SteamRanger
Heritage Railway

GEMCO
TRACK MACHINE

Maintenance & Operation Manual

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Infrastructure Services

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Approved by: Troy Barker, Manager Infrastructure Services

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Issued By:

[Uncontrolled unless numbered and signed in red]

NOTES

SteamRanger Heritage Railway
PO Box 960 Mt Barker SA 5251
Tel: 08 83983621; Fax:08 83911933
ABN 36 611 842 947

www.steamranger.org.au

HERITAGE RAILWAY

CERTIFICATION OF TRACK MACHINE

We the undersigned certify that Track Machine GEM 6.0 ..... was inspected on 8-7-2005 ... at Goolwa DEPOT It was considered that, at the time of inspection, the Track Machine was in good condition and suitable for use on the SteamRanger Tourist Railway. Any comments made by the undersigned can be found in the attached Inspection Report.

PB Neville ..... P B Neville, Plant Manager

Alan Whittle ..... Alan Whittle, Engineering Consultant

Date 8/7/05

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GEMCO

TRACK MAINTENANCE MACHINE

Specifications

Engine	Ford 4 cylinder industrial diesel 200 cub. In. displacement 50 bhp. at 1800 rpm. 130 lb/ft. at 1100 rpm
Battery	Caterpillar low maintenance 3T 5760 750 CGA
Hydraulic pump	Vickers triple pump. Direct coupled 1 x 36 gpm. at 2500 psi. 2 x 90 gpm at 2500 psi
Hydraulic filters	- Oil reservoir tank, with magnetic plug. *(service required)* - Intake screen *(service required)* - Delivery Replaceable, with indicators. - Return screen. From work to tank. On top of tank. - Tank capacity 90 litres.
Oil cooler	- 2 fans and 2 radiators.
Control valves	- 1. Boom slew - 2. Remote control - 3. Sleeper grab rotation. (or backhoe bucket) - 4. Dipper arm (or bucket if fitted) - 5. Boom - 6. Sleeper clamp (or extra bucket cylinder) - 7. Turntable - 8. Scarifier drum - 9. Rail clamps - 10. L/H track jack - 11. R/H track jack - 12. Sleeper clamp - 13. Boom height - 14. Scarifier drun - 15. Boom travel - 16. Main drive NOTE. Ensure that the two-way switch in neutral is centred to off and is operative.
Indicators	- Temperature gauge - Oil level dipstick.
Pressure relief valve	- Set to 2200 psi.
Hydraulic hoses	- 2 wire types ½ in. 3 wire types 1in.

Operating the Machine

- Check the coolant water level through the locked door on top by the fuel tank between the scarifier. Water level should be seen, and only 1in. below the cap. Check for evidence of oil in the water. [ill. 31]

- Check the engine oil level through the locked door down by the driving seat. The dipstick has a full level mark. Replace the dip stick and lock the door. To top up, remove the cap at the fuel pump drive end. [ill 28]

- With the engine running, visually check for any faults, and correct if necessary.

- Check that the drawbar pins are locked, that the trolley load is secure, and that all the equipment required for the job is in hand.

- Release the hand brake by pressing the knob at the end of the lever, and pull the lever upwards to free it from the ratchet. [ill 28]

- Use the service brakes if the machine begins to roll on.

- To drive, push the lever forward for forward motion, or pull the lever back for reverse motion, in a manner to achieve a smooth start.

- Run the machine at low engine rpm while familiarising the actions required to achieve smooth starts and stops.

- Feathering of the control levers operating the the slew and boom needs to be practiced.

- Always be aware of any workers near the machine, and warn them of intentions before commencing any movements.

- When using the hydraulics, ease the actions to avoid jerking motions and hitting the ram ends causing sudden stops and stress.

- When towing the machine, ensure that all the requirements that apply to this action are taken. *(refer to instructions on the instrument cover) [ill 34]*

- A connecting bolt is to be inserted to secure the motion of the sprocket to the axle hub, and thus achieve a lock-up to propel the machine. Removal of this bolt will free the lock-up and achieve a neutral position, [ill 2]

  Access to this drive unit is gained through a cover over the motor and drive assembly. The machine may have to be moved slightly to get to the bolt. A grease nipple at this location should be given 2 or 3 strokes of grease regularly

Turning the machine on rail

- Check that the site selected to stand the turntable on is solid enough for the weight of the machine, and that it will not collapse and cause problems.

