific events.
3.5.1 Engine overheating is protected by thermal cut-out switch in coolant circuit.
3.5.2 Low engine oil pressure is protected by pressure switch in the engine oil pump. There is a manual override to enable starting.
3.5.4 Engine cover opening is protected by a microswitch to shut off the fuel solenoid.
3.5.5 The infeed chute being raised to the transport position.

3.6 No Stress system

3.6.1 Speed sensor disables feed roller FEED IN or FEED OUT mode when engine speed is below factory pre-set value.

3.7 SYMBOLS on the MACHINE

These relate to operator safety, correct use and maintenance of machine. Check that all personnel understand and are familiar with meanings before using the machine.

Important Safety symbols

Take the correct action shown on the display below the stated hazard (see table)

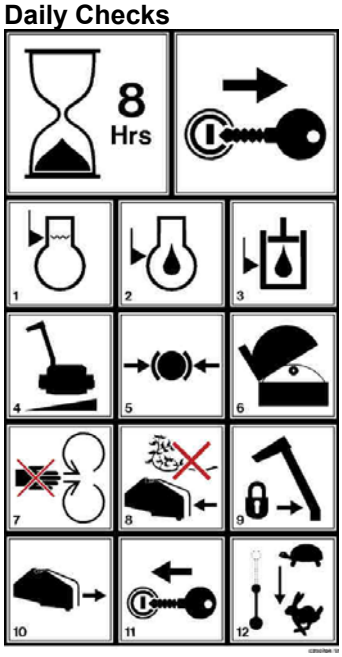
General Safety

Caution!		**Remove key**		**Do not start engine**
Caution!	**Beware flying object hazard**	**Beware noise hazard**	**Beware trapping hazard**	**Brakes off -incorrect**
Read instruction manual	**Wear helmet & visor**	**Wear ear protectors**	**Wear proper clothes**	**Brakes on -correct**
Machine not level -incorrect	**Beware flying object hazard**	**Beware flying object hazard**	**Beware exposed drives hazard**	**Caution!**
Machine level -correct	**Keep bystanders away**	**Position and lock discharge chute**	**Fit all guards**	**Keep nuts tight**

Important Operating Checks Notice

Before use carry out daily the stated checks in the order shown (see table)

Daily Checks



Every 8 Hours – Daily checks		**Remove key stop engine**
1. Check coolant level	**2. Check engine oil level**	**3. Check hydraulic oil level**
4. Check machine is level	**5. Check brakes are on**	**6. Check chipper disc is clear of debris**
7. Check all guards are in place	**8. Check infeed chute is clear of debris**	**9. Lock discharge chute**
10. Pull control bar to work position	**11. Start engine**	**12. Increase from Idle to Run**

Important Safety Information

Caution! Beware of thrown object hazard

Action: Keep away from fast discharge chute

Caution! Beware of thrown object hazard

Action: Stand to side of infeed chute, NOT in centre.

Face shield must be worn

Caution!

Do NOT operate with infeed chute at less than 600mm from ground (bottom bar machine).

Sound level

Ear defenders must be worn.

Ear defenders must be worn

Transport Lock

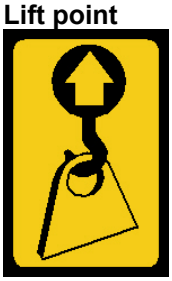
Lock this component before moving machine.

Caution!

Do NOT fold infeed chute unless control bar is in STOP position
1) Control bar in STOP position
2) Fold up infeed chute.
3) Lock infeed chute before transport.
Do NOT transport with chute down

PTO drive (tractor mounted only)

Lift point

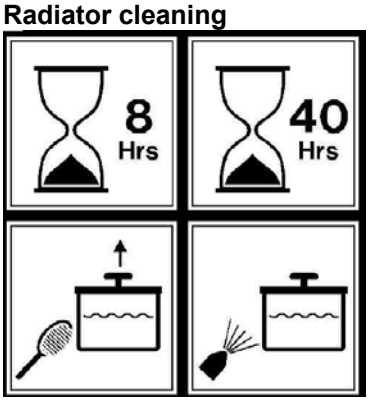


Maintenance Information

Diesel Filler

Hydraulic Filler

Radiator cleaning



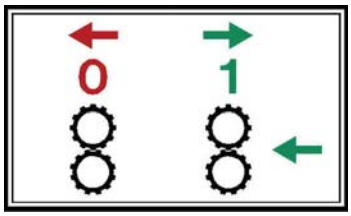
8 Hours	40 Hours
Check radiator screen	Blow out radiator core

Grease point

40 hours / weekly

High temperature Grease 40 hours

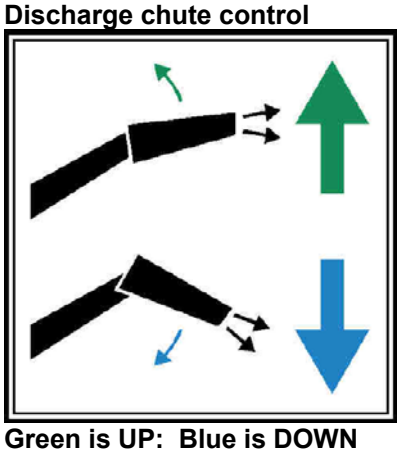
Reset lever: Left hand shown



Pull to reset

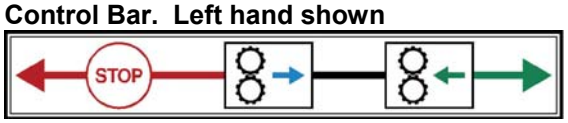
Operating Information

Discharge chute control



Green is UP: Blue is DOWN

Control Bar. Left hand shown



Push to stop: Centre-feed out: Pull–feed in

No-Stress indicator

Green is ON: Red is OFF

Engine throttle

Fast ---------- Slow

Fig 4.1 Adjustable drawbar and Handbrake

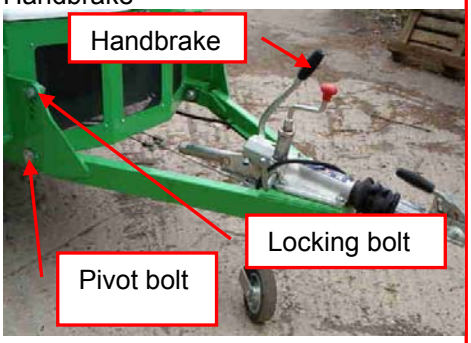
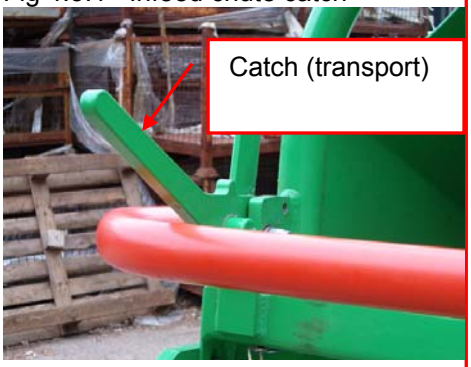
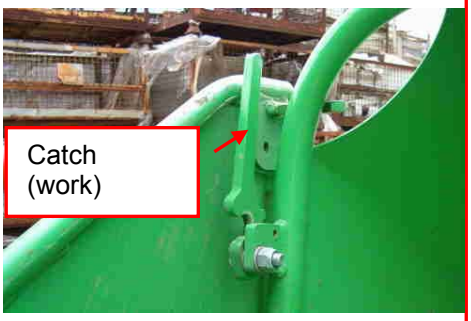


Fig 4.3.1 Infeed chute catch





4.1 Initial Fuelling and Parking
(For tractor mounted models see 4.6)

4.1.1 Fill the fuel tank with diesel.
4.1.2 Top up the hydraulic tank if necessary, with the correct oil. See Section 6.
4.1.3 Position the machine on level ground.
4.1.4 Apply the vehicle handbrake.
4.1.5 If the machine is detached from the vehicle, apply the trailer handbrake (fig 4.1) and chock the wheels.

4.2 Drawbar adjustment
4.2.1 Support the front of the chipper with a suitable jack and remove the two locking bolts (fig 4.1).
4.2.2 Adjust the jack until the chute is 600mm or more from the ground.
4.2.3 Once the correct height is reached refit the two bolts in their new position and tighten securely.
4.2.4 Remove the jack.

⚠ CAUTION! A loaded vehicle increases the height of the infeed chute.

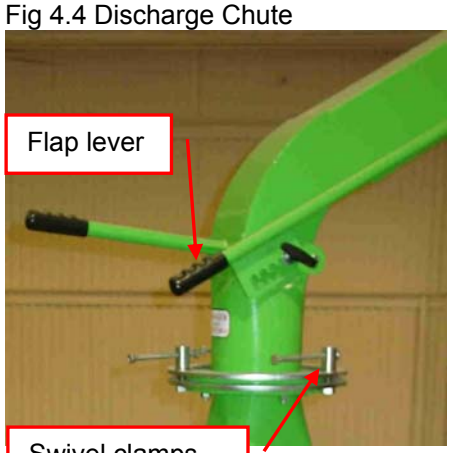
⚠ CAUTION! If the height of the drawbar is adjusted, check that the handbrake cable is also correctly set.

4.3 Infeed Chute
4.3.1 Remove the transport pin for the infeed chute catch, release the catch (fig 4.3.1), using the tubular edge, lower the infeed chute to the work position and reset the catch (fig 4.3.1).
4.3.2 Measure the height of the infeed chute. If less than 600mm either adjust the drawbar following instruction 4.2 or detach the machine from the vehicle and set with drawbar wheel.
4.3.3 Pull the reset lever to release the control bar for use.

⚠ CAUTION! The infeed chute must not be used at less than 600mm from the ground. (fig 3.4.3)

⚠ CAUTION! Before travelling, always fold up and secure the infeed chute flap.

Fig 4.4 Discharge Chute



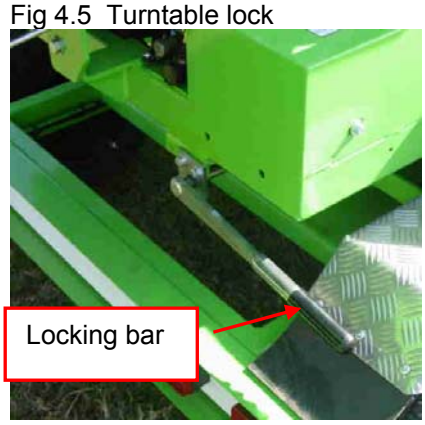
4.4 Discharge Chute (Fig 4.4)

4.4.1 Release the swivel clamps and point the chute in the desired direction.

4.4.2 Set the flap at the desired height and tighten the clamp.

⚠ CAUTION! Lock the discharge chute in the forward position when travelling.

Fig 4.5 Turntable lock



4.5 360 Turntable (if fitted)

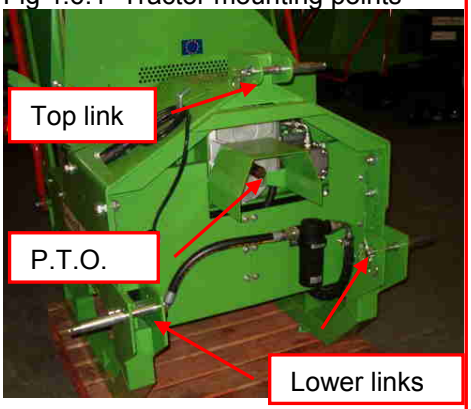
⚠ CAUTION! Before operating ensure the machine is level.

4.5.1 To rotate the Chipper body, release the transport pin with the locking lever (fig 4.5).

4.5.2 Move the locking lever in the direction indicated and rotate to the desired position and lock transport pin. The front security brace should be fitted for road transport.

⚠ CAUTION! Lock the turntable with the infeed chute in the rearward position when travelling.

Fig 4.6.1 Tractor mounting points



4.6 Tractor mounted models

Attaching the Tractor Mounted Chipper to the Tractor:

4.6.1 Remove the top, and lower linkage pins on the chipper (fig 4.6.1)

4.6.2 Lower the three-point linkage on the tractor and reverse up to the chipper.

4.6.3 Locate the two lower linkage pins through the lower arms and the chipper frame.

4.6.4 Secure the pins with the clips provided.

4.6.5 Adjust the top link to the correct length and locate the linkage pin through the frame and arm, secure with the clips provided.

4.6.6 Switch off the tractor engine.

4.6.7 Check that the PTO shaft is the correct length for the tractor make and model.

⚠ CAUTION! The PTO shaft is equipped with shear bolt protection and this end of the shaft MUST be fitted to the tractor PTO shaft. (Pictograms stamped on PTO shaft cover may be incorrect.)

4.6.8 Depress the two spring buttons and slide onto the tractor shaft until the buttons spring out into the correct locations.

4.6.9 Depress the single spring button on the ratchet clutch end and slide onto the chipper gearbox shaft until the button springs out into the correct location.

4.6.10 Connect up the trailer socket to the tractor.

4.6.11 Turn on the tractor's sidelights to provide power for the No-Stress system.

⚠ CAUTION! Check that the discharge chute does not hit the tractor cab when the chipper is lifted up.

⚠ CAUTION! Do not operate the machine when not fully attached to the tractor

Fig 5.1.1 Support Leg

Fig 5.1.2 Chipper Disc Cover

⚠ CAUTION! Beware sharp edges of discs and unexpected movement.

5.1 Pre-Work Checks:

5.1.1 Check machine is stationary, start key removed, and hand brake applied with support leg lowered (fig 5.1.1) if separated from vehicle.

⚠ CAUTION! Remember to raise support leg before driving off.

For tractor mounted models, check that tractor is parked securely with handbrake applied.

5.1.2 Check that machine is level and infeed chute is greater than 600mm from ground (fig 3.4.3).

5.1.3 Check engine oil level (See Engine instruction manual).

5.1.4 Check hydraulic oil level (See Section 6).

5.1.5 Check fasteners for tightness and hydraulic connections for leaks.

5.1.6 Check condition of disc blades.

5.1.6.1 Raise engine cover. Check nothing is rotating.

5.1.6.2 Remove the single bolt retaining chipper disc cover.

5.1.6.3 Using discharge chute handle as a lever, swing back cover on to stop to expose chipper disc and blades. (fig 5.1.2)

5.1.6.4 Carefully rotate chipper disc to check tightness of disc blade bolts and condition of blades.

5.1.6.5 Remove any loose wood material.

5.1.6.6 If any bolts are loose, refer to maintenance section for further action.

5.1.6.7 Replace chipper disc cover and tighten bolt securely.

5.1.7 Remove any loose material and dust from radiator and engine bay

5.1.8 Replace engine cover.

5.1.9 Check discharge chute is in desired position and all clamps are tight. (see Section 4.4)

5.1.10 Check infeed chute (fig 4.3.2) is locked in position with catch.

5.1.11 Check work area and erect signs and cone off discharge area if necessary.

5.1.12 Check **ALL** safety procedures have been followed.

Fig 5.2.1 Engine control box

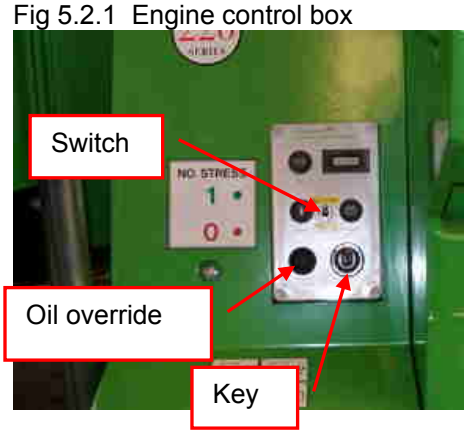
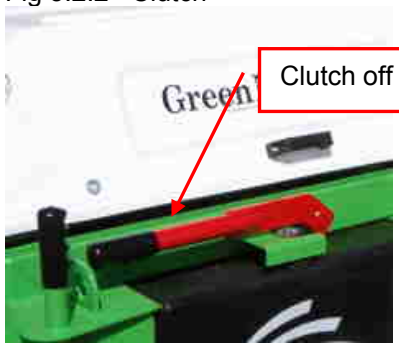
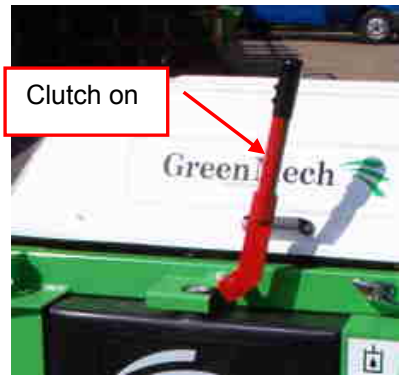


Fig 5.2.2 Clutch





5.2 Starting Machine:

5.2.1 Put throttle control toggle switch into up IDLE/START position (fig 5.2.1)

5.2.2 Check all other personnel are clear of machine.

5.2.3 Check that feed roller control bar is pushed to the FEED OUT or STOP position, to make the machine safe.

5.2.4 Check that clutch is disengaged (fig 5.2.2)

5.2.5 Turn start key to pre-heat position and depress low oil pressure override button for 5 seconds.

5.2.6 Keeping the override button depressed, turn the start key to START position.

5.2.7 When the engine starts, keep the override button depressed until the red “oil” warning light goes out.

5.2.10 Engage the clutch (fig 5.2.2)

5.2.11 Press the throttle control switch down to RUN position to increase the speed to operating speed. The green No Stress light will come on.

5.2.12 Pull the reset lever to release the control bar for work.

Tractor mounted models

5.2.13 Follow instructions above up to 5.2.4.

5.2.14 Turn on the tractor engine.

5.2.15 Engage the tractor PTO drive and increase the speed until the No-Stress light turns green, and then increase by 20revs/min at PTO.

5.3 Stopping Machine

5.3.1 Push the control bar to STOP position.

5.3.2 Select throttle switch (fig 5.2.1) up to START/IDLE position and allow chipper disc to slow down.

5.3.3 Disengage the clutch.

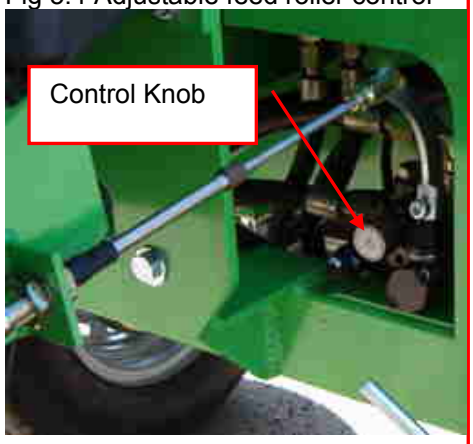
5.3.4 Switch start key to OFF to stop the engine (fig 5.2.1).

Tractor mounted models, disengage PTO and stop engine.

5.3.5 Wait for chipper disc to stop.

⚠ CAUTION! The chipper disc will take several minutes to stop due to its inertia.

Fig 5.4 Adjustable feed roller control



Control knob settings

Material	**Setting**
up to 150mm	Fully open (3 turns)
150 -250mm	1/2 - 3/4 turn

Fig 5.5 No Stress light

Green	Normal
Red	Rollers stopped -overloaded
Red flash	Engine START on

5.4 Adjustable Speed Feed Roller Control

When chipping wood sizes larger than 150mm diameter it is necessary to reduce the feed roller speed to suit the material being chipped.

5.4.1 Turn the valve control knob (fig 5.4) clockwise until valve is closed.

5.4.2 Turn the knob anticlockwise to the recommended setting in the table.

5.5 Operating Hints

5.5.1 Engage clutch slowly (fig 5.2.2)

5.5.2 Check that chipper disc is at full speed with green light showing on No-Stress control (fig 5.6).

NOTE: The “No Stress” system will only allow FEED IN (Forwards) operation of the feed rollers when the machine is running at FULL operating speed.

5.5.3 Select START/IDLE to reduce speed to idle whilst further material is collected for chipping.

5.5.4 Take care when feeding wood into the machine to allow for awkward shapes to “KICK” when contacting the feed rollers.

5.5.5 Position the end of larger sections of wood inside the infeed chute and then support the other end whilst pushing the wood into the feed rollers.

⚠ CAUTION! Do not release discharge chute clamps when chipping is in progress. Elevation of the discharge is altered by means of the adjustable flap (fig. 4.4).

⚠ CAUTION! Keep working area around the machine clear at all times and check only authorised personnel are present.

Fig 5.6 Support Leg raised

5.6 Preparing For Transport On Completion Of Work

5.6.1 Check that engine has stopped and chipper disc is stationary.
5.6.2 Remove surplus material from infeed chute and machine surfaces.
5.6.3 Lift up infeed chute to transport position, secure with lock and fit locking pin.
5.6.4 Set discharge flap into lowest position and tighten clamp.
5.6.5 Release clamps, turn discharge chute to forward position in line with trailer, tighten clamps.
5.6.6 Reset chipper body turntable (if fitted) to straight position with infeed chute rearward, and engage turntable parking lock.
5.6.7 Raise support leg and secure with clamp.
5.6.8 If detached, re-attach trailer to vehicle.

⚠ CAUTION! On tractor mounted models check that discharge chute does not hit tractor cab when chipper is lifted up for transport.

Supplement for Tractor Mounted Woodchipper with Removable Drawbar.

To convert from Road Tow to tractor mounted.

1. Stand Machine on smooth, level ground and chock the road wheels. Do not apply handbrake.
2. Drop rear stand and support the front of the machine with a suitable jack positioned just to the rear of the drawbar on the chassis side rail.
3. Remove clevis pin from brake rod situated underneath the machine. Do not apply the handbrake, as it is spring assisted. If possible, secure handbrake in the “off” position.
4. Remove all bolts securing the draw bar and carefully remove it.
5. Slide sleeves into the bottom pivot with the boss on the inside and fit legs, securing with both bolts on both legs. Remove front jack.
6. Fit tractor to three-point linkage in usual manner and raise rear support leg.

Please note that the trailer light board plug is on the near side of the chipper and the “No Stress” plug is on the off side. For the “No Stress” device to work it must be plugged in and the headlights switched on.

Re-fitting the draw bar is the reverse of above and care should be taken in supporting the machine and ensuring that the brakes are connected before applying the handbrake.

The machine is equipped with a high-speed axle and over-run brakes suitable for highway use. The lightboard is fitted with 12 volt bulbs and most be used when the machine is being towed and it is advisable to use it if it the machine obscures the tractor lights whilst it is being carried.

ROUTINE MAINTENANCE SCHEDULE

⚠ CAUTION! Always remove key and check for rotation before carrying out any maintenance.

Important! Check and, if necessary, re-tension drive belts after first 2-3 hours. Firm hand pressure should deflect centre of span no more than one depth of belt section.

Action	Section	Page
DAILY		
Check engine oil level and coolant (ref: engine manual)	6.2 – 6.3	6-4
Check hydraulic oil level	6.4	6-4
Check fuel level	6.5	6-4
Check all drive belts	6.6	6-5
Check condition of disc blades and retaining bolts	6.7	6-6
Clean radiator screen and around radiator	6.8	6-7
Check feed roller control bar function	3.4	3-2
First 50 hours		
Check drive belt tension	6.9	6-5
Check battery levels	6.13	6-8
Check wheel and tyre condition and pressures	6.14	6-9
Check brake condition and operation	6.15	6-10
Check hydraulic connections	6.17	6-11
Check all mountings	6.18	6-11
Check feed roller control bar function	3.4	3-2
Service engine	Refer to engine manual	
Weekly in addition to Daily actions		
Blow out radiator core with air line	6.8	6-7
Check drive belt tension	6.9	6-7
Steam clean machine	6.10	6-8
Clean air cleaner	6.11	6-8
Check electrical connections	6.12	6-8
Check battery levels	6.13	6-8
Check feed roller control bar function	3.4	3-2
Check wheel and tyre condition and pressures	6.14	6-9
Check and adjust brakes	6.15	6-10
Grease all bearings and pivots	6.16	6-11
Check hydraulic connections	6.17	6-11
Check all mountings	6.18	6-11
250 hours in addition to Daily and Weekly actions		
Check all fluid levels	6.2, 6.3, 6.4	6-4
Check brake condition and operation	6.15	6-10
Check condition of bearings and pivots	6.16	6-11
Service engine	Refer to engine manual	
Check axle mounting bolts for tightness	6.18	6-11
Replace return filter element	6.19	6-11
Check and grease wheel bearings	6.20	6-11

1000 hours in addition to 250 hour actions		
Change hydraulic oil when replacing filter element	6.21	6-11

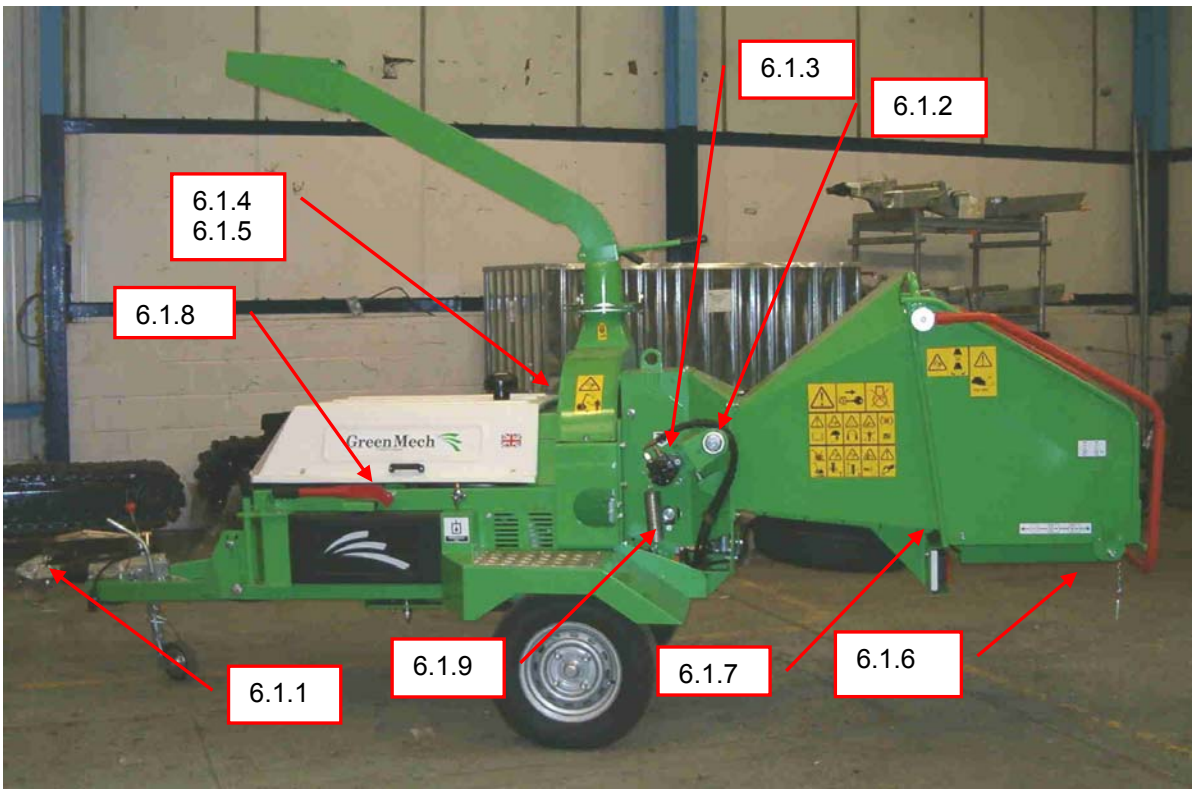
DIESEL ENGINE MAINTENANCE **REFER TO ENGINE MANUAL**

Tyre pressure **4.4bar (64 lb/in^2)**

Recommended lubricants	**Specification**	
Hydraulic Oil	ISO 32	
Grease	Complex grease EP2	(high temperature)
Engine	SAE 15W-40 APICD	

6.1 Lubrication Points (see 6.16)

Fig 6.1 Lubrication Points

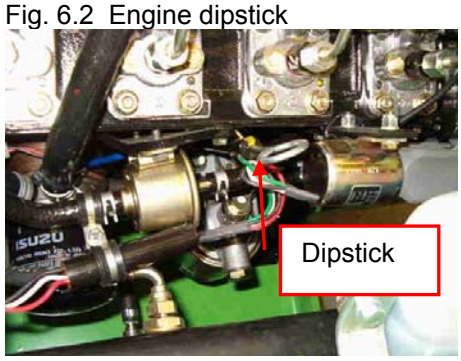


Grease except where stated

6.1.1	Drawbar	2 nipples
6.1.2	Top Feed roller pivot	1 nipple
6.1.3	Top Feed roller bearing	1 nipple
6.1.4	Chipper Disc bearings	1 nipple inside chipper chamber
6.1.5	Chipper Disc labyrinth seal	1 nipple inside chipper chamber
6.1.6	Infeed chute hinges	Oil
6.1.7	Mechanical reset mechanism	Clean and grease
6.1.8	Clutch lever	1 nipple
6.1.9	Bottom feed roller bearing	1 nipple

Note. Do not overgrease bearings as damage to seals may occur
Note: Use high temperature grease on chipper disc bearings

Fig. 6.2 Engine dipstick



6.2 Engine Oil

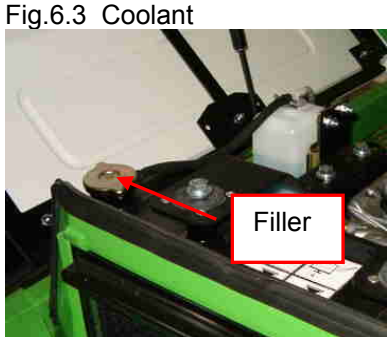
6.2.1 Check daily (fig 6.2). Refer to engine manual to refill.

6.3 Coolant

6.3.1 Check radiator level daily, including overflow tank (fig 6.3). Refill as required. Check antifreeze.

⚠ CAUTION! Do not remove cap when engine is hot.

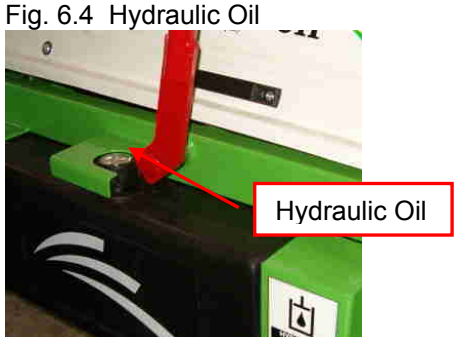
Fig.6.3 Coolant



6.4 Hydraulic Oil

6.4.1 Check daily (fig 6.4). If below mark check for leaks and refill to correct level.
6.4.2 1000 hours. Remove drain plug, Drain tank and refill with clean oil of correct specification. Replace filter (Para. 6.16)

Fig. 6.4 Hydraulic Oil



6.5 Fuel Level

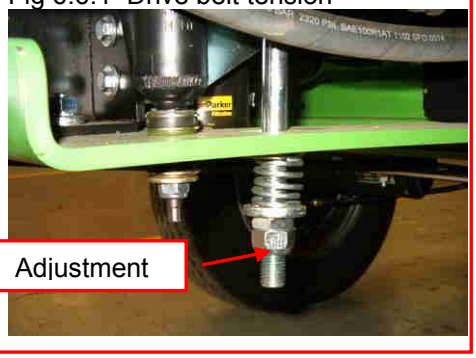
6.5.1 Check daily before work and fill as required (fig 6.5).