- Select a site like a road surface, or sleepers in the centre of the rails that will carry a weight of 9 tons.

- Centralise the machine on the proposed site, and allow enough space for the machine to turn.

    - Put down the the turntable and lift the machine until the rear leaves the rails only.

    - Then set the crane in a position, before the lift takes place, such that when the machine is lifted with the boom, it will be able to be turned.

    - The turning of the machine must be done when it is lifted high enough to clear the rails. Turn it as far as the crane can swivel it with the slew motor.

    - When the slew motor reaches its limit, the machine is lowered onto sufficient support to carry the weight without damaging the underframe parts such as chain, axles, and wheels.

    - Repeat this operation until a full turn is achieved, and the machine is on rails in the opposite direction.

If the machine is de-railed, it can be re-railed using the work crane and slew.

(Note: Care must be taken not to damage under-parts during turning or re-railing operations. Check each move)

Use of short cut sleeper blocks can be helpful to prevent damage to underparts of the machine. Position them under wheels, frame, and turntable to support the machine during turning.

Extraction of Sleepers

- All dogs and plates must be removed.

- Place the machine over the sleeper to enable the sleeper clamp to get a grip.

- Clear a space to allow the sleeper to come out by using the extractor to cut a suitable channel.

- Grip the sleeper and pull out.

- If the sleeper is tight, try the use of jacks and rail clamps.

  Clamp the rails, then using the jacks, see that they clear the sleeper and then raise the machine and rails. This should clear the top the sleeper by 1/2in. to allow it to be pulled out.

- Where fish plates prevent the rail clamps from gripping,a clamp provided on the footplate can be used. This goes in by the rail clamp and beneath the rail, gripping both together. All will rise when the jacks lift. The sleeper crane can be used as an aid to lifting.

- Note Care must be taken to ensure the machine is not lifted off the rails too far. If this occurs, extra care must be taken when lowering to the rails again. Sudden boom –down action will cause the machine to drop severely, causing damage to axles, bearings, and frame-work.

When the sleeper is not retrievable.

- The sleeper hook can be used to break it up.

- Position the hook in the cradle on the trailer, and grab it with the sleeper clamp. After the lock pin has been removed and put in place for safe keeping, lift the hook out of the cradle.

- Use the hook by inserting it in under the sleeper, in the middle of the sleeper in the line, and then twist the hook to break the sleeper in half.

- Note Care must be exercised when taking this action, as this often lifts the front axle off the rails. To prevent this, hold open the boom-down valve during hook operations.
  If the machine is lifted, extra care must be taken when lowering to the rails to prevent sudden dropping and/or de-railment. Hydraulic feathering needs to be carried out carefully.

Use of the crane to insert a sleeper

- Pick up the sleeper at 2/3 of its length from the sleeper trolley

- Swing it around to a point where the front axle is central with the place where the sleeper is to go in.

- Angle the sleeper to 45 deg., and bring in the edge to just below the rail and hook it under the rail.

- Bring in the dipper arm and lower the boom gently at the same time, and crowd up the bucket action. Take the sleeper in as far as the power of the crane will allow, or enough for the sleeper to secure it and place it into position.

- Note: Before the sleeper is inserted, ensure that the trench, if at ground level, is deep enough to allow the centre and end of the sleeper to go down into the bed, and to insert properly at a level with the bottom of both rails. - Trenching can be done with the sleeper extractor by cutting out the full length. Then if necessary with scoop. Work the scoop AWAY from the line to keep the trench clear.

- Use of the sleeper inserter.
  When entering the sleeper into the trench, down or up pressure on the inserter boom helps to align the sleeper, and down pressure helps to ensure a distance for plates as well.

- Note: Drawbar distance is an important consideration when picking up sleepers, to allow them to be grabbed 2/3 from the end.

  It may be helpful to push the extractor out to increase stability.