⚠ CAUTION! Use clean diesel fuel only. If in doubt, use a funnel with a filter.

⚠ CAUTION! Do not use any form of synthetic fuel.

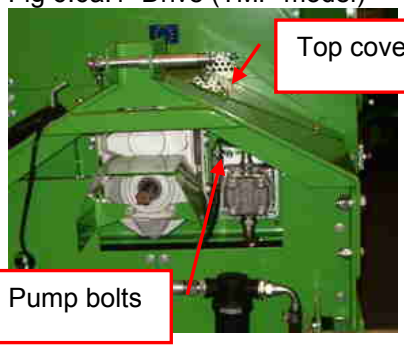
Fig 6.5 Fuel Tank

Fig 6.6.1 Drive belt tension



6.6 Drive belts (Road tow machines)
Daily
6.6.1 Check tension by engaging the clutch with engine stopped. If belts are slack, undo tensioning nut (fig 6.6.1) sufficiently to transfer engine weight onto belts. If nut is less than three threads from end, replace belts (section 6.9).

Fig 6.6a.1 Drive (TMP model)



6.6a Drive Belt for pump (TMP machines)
The hydraulic pump is mounted on an adjustable plate to side of gearbox. (fig 6.6a.1)
Note: Check tension after first 2-3 hours
6.6a.1 Remove top cover
6.6a.2 Check deflection of belt. (Fig 6.6a.2) Deflection not more than belt section depth (10mm) under firm hand force (150N).
Belt adjustment
6.6a.3 Loosen pump securing bolts (4).
6.6a.4 Move pump away from gearbox until belt is correctly tensioned.
6.6a.5 Tighten pump bolts.
6.6a.6 Replace top cover

Fig 6.6a.2 Pump belt (TMP model)

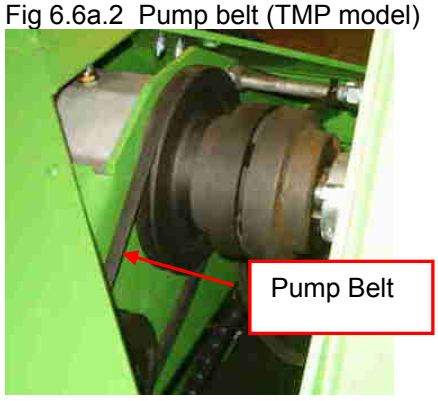


Fig 6.7.1 Chipper disc cover

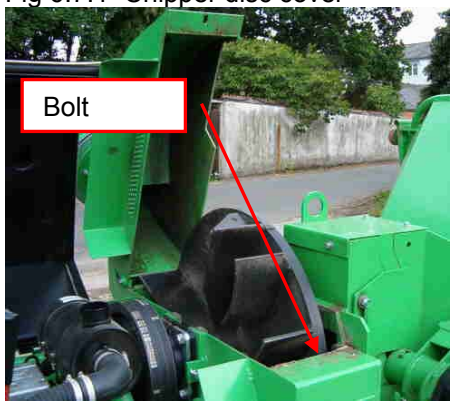
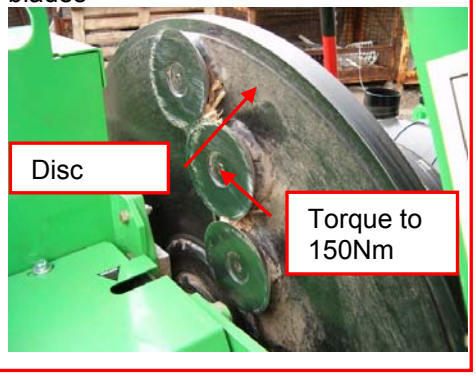


Fig 6.7.2 Chipper disc and disc blades



6.7 Disc Blade Rotation And Replacement

The design of the blades permits relocation in at least three rotated positions before regrinding or replacement is required.

6.7.1 Check engine is switched off and start key removed.

6.7.2 Raise engine cover and check any rotation has stopped.

6.7.3 Remove the single bolt retaining chipper disc cover (fig 6.7.1).

⚠ CAUTION! Take care. Blades are extremely sharp.

6.7.4 Using discharge chute handle as a lever, swing back cover on to stop to expose chipper disc and blades.

6.7.5 Current best practice is to 'lock' chipper disc with timber or similar in desired position when slackening or tightening blade bolts to 150NM.

6.7.6 Slacken disc blade retaining bolt, remove disc, clean mounting face and location (fig 6.7.2).

6.7.7 Replace disc in a rotated position to present a sharp section to the shear bars.

6.7.8 Torque up bolt to 150NM (110lb.ft.)

6.7.9 Check condition and security of shear bars. Rotate or replace if required. Do not regrind.

⚠ CAUTION! Disc blades must only be sharpened by grinding the angled back face on a bench grinder. Grinding of the front face will upset the gap, which is factory set. Do not sharpen with hand held equipment.

Note. If any of the Disc-Blades are worn below the flat annular section a complete set should be replaced. Inspect condition of nuts and bolts and replace if any signs of wear.

All blades must be sharpened in "sets" with equal amounts removed to maintain balance. (See section 6.24 for disc regrinding)

Fig 6.8 Radiator

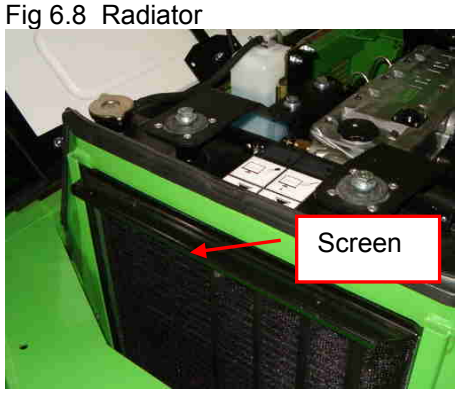


Fig 6.9.1 Lower Belt Wrap

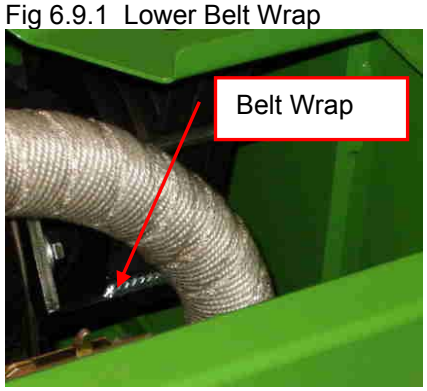


Fig 6.9a.1 Gearbox and Pump (TMP)

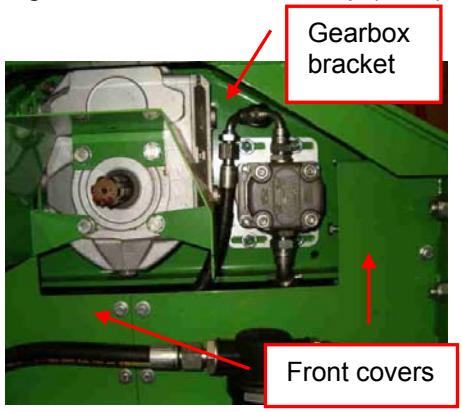
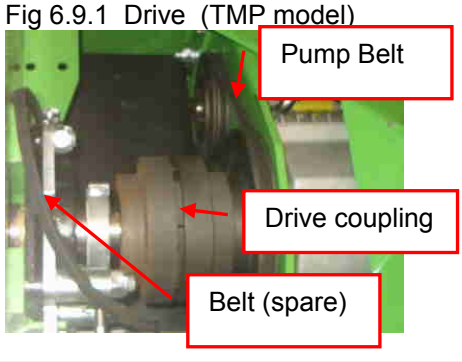


Fig 6.9.1 Drive (TMP model)



6.8 Radiator Screen

Daily

6.8.1 Lift out radiator screen, clean and replace (fig 6.8).

Weekly

6.8.2 In addition to above, blow out radiator core from back with suitable airline and clear from front.

⚠ CAUTION! A build up of debris risks overheating of the engine and a risk of fire.

6.9 Drive belt replacement (Road tow)

6.9.1 Lower support leg. (fig 5.1.1)
6.9.2 Jack up engine cradle to release tension.
6.9.3 Remove lower belt wrap (fig 6.9.1).
6.9.4 Remove all belts and replace.
6.9.5 Replace lower belt wrap.

6.9a Pump belt replacement (TMP model)

Note: If spare belt already present, clean off any oil and grease and fit, following 6.6a above. Otherwise follow instructions below.
6.9a.1 Mark the position of pump and gearbox bracket.
6.9a.2 Remove front covers leaving filter housing attached to hoses (fig 6.9a.1).
6.9a.3 Release gearbox bracket and pull forward, parting chipper drive coupling (fig 6.9a.2).
6.9a.4 Place 2 new belts over drive coupling (spare belt for future use).
6.9a.5 Replace gearbox bracket in original position, using straight edge tool to re-align drive coupling.
6.9a.6 Loosen pump bolts to fit new belt for use.
6.9a.7 Re-tension as 6.6a.3 above.
6.9a.8 If spare belt fitted, ensure it is secured clear of all rotating parts.
6.9a.9 Re-fit front covers and secure hydraulic filter bracket.
6.9a.10 Refit top cover.

Fig 6.11 Air Cleaner

6.10 Steam Cleaning

Weekly

6.10.1 Check all covers are fitted and closed

6.10.2 Steam clean machine surfaces.

6.10.3 Clean electrical components with a damp rag, spray with WD40 and then wipe with dry rag.

⚠ CAUTION! Do not steam clean directly on to electrical components, e.g. control boxes.

6.11 Air Cleaner

Weekly

6.11.1 Remove cover (fig 6.11) and release wingnut.

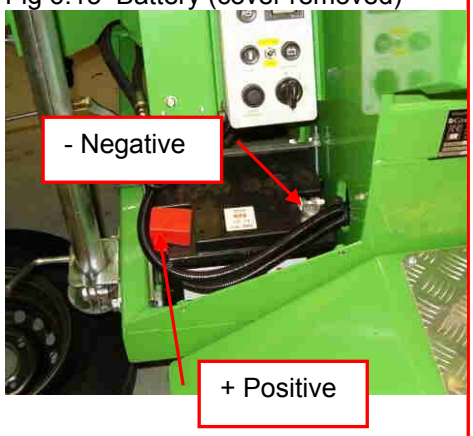
6.11.2 Slide out element and either blow out with air-line or gently tap on smooth ground to release debris.

Note: If full of dirt the element must be replaced.

6.11.3 Replace and tighten wingnut finger-tight.

6.11.4 Replace cover.

Fig 6.13 Battery (cover removed)



6.12 Electrical connections

50 Hours

6.12.1 Check all wiring loom connections are secure.

⚠ CAUTION! Poor connections will affect engine security cut-outs and may prevent starting.

6.13 Battery

First 50 hours and weekly

6.13.1 Remove metal cover, check electrolyte level and top up if required (fig 6.13).

6.13.2 Replace cover.

⚠ CAUTION! Gases are explosive. Electrolyte is corrosive. Avoid sparks and spillage.

6.13.3 Removal of battery

6.13.3.1 First disconnect negative (-) cable.

6.13.3.2 Disconnect positive (+) cable.

6.13.3.3 Remove clamp and carefully lift out battery.

6.13.3.4 Replace by connecting positive cable before negative.

6.14 Tyres and Wheels

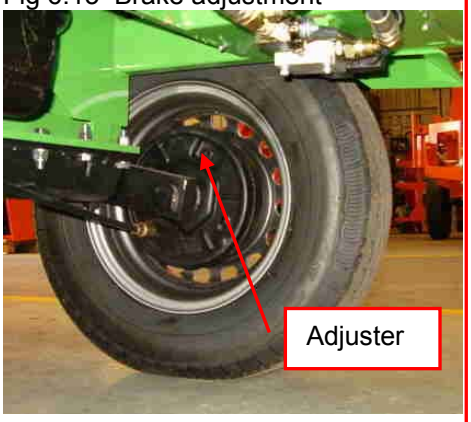
First 50 hours then weekly

6.14.1 Check condition of tyres.

6.14.2 Check pressures and inflate to 4.4bar (64lb/in^2) pressure as required.

6.14.3 Check wheel nuts are tight to 110Nm (80lbft) torque.

Fig 6.15 Brake adjustment



6.15 Brakes

50 hours or weekly,

6.15.1 Check operation and effectiveness of overrun and handbrake.

100 hours

6.15.2 Adjust brakes as follows.

6.15.2.1 Chock machine, release handbrake and check drawbar is fully extended.

6.15.2.2 Jack up both wheels and support on axle stands.

6.15.2.3 Turn brake adjuster clockwise whilst rotating each wheel forwards until tight (fig 6.15).

6.15.2.4 Check break linkage is free from slack.

6.15.2.5 Back off one notch and check wheel is free and repeat for opposite wheel.

Note:

Servicing of brakes may be required more often if above average mileage is covered.

⚠ CAUTION! Reverse rotation of wheel may prevent correct adjustment.

6.16 Bearings and Pivots

Weekly

See paragraph 6.1 for routine lubrication.

250 hours

6.16.1 Check rotating components for excessive movement and noise in operation.

6.16.2 Replace as required.

6.17 Hydraulic connections

First 50 hours, weekly, every 250 hours

6.17.1 With the aid of the circuit diagram to follow the hose routings, check all hoses and connections for leaks and damage.

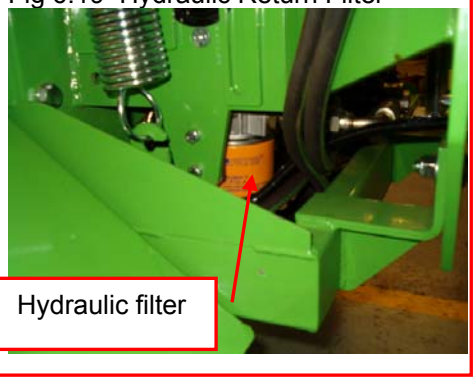
6.17.2 Replace any worn or damaged hoses with the correct type and length.

6.17.3 Before removal, check routing and ensure replacement hose is fitted free of strains, twists or kinks.

⚠ CAUTION! Ensure any residual pressure is released before dismantling.

⚠ CAUTION! Ensure hoses are refitted free of twists and kinks.

Fig 6.19 Hydraulic Return Filter



6.18 Mountings
First 50 hours, weekly and every 250 hours

6.18.1 Check that all mounting bolts are tight.

6.19 Hydraulic Return Filter
250 hours

6.19.1 Check oil is cool.
6.19.2 With a drip tray underneath, unscrew the filter element and discard safely (fig 6.19).
6.19.3 Fit a new filter to the correct specification.

⚠ CAUTION! Do not overtighten.

6.20 Wheel bearing adjustment
250 hours

6.20.1 Remove cap to reveal nut and split pin.
6.20.2 Remove split pin and slacken nut.
6.20.3 Clean out old grease.
6.20.4 Tighten nut to relocate bearing until hub is stiff to turn.
6.20.5 Slacken nut to next slot and fit new split pin. Check that hub is free to turn.
6.20.6 Repack with new grease and replace cap.

6.21 Hydraulic Oil change
1000 hours

6.21.1 Remove hydraulic oil with suction pump at filler and replace with new oil of correct specification.
6.21.2 Replace suction filter.
6.21.3 Dispose of waste oil according to local authority environmental procedures.

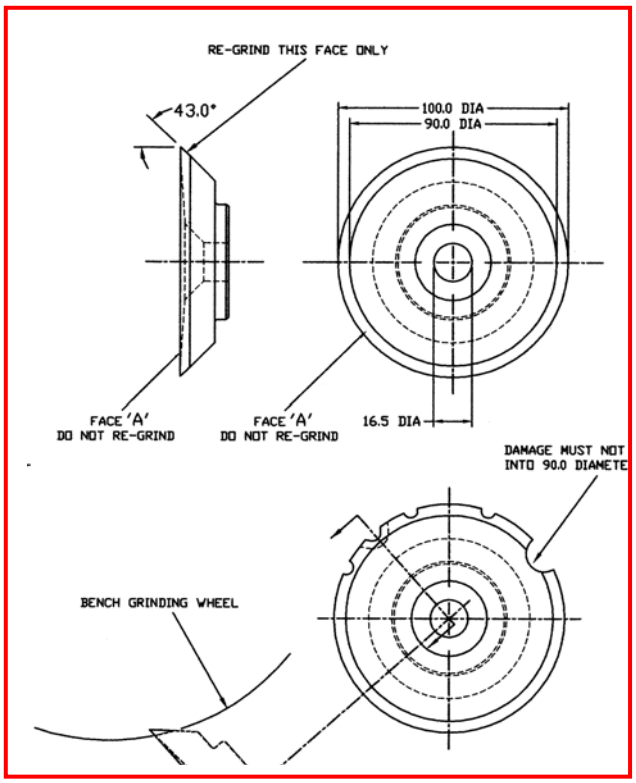
6.22 Fuses and No Stress system

There are two fuses.
6.22.1 A 40 amp in-line fuse protects the engine pre-heat and start circuit.
6.22.2 A 20 amp fuse protects the No Stress system.
Note The engine operating speeds for the No Stress system are factory set for particular machine builds and must not be readjusted.

6.23 Fault finding

Fault	Check	Action	Page
Engine will not start	Battery	Recharge	6-7
	Fuel	Fill tank	6-4
	Oil pressure	Check Oil level	6-4
	Thermal cut-out	Check operation	3-2
	Fuses	Check	6-9
Engine not at correct speed	Clutch cut-out	Check operation	3-2
No stress light not on	Fuses, cut-outs	Check operation	6-9
Blade disc will not start	Clutch	Adjust	5-2
	Drive belts	Replace	6-6
Feed rollers do not turn	Control bar	Reset and check	3-2
	Hydraulics	Check solenoid valve	5-3
Feed will not reverse	Control bar	Rest and check	3-2
	Hydraulic valve	Check operation	
Discharge does not flow	Discharge chute	Check for blockage	5-1
	Blade disc	Check for blockage	5-1
Wood unevenly chipped			
Machine unsteady	Support leg	Set to correct position	5-1
Unusual noise(s)	Blade disc and bearings	Check and replace	6-5

6.24 Chipper Disc Re-grinding



6.24.1 Examine set of chipper discs for damage. If front face 'A' is worn the disc must be scrapped. If chips have broken off the cutting edge they can be re-dressed provided that they do not go inside the 90mm diameter.

6.24.2 Always regrind the worst damaged disc first, as this will establish the target weight for the other discs.

6.24.3 If large chips exist over less than 30% of the circumference the disc may be re-ground provided the large damaged area is not used for chipping.

6.24.4 Chips may be repaired by grinding a cutting edge around the damaged area using a bench grinder.

6.24.5 With chipper disc mounted on a mandrel re-grind remainder of cutting edge at 43º as shown

6.24.6 Re-grind in increments of approximately 0.01mm (0.004") until sharp edge is restored.

6.24.7 If re-grinding breaks into the 90mm diameter the disc must be scrapped.

6.24.8 After re-grinding the weight of discs within a set must not vary by more than +/- 1gm (0.03oz). The weight of each disc must not be less than 560gm (20oz)

7.1 Storage

7.1.1 Thoroughly clean machine and note any replacement parts required.
7.1.2 Carry out 250 hour service if not already done. Refer to Section 6
7.1.3 Fit replacement parts when available.
7.1.4 Remove battery Refer to 6.10
7.1.5 Drain fuel
7.1.6 If machine is to be stored for more than 3 months, place on axle stands to remove weight from wheels.

7.2 Removal from Storage

7.2.1 Charge battery and refit Refer to 6.10
7.2.2 Check tyre pressures Refer to 6.12
7.2.3 Check brake operation Refer to 6.13
7.2.4 Carry out machine preparation as necessary Refer to Section 4

When the machine is finally scrapped, the following items should be disposed of only at authorised waste disposal facilities.

Engine oil. Hydraulic oil. Antifreeze. Battery. Tyres.

If in doubt, consult the Local Authority environmental department.

Major non-ferrous items such as engine cover and hydraulic hoses may also be disposed of separately.

Safety Guides and Checklist as Transcribed from and Advised by Arborculture & Forestry Advisory Group and Issued as Leaflet AFA604(rev1) by HSE, issued 04/14

INTRODUCTION

This leaflet covers the safe working practices to be followed when operating a wood chipper.

It does not cover a combination of machines working within each other's risk zones (see AFAG leaflet 605 ***Mechanical roadside processing*****)**

You can use this leaflet, along with the manufacturer's handbook, as part of the risk assessment process to help identify the controls to put in place when using a wood chipper.

You must also assess the effect of the site and the weather as well as following this guidance

All operators must have had appropriate training in how to operate the machine and how to carry out the tasks require (see AFAG leaflet 805 ***Training and certification)***

PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Use the following PPE

- A Safety Helmet, complying with EN 397, if identified as required in the risk assessment.

- Eye Protection (a mesh visor complying with EN1731 or safety glasses to EN166)

- Hearing protection (complying with EN352) where noise level exceeds 85 dB(A) (see HSE pocket card INDG363 ***Protect your hearing or lose it!)***
- Gloves with long, close-fitting cuffs that can be tucked into sleeves
- Safety Boots with good grip and ankle support (complying with EN345-1)

- Non-Snag Outer Clothing appropriate to prevailing weather conditions. High-visibility clothing (complying with EN471) should be worn when the risk assessment identifies that it is needed.

2. Each person should carry a personal first-aid kit including a large wound dressing (see HSE leaflet INDG214 ***first aid at work; Your questions answered).***

3. Hand cleaning material such as waterless skin cleanser or soap, water and paper towel should be readily available.

THE MACHINE

4. Before working with a machine, check it has been properly converted from any transport mode.

5. Ensure guards for dangerous parts (e.g. belts, pulleys, shafts etc) are secure and undamaged.

6. Ensure protective devices, such as the infeed control bar (incorporating the stopping device), are working correctly (see HSE leaflet AI S 38 ***Power-fed mobile wood chippers: Operator protection at infeed chutes).***

7. Ensure any lock for the chipping components has been disengaged;

8. Ensure the infeed hopper is clear of any materials.

9. Ensure Noise warning signs are in place.

10. For machines driven by a power take-off (PTO) shaft, before starting ensure:

- The PTO shaft is fitted with a suitable guard complying with EN1152, that encloses the shaft along its full length from tractor to machine.

- The guard is correctly fitted and in effective working ordersee AIS40 ***Power take-offs and power take-off drive shafts;***

- The PTO speed is suitable for the machine.

SELECTING THE WORK AREA

11. Select as firm a surface as possible and stabilise the machine

12. Ensure ventilation is adequate and any exhaust fumes are vented into open air if working in an enclosed space.

13. Where appropriate, if the chipper is detached from the tow vehicle, apply the handbrake and, if necessary, chock the wheels.

14. On all reasonably foreseeable approaches to the worksite, erect warning and prohibition signs conforming to the Health and Safety (Safety Signs and Signals) Regulations 1996, indicating a hazardous worksite and that unauthorised access is prohibited. In areas of very high public access, a risk assessment may indicate that additional controls (e.g. barrier tape, barriers, extra manning) are required.

15. Ensure all operations near to highways are adequately signed with the appropriate notices as specified in the Department of Transport's ***Safety at street works and road works : A Code of Practice.***

16. Ensure that the discharge chute is positioned to prevent chips being blown onto the highway during roadside operations, or in any direction where they can affect colleagues or members of the public.

17. Position the chipper so that operators do not have to stand on embankments/slopes when feeding material into the machine

EMERGENCY PROCEDURES

18. Ensure a designated and responsible person knows the daily work programme and agree with them a suitable emergency contact procedure. Where reasonably practicable use a mobile phone or radio and pre-arrange call-in system.

19. Ensure the operators can provide the emergency services with enough detail for them to be found in the event of an accident, e.g. the grid reference, the distance from the main road, the type of access (suitable for car/four-wheel drive/emergency service vehicles). In urban areas street names are essential. Know the location details before they are needed in an emergency.

OPERATION

20. Make sure the cuffs of gloves are close fitting or tucked into you're sleeves to stop them being caught on material as it is fed into the chipper.

21. Set the engine speed (and set the stress control if fitted) to obtain optimum performance.

22. Check that material to be chipped is free from stones, metal and foreign objects.

23. Stand to one side of the infeed rollers to avoid being hit by ejected material.

24. Let material go as soon as it is engaged in the infeed rollers or chipping components.

25. Use a push stick at least 1.5 metre long, for both short produce and for the last piece of produce to be chipped.

26. Do not put any part of your body (including hands or feet), into the infeed hopper while the machine is running.

27. Always follow the manufactures' instructions for dealing with blockages on the machine.

28. Keep the area of ground in front of the infeed hopper free from debris to prevent any tripping hazard.

29. Remove the engine start key when the machine is left unattended or when undertaking any maintenance.

FUELLING

30. Stop engine and, if necessary allow the machine to cool before refuelling.

31. Petrol vapour is invisible and can flow considerable distances from spillage or fuelling sites. Maintain a safe distance from any source of ignition at all times.

32. Store fuel to avoid vapour ignition from any source such as fires, people smoking or the wood chipper. Select a site shaded from direct sunlight and away from watercourses and drains.

33. Containers must be clearly labelled and have securely fitting caps. Plastic containers must be designed and approved for use with petrol or diesel fuel.

34. Replace the fuel cap securely.

35. Keep fuel from contacting the skin. If fuel gets into the eyes wash out with sterile water immediately and seek medical advise

Maintenance

36. Ensure the machine is carried out in accordance with the manufacture's handbook.

37. Check chipping components and knives each day for damage and wear.

38. Wear gloves when handling knives.

39. Before working on knives, confirm that the engine is switched off, the start key removed, and the chipping component is stationary.

40. Before opening any guard/cover or reaching into the infeed hopper or discharge chutes make sure that the engine is switched off, start key removed and dangerous parts have come to a stand still.

41. Knives must be changed or reversed if damaged or blunt. Knives must be scrapped when worn to the minimum size specified by the manufacturer.

42. When new/sharpened knives are fitted, ensure that there is the recommended clearance between the knives and the anvil.

MOVING THE MACHINE

43. Stop the engine and remove the start/stop key.

44. Lock the chipping components.

45. Secure the infeed hopper and the chip discharge chute in the transport position.

46. Check the towing bracket, attach, then lift and secure the jockey wheel.

47. Connect the electrics and the safety chain/s to the towing vehicle.

48. Ensure that the load is secure and that people are in a safe position before moving off.

Further Reading

Noise: Don't lose your hearing!
INDG363(rev2)
HSE Books 2012
www.hse.gov.uk/pubns/indg363.htm

First aid at work: Your questions answered
Leaflet INDG2114(rev1)
HSE books 2009
www.hse.gov.uk/pubns/indg214.htm

Safety signs and signals. The Health and Safety (Safety Signs and Signals) Regulations 1996. Guidance on Regulations L64 (Second edition) HSE Books 2009 ISBN 978 0 7176 6359 0
www.hse.gov.uk/pubns/books/164.htm

Power-fed mobile wood chippers: Operator protection at infeed chutes AIS38 HSE 2013
www.hse.gov.uk/pubns/ais38.htm

Power take-offs and power take-off drive shafts AIS40 HSE Books2012
www.hse.gov.uk/pubns/ais40.htm

Treework webpages:
www.hse.gov.uk/treework

Risk Assessment

Assessment No: R028

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 (CM.220.MT.55.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
ENTANGLEMENT With cutter in base of CHIPPER infeed chute	OPERATOR	FATALITY – LOSS OF LIMB	5	VERY LIKELY	5	25	Reach area safety distance to cutter complies to latest HSE guidelines. Fix safety stop rail to lower perimeter on infeed chute. Operation of this emergency stop system should operate as recommended by HSE. Only appointed operators to use machine (competent)	5	2	10
STABBING AND PUNCTURE by projectiles from cutter. Wood, stones, nails rebound back out of infeed chute	OPERATOR	Injuries to face, eyes, head and hands	3	PROBABLE	4	12	Trained Operator. Check only green waste is fed into machine. Safety helmet to BSEN 397 Forestry visor Hard wearing gloves	3	2	6

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required.
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	Final revised likelihood score must be 2 or less
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R028-2

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 (CM.220.MT.55.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
NOISE Guaranteed sound pressure level of Lwa 100dB	OPERATOR THIRD PARTY	NOISE INDUCED HEARING LOSS	4	PROBABLE	4	16	Wear hearing protection to BS EN 352-3. Display mandatory 'wear hearing protection' sign	4	2	8
VIBRATION – movement of machine	OPERATOR	BROKEN OR BRUISED LIMB	3	POSSIBLE	3	9	Trained Operator. Lock off handbrake Chock wheels and secure stabiliser in place Stand machine on sound level ground	3	2	6
STABBING – PUNCTURE When operating handle to raise engine – residue from exhaust chute	OPERATOR THIRD PARTY	EYE INJURIES CUTS TO FACE	2	POSSIBLE	3	6	Cordon off collection point. Operator to wear head and face protection	2	1	2

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R028-3

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 (CM.220.MT.55.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
ENTANGLEMENT Branches with clothing	OPERATOR	Drawn into cutters – FATALITY – LOSS OF LIMBS	5	POSSIBLE	3	15	Wear snug fitting clothes. No ties, scarves etc. Same controls as for previous hazard of entanglement with cutters. Wear gloves with long cuffs which can be tucked into sleeves	5	2	10
STABBING AND PUNCTURE – Processed green waste	OPERATOR THIRD PARTY	EYE INJURIES, CUTS TO FACE	1	POSSIBLE	3	3	Trained operator Lock off exhaust chute Cordon off collection point	1	1	2
STABBING AND PUNCTURE – Handling branches	OPERATOR	CUTS TO HANDS	2	PROBABLE	4	8	Wear hard wearing gloves with long cuffs that can be tucked into sleeves.	2	2	4

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R028-4

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 (CM.220.MT.55.D)

Hazard	**At Risk**	**Consequence (C)**		**Likelihood (L)**		**Risk Score**	**Controls**	**Revised**		**Final Risk Score**
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
IMPACT Being struck by branch when feeding green waste into cutters	OPERATOR	BROKEN LIMB BRUISES	3	POSSIBLE	3	9	Stand at side of machine. Trained operator	3	2	6
CRUSH Adjusting height of A-frame	OPERATOR	BROKEN LIMB, BRUISES	3	POSSIBLE	3	9	Ensure hand brake is applied and wheels are chocked. Use winding handle to lower jockey wheel. Lower stabiliser and lock off	3	1	3

Key:

Consequence	**Score**	**Likelihood**	**Score**	**To find risk Score multiply consequence rating by the likelihood rating**
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R015-1

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 TWIN AXLE 360 (CM.220.MT.55.360.D)