Operation of the Scarifier

To operate the scarifier, push the control lever in the forward (away) direction and hold. Then use scarifier raise and lower lever to lower the drum into the work position easing it down as scarifier cuts the hole out, until the depth regulator cuts it out.

Then continue to hold the drum down, and reverse the direction of the scarifier lever to clean out the hole. Then raise the drum to travel height and release the scarifier lever.

Operate at full engine rpm.

If vibration occurs, check for missing or damaged flayls and correct as necessary.

- In operation, the mower must be run at full engine rpm to achieve sufficient flayl speed. The mower is then moved forward over the crop or vegitation at a speed that will not reduce the engine rpm, and with the driving drum square-on to achieve best results.

  Note: If the mower is fed into vegetation too fast, the cutting ability is overloaded due to reduced drum speed, causing stalling.
- Care should be taken when the mower is used at full stretch, as there is a longer leverage over the machine. Sudden application of the controls will result in jerking actions imposing unnecessary strain on arms and other parts of the machine.

- The mulcher diversion valve lever must be positively placed in either the mulcher or the scarifier position. An intermediate position between will allow oil restrictions sufficient to damage the pump.

Travelling the machine

When travelling, the Gemco drawbar is used, and the sleeper crane and tools in place.

No rail vehicles in tow should contact each other unless special circumstances are justified by the track manager.

New operators using the crane should start with engine rpm as low as possible (1000rpm), and as confidence builds, increase engine speed.

When towing the machine

Towing vehicle must have at least 13 tons GCM. Or 4 x 4 heavy
Use towbar marked "GEMCO" [ill 47]
No part of either vehicle must contact the other
Use security pins
Remove the drive sprocket connecting bolt and grease the sprocket hub. [ill 2- 3- 4]
Observer must ride on the Gemco for visual safety, and sound horn
Drive security chains must be in place
The towing speed must not exceed 20 kph
When chains are put in place, also make sure that the lock on the hydraulic control valve is activated, to prevent accidental operation which will break chains and drop clamps.

Speeds on the open track are not to exceed:-

20 kph either self propelled or towed

5 kph at road crossings and switches crossings

Check before proceeding over road crossings or rail crossings that all tools and clamps are up.

Check that the crane and boom clear all trackside objects such as posts platforms, etc.

Be alert to red light and sounds of buzzer when travelling. Stop and correct if necessary.

To confirm that the turntable and the L/H and R/H jacks are fully up, operate the hydraulic raise valve lever for each, and check that the hydraulic gauge indicates 2000psi. (cylinder at end of stroke)

This procedure can also indicate that the boom is up.

Rail clamp indicators will confirm that the clamps are up.

Use of Accessories

- Hook
  - Pull a slewed sleeper straight.
    Set the hook up so that a small gap exists between it and the sleeper.
    Powering the machine backwards forces the sleeper into position.
  - Scarifying each side each of sleepers
  - Ripping out roots.
  - Eliminating rabbit burrows which can be reached.
- Breaking out timbers in old switches.

Sleeper trenching bucket

- Trenching out for sleeper removal, in banks or on rail level ground
  Work trenching scoop away from the machine to clear way, otherwise the sleeper pushes material in a heap which must then be removed.

Clamshell bucket

- To fit this to the machine, remove the sleeper clamp.
  Assemble the bucket, door, and ram. Set up the ram to the sleeper clamp remotes. Set the hydraulics to open and close in response to the lever directions.
  Note: The ram on the bucket has more closing power, and can overpower the door ram thus causing damage. To use the bucket, open the door as wide as possible and use the scoop action first, then close the door.

Tree Mulcher

- Fit by removing the sleeper clamp, and installing the mulcher.
- Set up the hydraulic lever for up = clockwise turn, and down (or toward)
- The mulcher can be positioned into all forward directions, either side of the machine.
- Hydraulic hoses to the mower motor are to be coupled up to the 1in. hose on the front of the machine. Check that the hoses will release from the couplings when pulled. *(check this by ensuring that the clip is holding the outer rings of the centre hoses when all are pulled)*
- When all hoses are coupled, the gemco engine shut down, the two-way valve can be used by moving it from the scarifier position to the remote or mulcher.
  Note: Do not open the control valve until the couplings are fully connected. To do so will lock in pressure against the coupling valve and prevent connection.
- With the mulcher, valves, and hoses fitted, lift from the ground and check manoeuvrability. Then test mower running by engaging the hydraulics and bringing the engine up to full 1800 rpm to ensure smooth operation.