Hazard	**At Risk**	**Consequence (C)**		**Likelihood (L)**		**Risk Score**	**Controls**	**Revised**		**Final Risk Score**
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
ENTANGLEMENT With cutter in base of CHIPPER infeed chute	OPERATOR	FATALITY – LOSS OF LIMB	5	VERY LIKELY	5	25	Reach area safety distance to cutter complies to latest HSE guidelines. Fix safety stop rail to lower perimeter on infeed chute. Operation of this emergency stop system should operate as recommended by HSE. Only appointed operators to use machine (competent)	5	2	10
STABBING AND PUNCTURE by projectiles from cutter. Wood, stones, nails rebound back out of infeed chute	OPERATOR	Injuries to face, eyes, head and hands	3	QUITE POSSIBLE	4	12	Trained Operator. Check only green waste is fed into machine. Safety helmet to BSEN 397 Forestry visor Hard wearing gloves	3	2	6

Key:

Consequence	**Score**	**Likelihood**	**Score**	**To find risk Score multiply consequence rating by the likelihood rating**
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required.
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	Final revised likelihood score must be 2 or less
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R015-2

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 TWIN AXLE 360 (CM.220.MT.55.360.D)

Hazard	**At Risk**	**Consequence (C)**		**Likelihood (L)**		**Risk Score**	**Controls**	**Revised**		**Final Risk Score**
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
NOISE	OPERATOR	LOSS OF HEARING	4	QUITE POSSIBLE	4	16	Wear hearing protection to BS EN 352-3.	4	2	8
VIBRATION – movement of machine	OPERATOR	BROKEN OR BRUISED LIMB	3	POSSIBLE	3	9	Trained Operator. Lock off handbrake Chock wheels Stand machine on sound, level ground	3	2	6
STABBING – PUNCTURE When operating handle to raise engine – residue from exhaust chute	OPERATOR THIRD PARTY	EYE INJURIES CUTS TO FACE	2	POSSIBLE	3	6	Cordon off collection point. Operator to wear head and face protection	2	1	2

Key:

Consequence	**Score**	**Likelihood**	**Score**	**To find risk Score multiply consequence rating by the likelihood rating**
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R015-3

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 TWIN AXLE 360 (CM.220.MT.55.360.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
ENTANGLEMENT Branches with clothing	OPERATOR	Drawn into cutters – FATALITY – LOSS OF LIMB	5	POSSIBLE	3	15	Wear snug fitting clothes. No ties, scarves etc. Same controls as for previous hazard of entanglement with cutters. Wear gloves with long cuffs which can be tucked into sleeves	5	2	10
STABBING AND PUNCTURE – Processed green waste	OPERATOR THIRD PARTY	EYE INJURIES, CUTS TO FACE	1	POSSIBLE	3	3	Trained operator Lock off exhaust chute Cordon off collection point	1	1	2
STABBING AND PUNCTURE – Handling branches	OPERATOR	CUTS TO HANDS	2	QUITE POSSIBLE	4	8	Wear hard wearing gloves with long cuffs that can be tucked into sleeves.	2	2	4

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R015-4

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 TWIN AXLE 360 (CM.220.MT.55.360.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
IMPACT Being struck by branch when feeding green waste into cutters	OPERATOR	BROKEN LIMB BRUISES	3	POSSIBLE	3	9	Stand at side of machine. Trained operator	3	2	6
CRUSH Adjusting height of A-frame	OPERATOR	BROKEN LIMB, BRUISES	3	POSSIBLE	3	9	Ensure hand brake is applied and wheels are chocked. Support front of engine section with jack, or similar	3	1	3
ENTANGLEMENT Unguarded end of cutter spindle.	OPERATOR	LOSS OF FINGERS	3	POSSIBLE	3	9	Cover end of spindle with fixed guard.	3	1	3

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R015-5

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 220 TWIN AXLE 360 (CM.220.MT.55.360.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
IMPACT Struck by rotating machine during 360 degree turn	OPERATOR THIRD PARTY	Broken bones, bruises.	3	REMOTELY POSSIBLE	2	6	Cordon off area. Restrict access. Trained operator.	3	1	3
CUTTING Sharp corners on wheel cover, when rotated from locked position.	OPERATOR THIRD PARTY	Cuts and bruises to legs.	2	POSSIBLE	3	6	As above. Position bollards or similar adjacent to sharp corners.	2	1	2

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R030

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 260 (CM.260.MT.70.D)

Hazard	At Risk	Consequence (C)		Likelihood (L)		Risk Score	Controls	Revised		Final Risk Score
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
ENTANGLEMENT with cutter in base of CHIPER infeed chute	OPERATOR	FATALITY- LOSS OF LIMB	5	VERY LIKELY	5	25	Reach area safety distance to cutter complies to latest HSE guidelines. Safety stop rail to lower perimeter of infeed chute. Operation of this emergency stop system should operate as recommended by HSE. Only appointed operators to use machine (competent)	5	2	10
STABBING AND PUNCTURE by projectiles from cutter. Wood, stones, nails rebounding back out of infeed chute	OPERATOR	Injuries to face, eyes, head and hands	3	PROBABLE	4	12	Trained operator. Check only green waste is fed into machine. Safety helmet to BSEN 397 Forestry visor Hard wearing gloves	3	2	6

Key:

Consequence	Score	Likelihood	Score	To find risk Score multiply consequence rating by the likelihood rating
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required.
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	Final revised likelihood score must be 2 or less
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R030-2

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 260 (CM.260.MT.70.D)

Hazard	**At Risk**	**Consequence (C)**		**Likelihood (L)**		**Risk Score**	**Controls**	**Revised**		**Final Risk Score**
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
NOISE Guaranteed sound pressure level of Lwa 97 dB	OPERATOR THIRD PARTY	NOISE INDUCED HEARING LOSS	4	PROBABLE	4	16	Wear hearing protection to BS EN 352-3 Display mandatory 'wear hearing protection' sign	4	2	8
VIBRATION – movement of machine	OPERATOR	BROKEN OR BRUISED LIMB	3	POSSIBLE	3	9	Trained operator Lock of with handbrake chock wheels and secure stabiliser in place. Stand machine on sound, level ground	3	2	6
STABBING – PUNCTURE When operating handle to raise engine- residue from exhaust chute	OPERATOR THIRD PARTY	EYE INJURIES, CUTS TO FACE	2	POSSIBLE	3	6	Cordon off collection point. Operator to wear head and face protection.	2	1	2

Key:

Consequence	**Score**	**Likelihood**	**Score**	**To find risk Score multiply consequence rating by the likelihood rating**
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R030-3

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 260 (CM.260.MT.70.D)

Hazard	**At Risk**	**Consequence (C)**		**Likelihood (L)**		**Risk Score**	**Controls**	**Revised**		**Final Risk Score**
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
ENTANGLEMENT Branches with Clothing	OPERATOR	Drawn into cutters- FATALITY- LOSS OF LIMB	5	POSSIBLE	3	15	Wear snug fitting clothes. No ties, scarves etc. Same controls as for previous hazard of entanglement with cutters. Wear gloves with long cuffs which can be tucked into sleeves.	5	2	10
STABBING AND PUNCTURE- processed green waste	OPERATOR THIRD PARTY	EYE INJURIES, CUTS TO FACE	1	POSSIBLE	3	3	Trained operator Lock off exhaust chute Cordon off collection point	1	1	2
STABBING AND PUNCTURE- handling branches	OPERATOR	CUTS TO HANDS	2	QUITE POSSIBLE	4	8	Wear hard wearing gloves with long cuffs that can be tucked into sleeves.	2	2	4

Key:

Consequence	**Score**	**Likelihood**	**Score**	**To find risk Score multiply consequence rating by the likelihood rating**
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Risk Assessment

Assessment No: R030-4

GreenMech Ltd
A Turner Company

Company Name: **GreenMech Ltd**

Activity: CHIPMASTER 260 (CM.260.MT.70.D)

Hazard	**At Risk**	**Consequence (C)**		**Likelihood (L)**		**Risk Score**	**Controls**	**Revised**		**Final Risk Score**
	Those likely to be affected	Likely injury from hazard	Rating	Of incident	Rating			C Rating	L Rating	
IMPACT Being struck by branch when feeding green waste into cutters	OPERATOR	BROKEN LIMB, BRUISES	3	POSSIBLE	3	9	Stand at side of machine. Trained operator	3	2	6
CRUSH Adjusting height of A- frame	OPERATOR	BROKEN LIMB, BRUISES	3	POSSIBLE	3	9	Ensure hand brake is applied and wheels are chocked. Use winding handle to lower jockey wheel. Lower stabiliser and lock off.	3	1	3
MANUAL HANDLING Lowering outfeed chute	OPERATOR	Back problems. Damaged tendons, muscles etc.	3	POSSIBLE	3	9	To lower chute, have chute set towards front of machine, not at right angles.	3	1	3

Key:

Consequence	**Score**	**Likelihood**	**Score**	**To find risk Score multiply consequence rating by the likelihood rating**
Fatality	5	Very likely	5	Final revised risk score acceptable to the company is 10 or less. If higher, further controls are required. Final revised likelihood score must be 2 or less
Disability	4	Probable	4	
Very serious (broken limbs)	3	Possible	3	
Important (3 day accident)	2	Remotely possible	2	
Noticeable (first aid)	1	Improbable	1	

Signed: ……

Date: ……

Review Date: ……

Sound Power Measurement Report

Measurement Information

Date of Measurement	08/22/01	**Measurement made by:**	JAET

Equipment under test:

CM 220 MT 55D

Serial No. 1146M

Measurement Equipment

Sound Level Meter	CEL-440	**Manufacturer**	Casella	**Date of last verification**	08/22/03
Acoustic Calibrator Type	CEL_282	**Manufacturer**	Casella	**Date of last verification**	08/22/03
Calibration Level	114dB				

Measurement Setup

Number of Measurements	N	6	
Radius of Measurement Area	r	4	m
Surface Area	S	100.53	m2
Reference Surface Area	S0	1	m2
Directivity Index	DI	0	dB

Calculated Data				Duration
Broadband Sound Power	dB(A)	**119.9**	Lw dB(A)	00:00:20 :mm:ss

WARRANTY POLICY

PERIOD OF WARRANTY

All new machinery is supplied with a 2 year warranty from original date of purchase, excluding CS100 which has a 1 year warranty from original date of purchase.

LIMITATIONS

This warranty applies only to manufacturing defect and **does not** cover repairs or costs due to:

1. Normal wear and tear.
2. Routine maintenance or adjustment.
3. Damage caused by improper handling/abuse/misuse or neglect.
4. Lack of lubrication.
5. Overheating due to lack of maintenance.
6. Damage due to fittings/fasteners becoming loose/detached through lack of maintenance.
7. Damage caused by cleaning with water.
8. Machines serviced or repaired by non-authorised GreenMech dealers.
9. Machines incorrectly assembled or adjusted.
10. Damage caused by improper use of the machine.
11. Items considered as consumable parts are not normally covered by the warranty, including but not limited to: Blade and Blade Assemblies - Belts - Filters - Clutch Assemblies - Lubricants - Wheels & Tyres - Batteries
12. Consequential loss, damages or costs.

MAINTENANCE

Maintenance carried out during the warranty period should be carried out as per section 6 of the machine owner's manual and by an authorised GreenMech dealer.

ENGINES

This is covered by the manufacturer of the engine. Please refer to the separate warranty conditions as supplied with the owner's manual.

All warranty repairs must be carried out by an authorised GreenMech dealer, except for engines, please refer to separate warranty terms supplied with the engine owner's manual.

STARTER
BOX

CM170/220 ALTERNATOR CURRENT SENSING
FROM 14TH AUGUST 2001

COLOUR CODE

R = RED
B = BLACK
G = GREEN
N = BROWN
U = BLUE
Y = YELLOW
K = PINK
P = PURPLE
W = WHITE
O = ORANGE
S = GREY

white
orange
PCB
1
2
4
3
HOUR METER
brown/yellow
blue/yellow
OIL PRESSURE LAMP
ALTERNATER LAMP
TEMPERATURE LAMP
THROTTLE SWITCH
white
OVERRIDE BUTTON
R
IGNITION SWITCH
NB
WN
R W
R W
NW
B
GU
WB
Y
WR

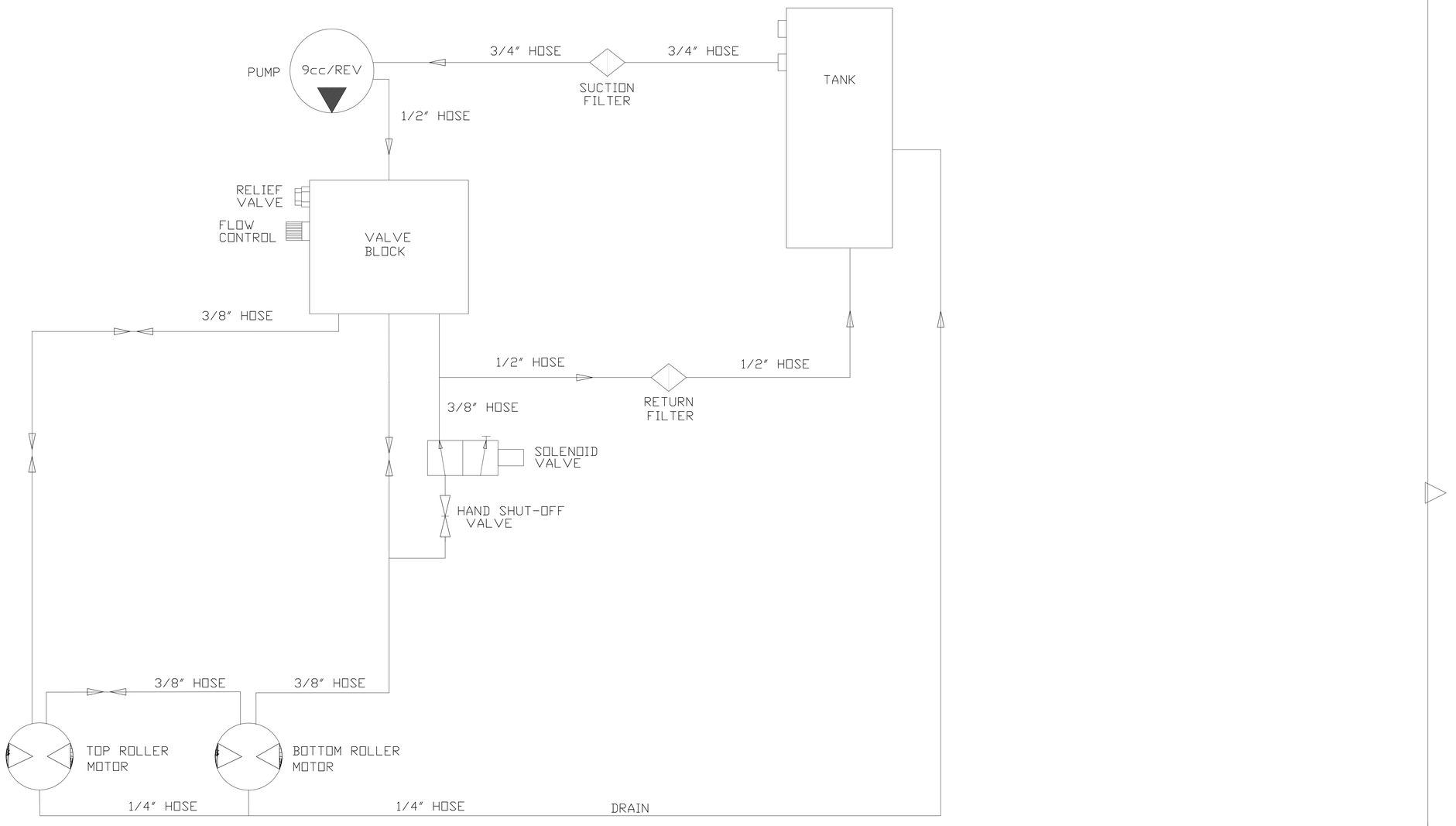
WIRE COLOUR	16 WAY HSG TERM. No
W/B	A
B	B
U/Y	C
N/B	D
W/N	E
G/U	F
-	G
-	H
-	J
-	K
-	L
Y	M
R	N
W/R	O
N/W	P
W/R	R

FUEL CONTROL SOLENOID
FUEL PUMP
NO STRESS SOLENOID
1 2
CLUTCH MICROSWITCH N/O
NO STRESS BOX
1 6 4 3
BONNET MICROSWITCH N/O
R W
B
B
P
R U
R
B P G
UW
UW
THROTTLE SOLENOID
W
R
B
B
ENGINE EARTH
WB
R U
UY
NB
WN
G U
R W
W R
NW
20A
GLOW PLUGS
OIL PRESSURE
ENGINE TEMP
STARTER MOTOR
M
40A
ALTERNATOR
A
NB
WB
G
NW
FROM BATTERY
ENGINE HARNESS

DO NOT SCALE - IF IN DOUBT ASK

THIS DRAWING IS 1ST ANGLE PROJECTION

DIMENSIONS IN MILLIMETERS



Issue	Modifications	Date	Sig	Chkd

Designed by	Checked by	Approved	Filename	Date	Scale
ECR	xxx	ER	xxx	30-05-2001	1/1

GreenMech LTD
The Mill Industrial Park, Kings Coughton
Alcester,Warks B49 5QG
Phone 01789 400044

TITLE 170-220 HYD CIRCUIT

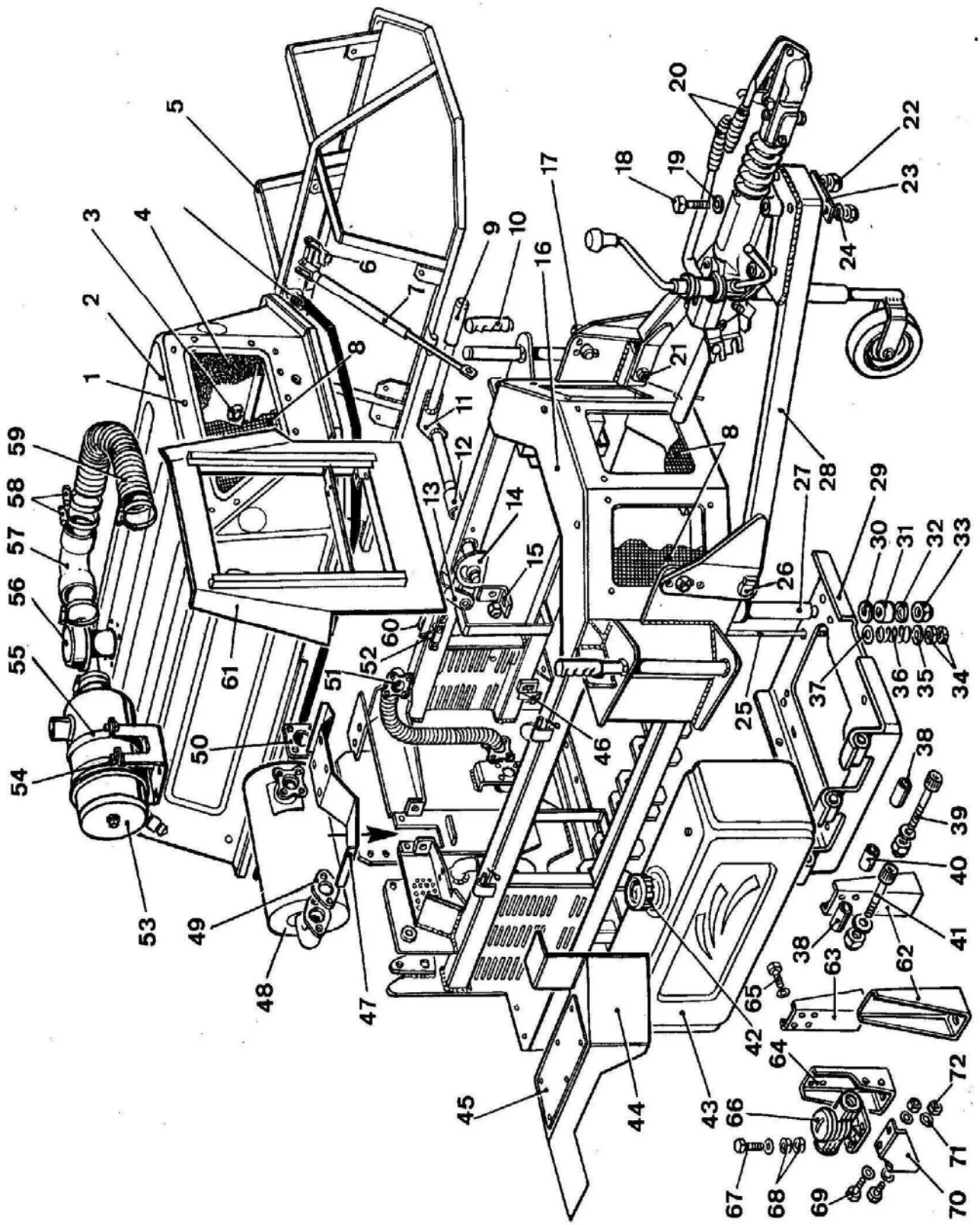
DWG.No	Edition	Sheet
	A	1 OF 1

Parts Manual

CM220MT55

CONTENTS

MAIN CHASSIS, TANKS, BONNET AND EXHAUST



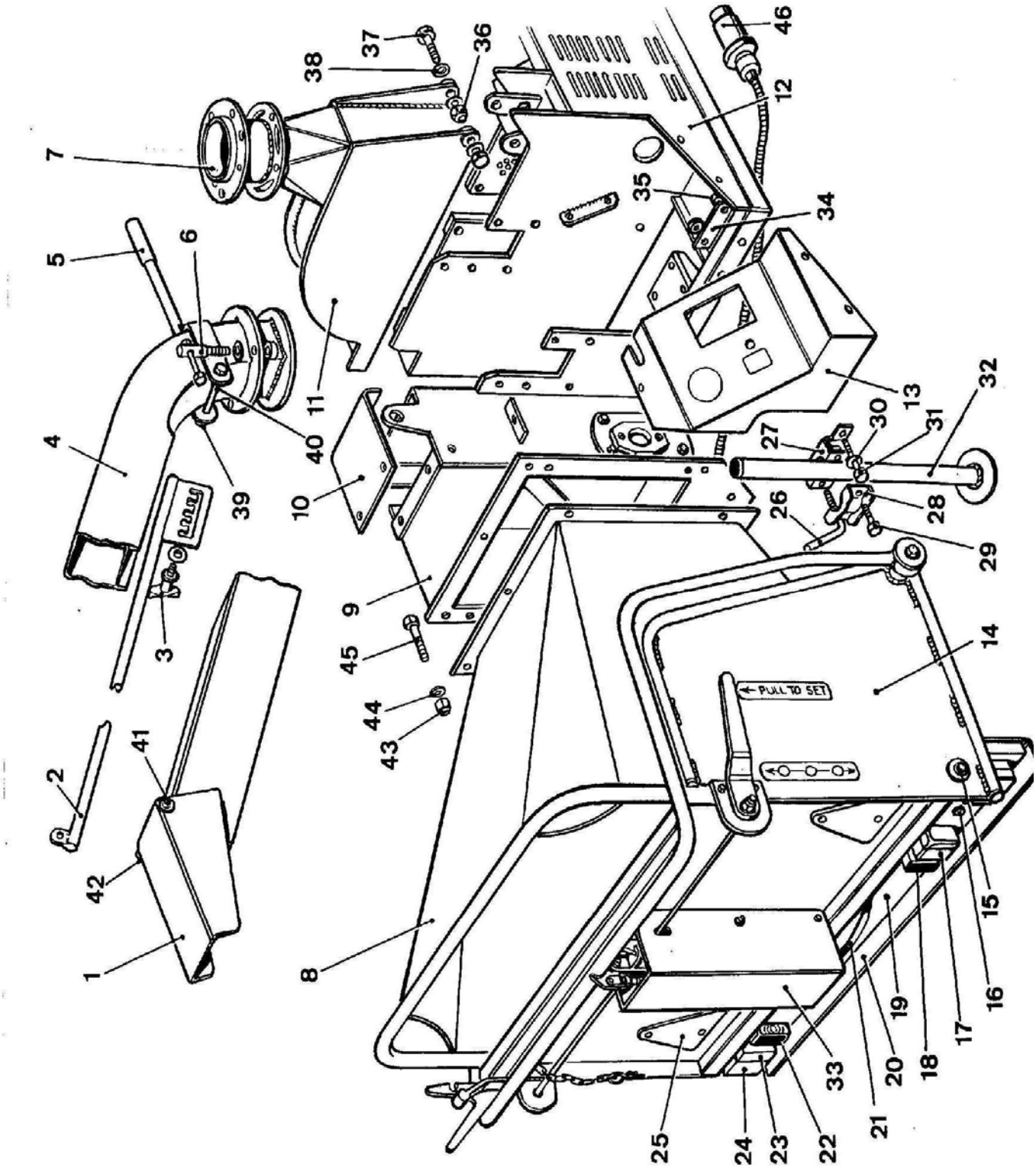
MAIN CHASSIS, TANKS, BONNET AND EXHAUST

1)	60620	Front grill fixing bolt	12
2)	C180523	Plastic bonnet	1
3)			
4)	C200703	Bonnet foam	set
5)	CM170-1-64	Bonnet frame	1
6)	C251814/1	Clevis	1
7)	C180108	Gas strut	1
8)	CM170-1-79	Front bonnet grill	1
9)	9227/1	Rubber grip	1
10)	9227/1	Rubber grip	1
11)	CM170-6-28	Clutch lever	1
12)	C170637	Spacer	1
13)	CM170-6-32	Micro switch striker	1
14)			
15)	CM170-6-36	Engine damper bracket	1
16)	CM220-1-1	Chassis	1
17)	91645	Adjuster bolt	2
18)	912150	Bolt	2
19)	91202/C	Washer	6
20)	C200322/B	Coupling assembly	1
21)	92401	Nyloc nut	2
22)	91201	Nyloc nut	
23)	CM170-1-72	Cable support strip	1
24)	91202	Washer	2
25)	C170633	Clutch rod	1
26)	C170124	Drawbar pin	2
27)	C170632	Engine damper	1
28)	CM170-1-2	“A” frame	1
29)	CM220-6-2	Engine cradle	1
30)			
31)			
32)			
33)	90801	Nut	1
34)	91601	Nut	1
35)	91602/H	Washer	2
36)	9013	Spring	1
37)			
38)	EC150006	Rubber bush	5
39)	714130	Pivot bolt, large	2
40)	EC150006	Rubber bush	5
41)	71490	Pivot bolt, small	1
42)	C180120	Level gauge	2
43)	C180103	Plastic tank	2
44)	CM170-1-34	Off side mudguard	1
45)	CM170-1-36	Aluminium tread plate	2
46)	HYD 11	Hose clamp	1
47)	CM220-1-46	Air filter mounting bracket	1

MAIN CHASSIS, TANKS, BONNET AND EXHAUST

48)	**C220615**	**Exhaust**	**1**
49)	**SI20020**	**Oval exhaust gasket**	**1**
50)	**SI20021**	**Square exhaust gasket**	**2**
51)	**C220616**	**Flexible exhaust**	**1**
51a)	**C200333**	**Exhaust wrap**	**per meter**
51b)	**C200340**	**Jubilee clip**	**2**
52)	**C170102**	**Bonnet lock**	**1**
53)	**SI20025**	**Air filter assembly**	**1**
53a)	**SI20003**	**Air filter element**	**1**
54)	**60635**	**Bolt**	**2**
55)	**SI20026**	**Air filter mounting band**	**2**
56)	**SI20027**	**Air filter cap**	**1**
57)	**SI20003/1**	**Rubber elbow**	**1**
58)	**C200340**	**Jubilee clip**	
59)	**C200920/1**	**Flexible hose**	**1**
60)	**C170101**	**Bonnet locking handle**	**1**
60a)	**C170102/1**	**Replacement key**	**1**
61)	**CM220-1-45**	**Cold compartment**	**1**
62)	**CM170-6-5**	**Engine mounting foot (rear)**	**2**
63)	**CM170-6-4**	**Engine mounting foot**	**1**
64)	**CM170-6-4-1**	**Engine mounting foot**	**1**
65)	**91025**	**Bolt**	**16**
66)	**C170103**	**Suction filter**	**1**
66a)	**C170103/1**	**Suction filter element**	**1**
67)	**90820**	**Bolt**	**2**
68)	**90802/C**	**Nut**	**2**
69)	**90830**	**Bolt**	**2**
70)	**CM170-1-59**	**Filter mounting bracket**	**1**
71)	**951602**	**Washer**	**2**
72)	**90801**	**Nut**	**2**