Operating tips

Drive Motor

The driven sprocket on the drive axle is provided with a "neutral" position, so that the motor can be isolated when the machine is towed. This is achieved by attaching the sprocket free-running on a hub affixed to the axle.
When powered drive is required, a lock bolt is installed to couple the sprocket to the hub. [ill 2- 3- 4]

The motor can be reversed carefully at low speeds, for braking. Care must be taken to ensure that the chain and sprocket are not overloaded. This procedure demands practice action.

Safety devices

Security devices are provided on the scarifier and rail clamps. When travelling the machine over longer distances, these must be used.
The lever controlling the drive motor must operate an 8 way switch to connect power to a light and buzzer to operate warning indicators if equipment as still in working positions, and the machine is not to be moved.

Rail clamps

Chains are provided for holding up and securing the rail clamps when travelling longer distances, and when towing the machine.
When the chains are in place, the hydraulic lever is prevented from being used.. [ill 22 – 30]

Crane locks

Locking straps are provided to secure the crane boom from hydraulic creep when the machine is travelling.
Two stays are used, one to hold the boom up, and one to prevent boom slew. Safety clips must be used.
Extra boom stay straps are provided on the machine frame. Locking clips must be used. [ill 18]

A stabilizing strap is provided to secure the crane dipper arm during travelling. Safety clips must be used.

Safety equipment

All locking straps are to be stored under the machine seat while the machine is working. A chain is also locked to the machine post. This is to be used for locking the machines down to the rail when all machines are locked together and not in use.

Wheel chocks are kept under the seat, or on the oil tank, for securing unused machines.

3 stage hydraulic pump
Pressure check point for gauge [ill 39]
Relief valve set to 2500psi, and bypass return to the hydraulic oil tank (safety valve)
Replaceable oil filter element, with colour indicator. [ill 5]
Pressure check point and relief valve to adjust the operating pressure required, and return to the tank. Set to 2200psi.
Work crane
Sleeper clamps, buckets, sleeper hook and ripper, matching heads

Control valves (Left to right in front of operator) [ill 26-27-29-34-36-39]

1. Boom Slew
   Lifting the lever **up** slews the boom to the left, pushing the lever **down** slews the boom to the right
   [Move the levers gently, as the boom movement is rapid, and an overrun from intended travel causes correction problems]

2. Remotes control [ill 36]
   This valve operates ancillary equipment or tools. Lever movement will need to be adapted as required.

3. Bucket
   Lever **up** is dump, Lever **down** is fill. *[If the hook is fitted, **up** is tip away, **down** is tip in. If the mulcher is fitted, **up** is raise head, **down** is lower head]*

4. Dipper arm on boom of crane
   Away is **up**. (or away) Toward is **down** (or Toward)
   Note Movement down must be made extremely Carefully as a quickly opened valve can cause the boom to drop too quickly and cause damage
   This valve, and the cylinder, requires high pressure, and needs to be maintained in good working order.

5. Boom on sleeper crane
   Away is **up** (or away) Toward is **down** (or toward)
   Note: Movement down must be made carefully, as a quickly opened valve can cause a too-quick drop and damage

6. Sleeper clamp
   Grab is **up**, release is **down.** *[this valve also controls the mulcher motor, clam on the clamshell bucket – open is]*

- 7. Turntable - machine off tracks. **F** = Machine down
  R = Machine up

- 8. Scarifier drum - **F** = Down
  R = Up

- 9. Rail clamp - **F** = Down and close
  R = Up and open

- 10. L/H track jack - **F** = Machine down (jacks up)
  R = Jacks up

- 11. R/H track jack - ("as above)

- 12. Sleeper clamp - **F** = Clamps closed
  R = Clamps open

- 13. Boom height **F** = Boom down
  R = Boom up

- 14. Scarifier drum **F** = Scarifier
  R = Sweeps

- 15. Boom travel **F** = Boom out
  R = Boom in

- 16. Main drive **F** = Foreward
  R = Reverse

Note. Ensure that the two-way switch in neutral is centred to off and is operative.

Notes on Hydraulics

Travel security

The scarifier rail clamps, jacks, and turntable are set up with a warning device system, with electric switches fitted on rods to indicate that they are down in working positions. If the drive motor valve is actuated in this situation (attempted move from neutral), a red light will light-up and a buzzer will sound. The machine is not to be moved until the work components are retracted, and the light and buzzer cease.

If the light and buzzer continue, the fault must be investigated and corrected. Failure to take this action will cause expensive damage.
Regular checks must be made to ensure correct operation.

Put each item into work mode, with the motor stopped,

Select forward and reverse to establish that the light and buzzer operate. If this does not occur, check :-

Broken wires on fitting connections
Damaged switches
Mis-alignment of switch control rods
Blown globe in light
Faulty buzzer
Faulty earthing in electrical circuits

Hydraulic hose coupling fittings

- Clean both male and female couplings before assembling together. (These are a prime target for allowing the entry of dirt into the system, and when hydraulic motors are in use, they can sustain damage, along with the pump and valves.)
- To couple the male and female fittings, the outer ring on the female fitting is pulled back to allow little locking balls to pop out enough allow the male fitting to enter into the coupling.
  Then pushing the two parts together hard, opens valves and sealing into "O" rings. Once pushed in far enough, the outer ring can be released, thus locking the couplings together.
- To release , it is a matter of pulling the outer ring back and pulling on the hoses, (which usually jump out). The valve re-seats and seals up the system.

- Note If difficulty is experienced in coupling hoses, possible causes can be:-
  Outer ring not pulled back far enough
  Control pressure in hoses. (release by opening the control valve lever up or down.)

  Coupling is best done with the pump stopped.

Servicing and Maintenance Considerations

- Work undertaken on hydraulic components must be done by, or supervised by, a competent person, to prevent expensive damage or personal injury. Errors can cause poor subsequent performance of equipment.

- Cleanliness is of utmost importance in oil circuits and entrance of dirt, water, or condensation must be prevented.

- All leaking equipment must be repaired as soon as possible, to prevent entry of dirt and air, and loss and waste of oil.

- Check oil system breathers for free flow of clean air, and exclusion of dust, dirt, or water.

- Oil filter indicators must be checked regularly. When the red indicator activates while the oil is hot, the oil filter must be changed. The magnetic plugs and oil intake screens cleaned, along with the inside of the tank. Replace oil with the correct grade.

- Check regularly for overheating of the oil, which causes excessive wear.

- Ensure that the correct level is maintained. The quantity of oil also acts as a coolant. Low oil level can lead to air intake and cavitation in the pump, and poor ram performance.

- The brakes are of the manual / hydraulic fluid type. Care must be taken to prevent hydraulic oil spillage mixing with brake fluid. Levels must be checked regularly to ensure that the fluid is not going down. Low fluid, and the entry of air into the system, will cause loss of braking. It will be necessary to purge air from the system to regain braking.

- The front brake caliper is a Ford type.
  The rear brake calliper is a Holden model HQ Torana sports extra
  The master cylinder is a Holden Torana.

  It has been found that, due to the large hydraulic pipe size, the calliper is best removed from the axle and lowered down. This allows brake fluid to fill the pipe without incorporating air.
  A piece of wood should be placed between the brake pads to enable the bleeding process to be carried out with the calliper not on the brake disc, while the system is purged of air prior to refitting.
  Note: Brake pads should be in good order, with plenty of lining in good smooth condition. Too little lining results in poor hand brake operation.

- The hydraulic oil pressure gauge fitted to the machine can be used to test the pump delivery of each circuit at the point provided. When testing is complete, the gauge must be left to operate on the third pump small flow at 36 lpm which supplies oil to the extractor clamps and sleeper crane.

- When servicing the drive chain, use chainsaw bar oil. When in constant use , and when transporting long distances, apply every 10 hours. Keep chainsaw bar oil in a container on the machine for use as required.