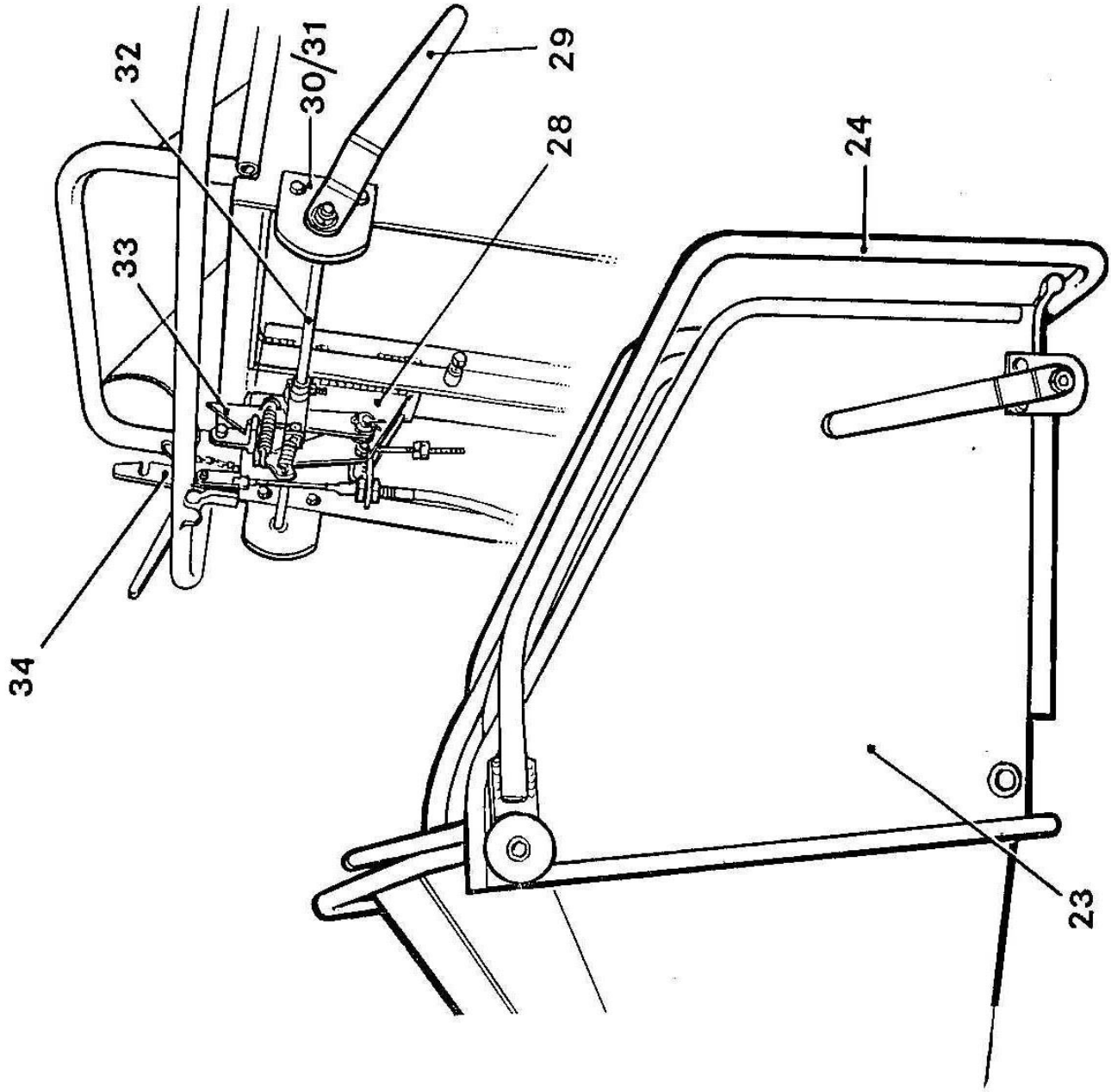
INFEED AND DISCHARGE CHUTS, ROLLER BOX AND CHIPPERCHAMBER TOP



INFEED AND DISCHARGE CHUTS, ROLLER BOX AND CHIPPER CHAMBER TOP

1)	CM170-5-2	Discharge chute flap	1
2)	CM170-5-4	Adjuster rod	1
3)	C180104	Clamp handle	1
4)	CM170-5-1	Discharge chute body	1
5)	CM170-5-3	Directional handle	1
6)	C200613	Clamp bolt	3
7)	CM170-5-11	Base ring	1
8)	CM2204-2	Infeed chute	1
9)	CM220-3-1	Roller box	1
10)	CM220-3-15	Roller box top plate	1
11)	CM220-2-2	Chipper chamber top	1
12)	CM220-1-1	Chassis	1
13)	CM220-1-68	Battery/starter box cover	1
14)	CM220-4-71	Infeed chute flap	1
15)	CM170-4-14	Flap pivot pin	1
16)	90830	Light board fixing bolt	2
17)	C200916/5	Fog lamp	1
18)	C200916/4	Number plate light	2
19)	C170433	Complete light board	1
20)	CM170-4-36	Light board channel	1
21)	C170107	Push pull cable	1
22)	C200916/4	Number plate light	1
23)	C200916/2	Light assembly	2
24)			
25)	C200916/1	Red reflective triangle	2
26)	C180356/3	Clamp handle	1
27)	C180356/1	Drop down leg bracket	1
28)			
29)	C180356/2	Shouldered bolt	1
30)	91202/B	Washer	2
31)	91265	Clamp fixing bolt	2
32)	C180356	Drop down leg	1
33)			
34)	CM170-4-39	Bracket clamp plate	1
35)			
36)	91201	Nyloc nut	2
37)	91250	Pivot bolt	2
38)	91202/C	Washer	4
39)	91001	Nyloc nut	1
40)	910150	Bolt	1
41)	91001	Nyloc nut	1
42)	910160	Bolt	1
43)	91001	Nyloc nut	4
44)	91002	Washer	8
45)	91035	Bolt	4
46)	C202117	7 Pin trailer plug	1

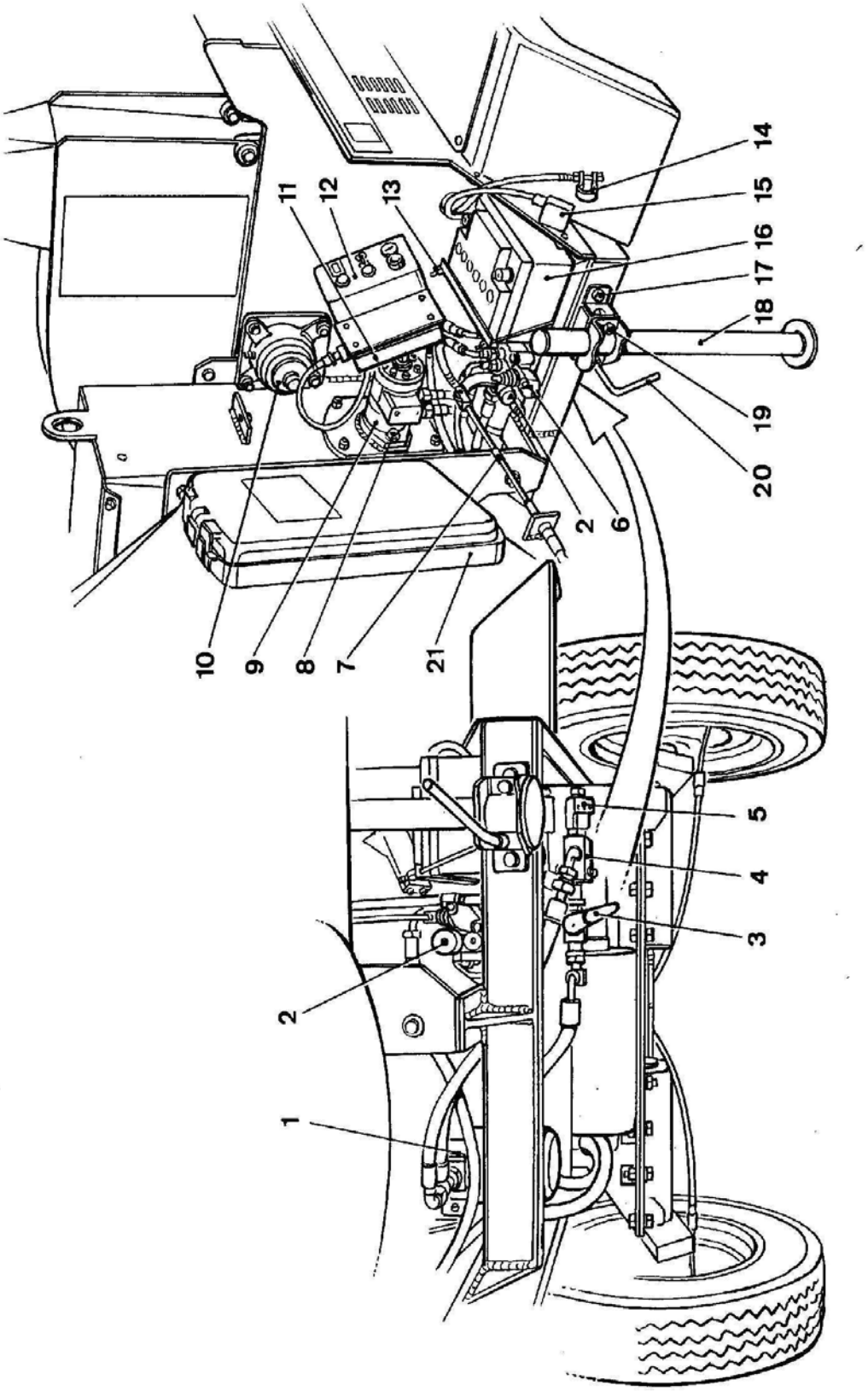
CHIPPER INFEED CONTROL AND RESET SYSTEMS



CHIPPER INFEED CONTROL AND RESET SYSTEM

23)	**CM220-4-71**	**In feed chute flap**	**1**
24)	**CM220-4-20**	**Safety bar**	**1**
28)	**CM170-4-17**	**Mounting bracket**	**1**
29)	**CM170-4-78**	**Near side operating lever**	**1**
30)	**CM170-4-79**	**Pivot plate**	**2**
31)			
32)	**C170477**	**Operating rod**	**1**
33)	**CM170-4-73**	**Latch**	**1**
34)	**CM170-4-19**	**Flap locking lever**	

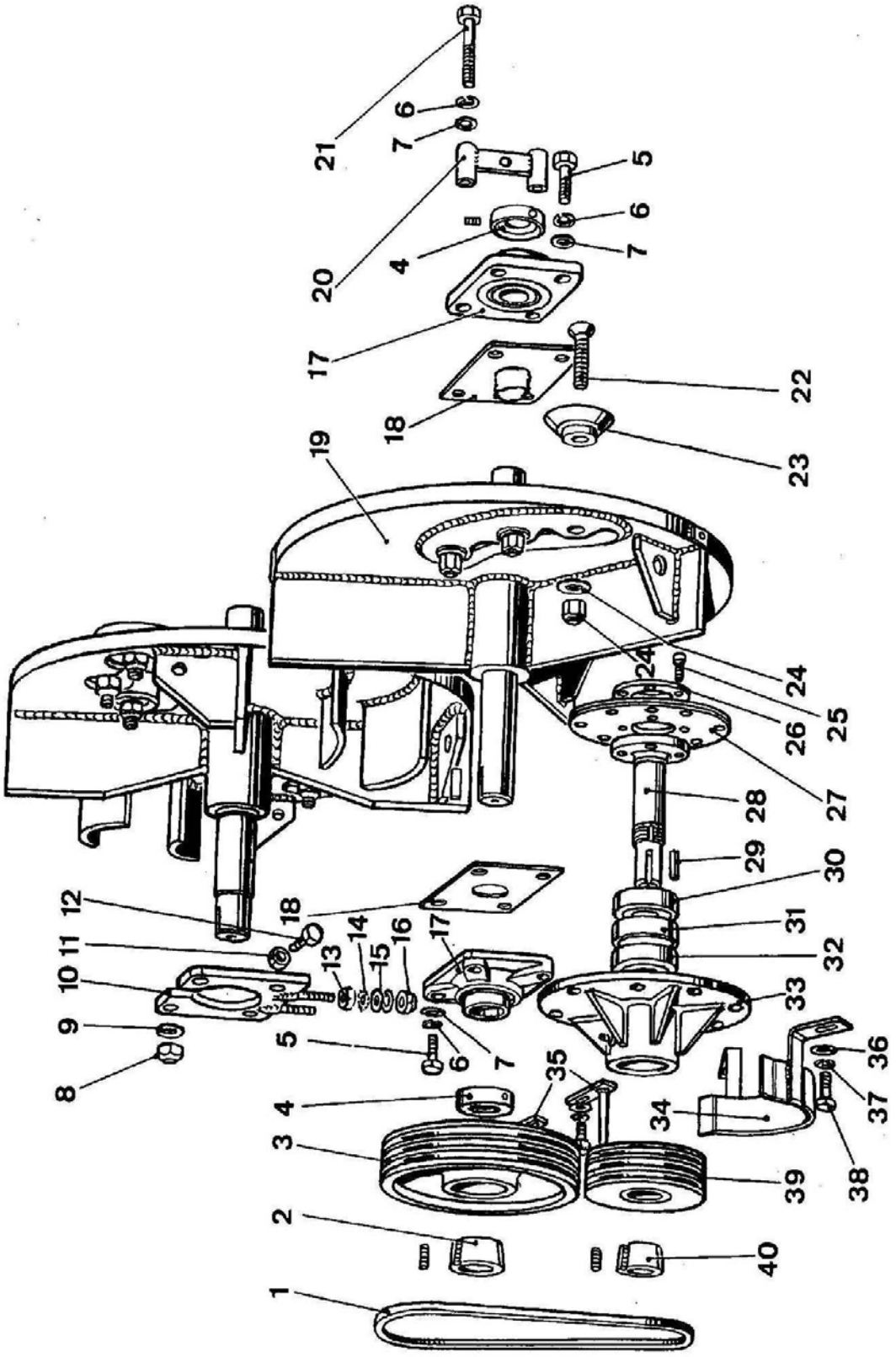
REAR HYDRAULICS, ENGINE CONTROL BOX AND LOWER ROLLER



REAR HYDRAULICS, ENGINE CONTROL BOX AND LOWER ROLLER

1)	C180106	In line return filter	1
1a)	C180106/1	Replacement filter	1
1b)	C180106/2	Filter head	1
2)	C251813	Hydraulic control valve	1
2a)	C251813/3	Flow control cartridge	1
2b)	C251813/4	Flow control knob	1
2c)	C251813/7	End cap (lever end)	1
2d)	C251813/8	Rear end cap	1
2e)	C251813/9	Seal kit	1
2f)	C251813/10	Relief valve	1
3)	HYD 2	3/8” Ball valve	1
4)	C251808	Hydraulic solenoid valve	1
5)	C251808/1	Plug	1
6)	CM170-4-44	Valve lever	1
7)	C170107	Push pull cable	1
7a)	C170107/1	Cable clevis	1
8)	71235	Motor fixing bolt	2
9)	C200207/1	Feed roller motor	1
10)	91602/H1	Fly wheel shaft end washer	1
11)	C202321	No stress box	1
12)	C253214	Ignition box	1
12a)	C253214/1	Ignition key	1
12b)	C253214/2	Key switch	1
12c)	C253214/3	Hour meter	1
12d)	C253214/4	PCB board	1
12e)	C253214/5	Oil pressure light	1
12f)	C253214/6	Temperature light	1
12g)	C253214/7	Battery light	1
12h)	C253214/8	Override button	1
13)	C200906	Battery strap	1
14)	C150124	Negative battery lead	1
15)	C150123/1	Positive battery lead	1
16)	C150118	Battery	1
17)	C180356/1	Drop down leg bracket	1
18)	C180356	Drop down leg	1
19)	C180356/2	Shouldered bolt	1
20)	C180356/3	Clamp handle	1
21)	C170409	Document box	1

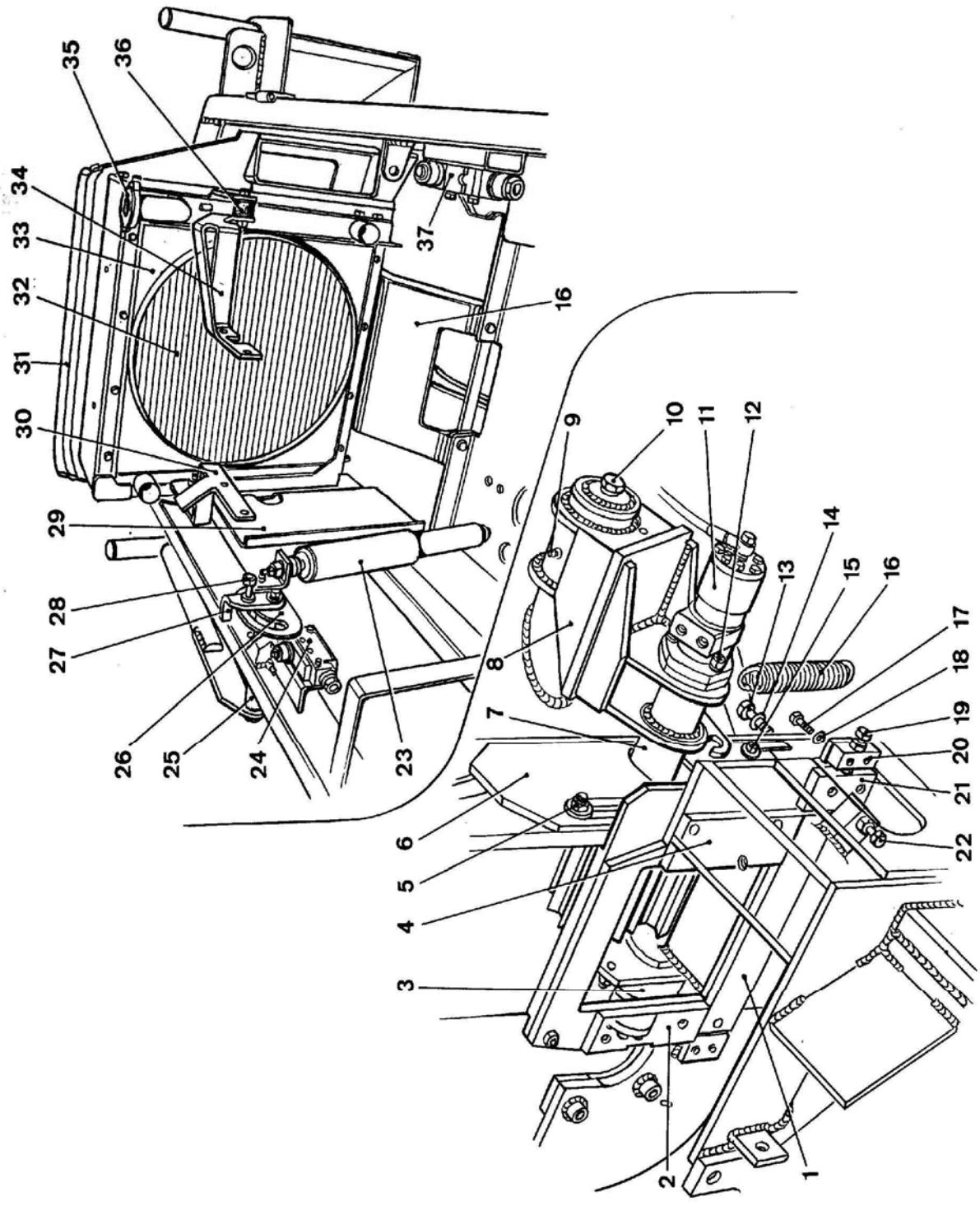
FLYWHEEL AND ENGINE PTO



FLYWHEEL AND ENGINE PTO

1)	**C152202/1**	**Drive belt**	**3**
2)	**C200508**	**Taper lock bush**	**1**
3)	**C203100**	**Fly wheel pulley**	**1**
4)	**C200801/1**	**Bearing locking collar**	**2**
5)	**91640**	**Bolt**	**2 Old**
6)	**91603**	**Spring washer**	**4 Old**
7)	**91602/A**	**Washer**	**4 Old**
8)	**91601**	**Nut**	**4**
9)	**91602/A**	**Washer**	**4**
10)	**CM220-2-50**	**Bearing adjuster plate**	**1**
11)	**91001/P**	**Nut**	**1**
12)	**91035**	**Bolt**	**1**
13)	**91001/L**	**Nut**	**2**
14)	**91002/S**	**Star washer**	**4**
15)	**91002/C**	**Washer**	**4**
16)	**91001/P**	**Nut**	**2**
17)	**C200801**	**Bearing**	**2**
18)			
19)	**C202501**	**Fly wheel (9 blade)**	**1**
19a)	**CM220-2-53**	**Fly wheel (6 blade)**	**1**
20)	**C200940**	**Sensor bracket**	**1**
21)	**91685**	**Bolt**	**2**
22)	**81670**	**Bolt**	**6 or 9**
23)	**C202503**	**Disc chip blade**	**6 or 9**
24)	**91602**	**Washer**	**6 or 9**
25)	**70816**	**Bolt**	**8**
26)	**C220106/1**	**Rear ring**	**1**
27)	**C220106/2**	**Flexi plates**	**4**
28)	**C220106/3**	**Drive shaft**	**1**
29)	**KS81470**	**Drive key**	**1**
30)	**C220106/4**	**Bearing**	**1**
31)	**C220106/5**	**Spacer**	**1**
32)	**C220106/4**	**Bearing**	**1**
33)	**C220106/6**	**Bell housing**	**1**
34)	**CM220-6-18**	**Belt wrap**	**1**
35)	**CM170-6-17**	**Belt guide finger**	**2**
36)	**91002/H**	**Washer**	**2**
37)	**91003**	**Washer**	**2**
38)	**91035**	**Bolt**	**2**
39)	**C203121**	**Engine pulley**	**1**
40)	**C150208**	**Taper lock bush**	**1**

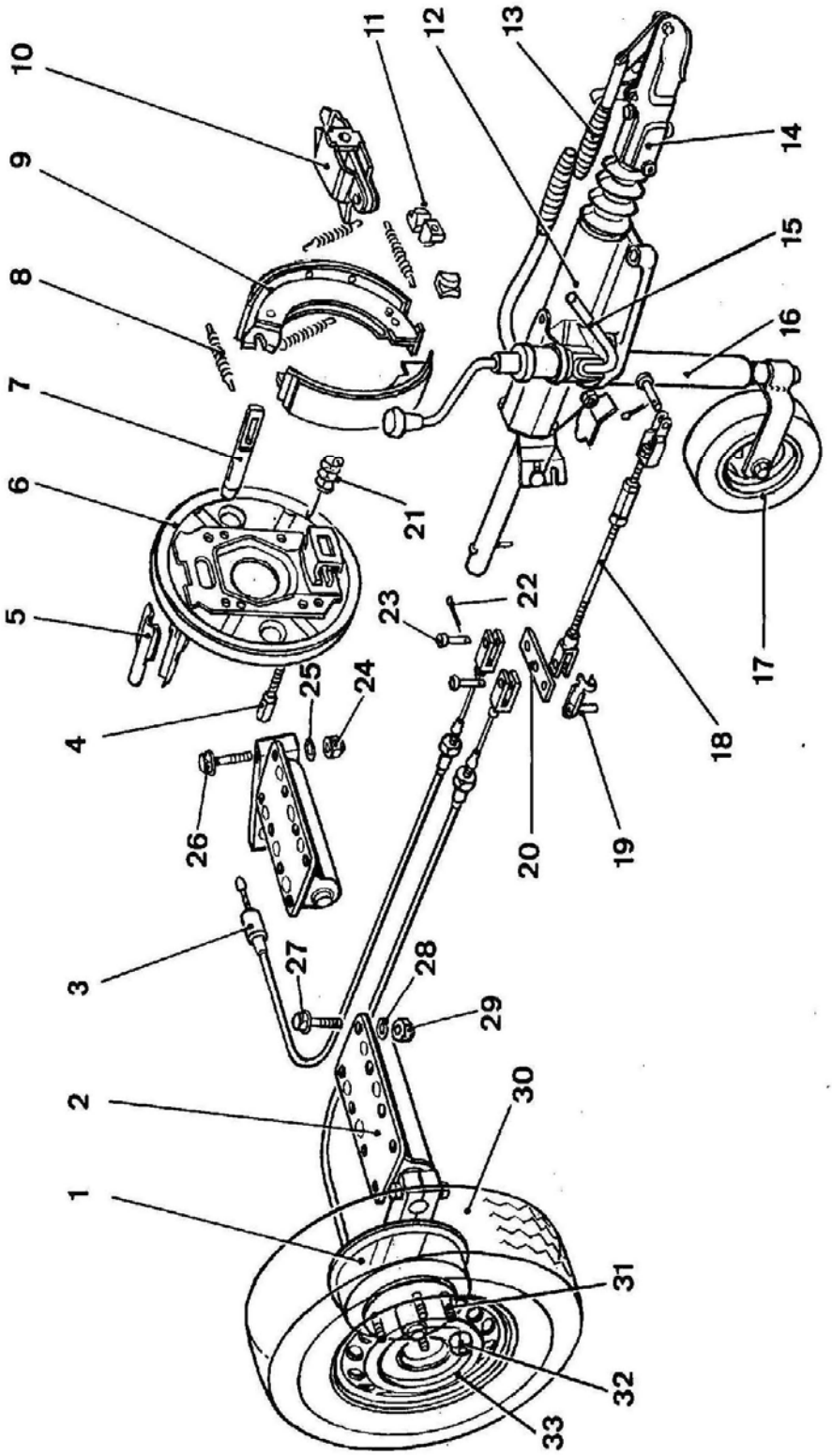
RADIATOR AND ENGINE CRADLE
TOP ROLLER PIVOT ARM AND SHEARBAR



RADIATOR AND ENGINE CRADLE
TOP ROLLER PIVOT ARM AND SHEARBAR

1)	C220231	Horizontal shear bar	1
2)	C220229	Vertical shear bar (threaded)	1
3)	C200207/1	Roller motor	1
4)	C220230	Vertical shear bar	1
5)	91201	Nut	1
6)	CM170-3-36	Sliding guard	1
7)			
8)	CM170-3-38	Pivot arm assembly	1
9)	GNS500	Grease nipple	1
10)	914180	Bolt	1
11)	C200207/1	Feed roller motor	1
12)	71235	Bolt	2
13)	91240	Bolt	2
14)	91202/H	Washer	2
15)		Bolt	
16)	C180119	Spring	1
17)	90830	Bolt	2
18)	90803	Washer	2
19)	91050	Bolt	1
20)	C170237	Shear bar lock	1
21)	C170232	Shear bar clamp	1
22)	91260	Bolt	1
23)	C170632	Engine damper	1
24)	C200206	Micro switch	1
25)	C170637	Spacer	1
26)			
27)	CM170-6-32	Micro switch striker	1
28)	71255	Bolt	1
29)	CM220-6-41	Heat shield	1
30)	CM220-6-13	Near side radiator bracket	1
31)	CM220-1-45	Cold compartment	1
32)	C150106/3	Radiator	1
33)	C150106/5	Radiator cowl	1
34)	CM220-6-12	Offside radiator bracket	1
35)	C150106/4	Radiator cap	1
36)	SI20014	Top radiator mount	2
37)	C200206	Micro switch	1

HITCH, BRAKES, AXLES AND WHEELS



HITCH, BRAKES, AXLES AND WHEELS

1)	**C203114/6**	**Hub**	**1**
2)	**C203114/10**	**Axle unit**	**1 pair**
3)	**C200347/8**	**Brake cable**	**1**
4)	**C203114/11**	**Re-adjust wedge & bolt**	**1**
5)	**C200347/9**	**Dust cover**	**1**
6)	**C203114/12**	**Back plate**	**1**
7)	**C203114/13**	**Torpedo connector**	**1**
8)	**C203114/14**	**Brake spring set**	**1**
9)	**C203114/2**	**Brake shoes**	**1**
10)	**C203114/15**	**Expander assembly**	**1**
11)	**C203114/16**	**Re-adjust shoe post**	**1**
12)	**C200322/B**	**Tow hitch assembly**	**1**
13)	**C200322/B/10**	**Handle**	**1**
14)	**C200322/B/7**	**Coupling head**	**1**
15)	**C200322/B/5**	**Clamp handle**	**1**
16)	**C150104/B**	**Jockey wheel**	**1**
17)	**C150104/B/1**	**Wheel**	**1**
18)	**C200347/4**	**Brake rod**	**1**
19)	**C251814**	**Clevis**	**1**
20)	**C200347/7**	**Compensator bar**	**1**
21)			
22)	**SP76**	**Split pin**	**2**
23)	**C250607**	**Rivet**	**2**
24)	**91601/P**	**Nut**	**1**
25)	**91602/A**	**Washer**	**1**
26)	**91690**	**Bolt**	**1**
27)	**91260**	**Bolt**	**2**
28)	**91202**	**Washer**	**2**
29)	**91201**	**Nut**	**2**
30)	**C200345/4**	**Tyre**	**3**
31)	**C200347/1**	**Wheel stud**	**8**
32)	**C200347/2**	**Wheel nut**	**8**
33)	**C200345/2**	**Wheel rim**	**3**
33a)	**C200345/1**	**Wheel assembly**	**3**

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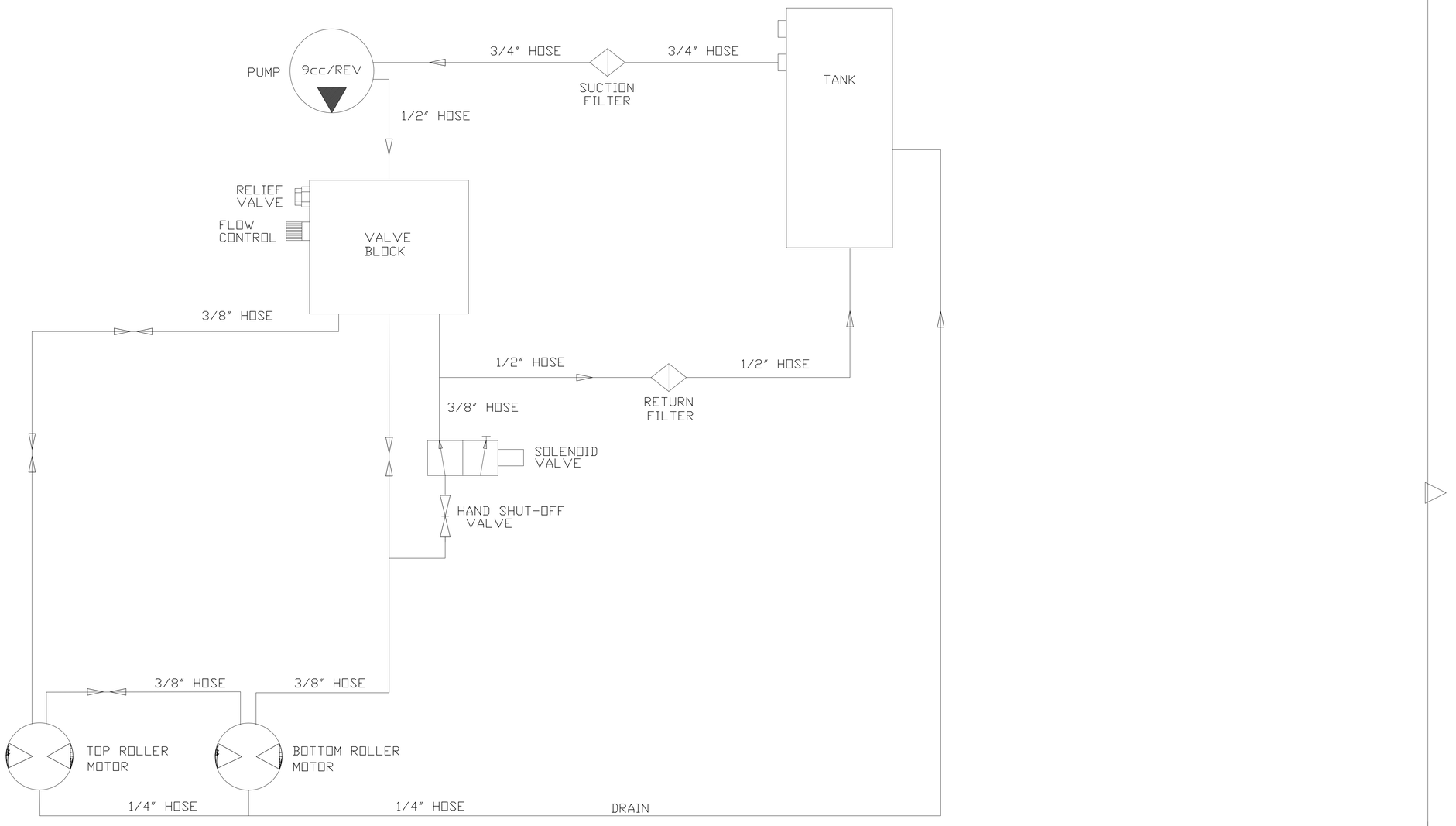

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GreenMech LTD
The Mill Industrial Park, Kings Coughton
Alcester,Warks B49 5QG
Phone 01789 400044

TITLE 170-220 HYD CIRCUIT

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CM170/220 ALTERNATOR CURRENT SENSING
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