- Keep chassis grease in a gun handy in the toolbox.

- Keep spare drive bolts, and spanners to keep tight.

- Keep earmuffs available for all personel who are on or near the machine.

- For cold starts, use the cold start button shown in [ill. 14]. Push the throttle lever open to ½ quadrant, or 1000rpm position and no more. This has to be done to activate the cold start action.

- Check the fan belts regularly. Every oil change tighten by removal of the side cover, near the operators seat, on the engine bay.
  Tighten to 3/8in. (10mm) depression by loosening off lower mounting bolts and top slide bolts , and tension the alternator and hold it at the correct tension while tightening all bolts. Check after running the engine. Regularly check for loose bolts.

- Regularly check the colour of the hydraulic oil. If it darkens, change the oil and clean the tank, screens, and magnets. When thoroughly clean, replace with oil of hydraulic performance type Mobil DTE26 or DTE25. Fill until oil shows in the sight gauge, to 1/4in. (6mm) when cold.. refer to [ill 32 – 43]
  Purge the system by running with oil in it and rechecking the level. Top up if necessary.

  Dark oil indicates overheating and burnt or full of carbon and metal filing contaminents. White oil could indicate too much condensation of water, and rusting parts will result.

Sources of outside assistance

Crane, backhoe, engine, used parts.
Wright tractor wreckers. McLaren Vale

Engine service.
N.G.Giles. Milne Road, Strathalbyn

Hydraulics
Strathalbyn Fabrications. Milne Road. Strathalbyn
B.L.Shipways. Richmond Road, Richmond.

Rail axle, wheels, bearings.
Steamranger Mt. Barker depot

Chain drive bearings.
S.A.Bearings Milne Road Strathalbyn
2 Mt. Barker Road, Mt. Barker

Construction Framework
Mt. Barker depot
Strathalbyn Fabrications. Milne road Strathalbyn
Victor Steel Supplies. Broderick tce. Victor Harbor

Auto Electrical.
Strathalbyn Auto Electrical. Milne Road, Strathalbyn
South Coast Auto Electrical. Elliott Street Pt Elliott

Gemco
Track Combination Maintenance Machine
Specification

Engine
- Ford 4 cylinder industrial diesel
- 200cub. In. displacement
- 50 bhp. At 1800 rpm
- 130 lb/ft at 1100 rpm

Battery
- Caterpillar low maintenance 3T 5760 750 CGA
- Strapped in a lockable box
- Isolation key switch adjacent to battery box

Alternator
- 50 amp with inbuilt voltage regulator

Hydraulic pump
- Vickers triple pump. Direct coupled
- 1 x 36 gpm. At 2500psi.
- 2 x 90 gpm at 2500 psi

Hydraulic system
- Control valves open circuit type
- Two 90 gpm pumps combine to work scarifier
- Filters on delivery side after pump before the valves, have relief valves set for 2300 psi to release back to the tank when filters are choked. Indicators are fitted to each filter housing.
- Remotes are taken off scarifier circuit to work the mulching attachment
- Remotes are break away type. Hoses are 1in. three wire hose lines
- Reservoir is 90 ltrs. Vent cap, filter and dipstick are in a lockable compartment.
- Return line filter is fitted with a restriction indicator
- Magnetic plug is fitted to bottom of tank
- Pump intake is fitted with a large screen.
- Sight screen with temp gauge on tank

Cooling system
- 2 cooling fans and a radiator on return line to tank

Control Valves
1. boom slew
2. remote control
3. sleeper grab rotation of back hoe bucket
4. dipper arm
5. boom
6. sleeper clamp or extra bucket cylinder or mulching head rotation motor

Valves 1-6 are set on relief at 2200 psi. Return passes to tank

7. turntable
8. scarifier drum
9. rail clamps

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Grade 8 bolts on wheel hubs 300 ft/lbs tension
Rail scrapers on each wheel

Instrument Panel

Protected &lockable
Consists of

- hydraulic pressure gauge with flexible tube which can be connected to either of 3 test points including the load on the lift arm
- horn buttons
- revolving light switches and indicators
- engine oil pressure gauge & low pressure light
- engine water temperature gauge & overheat light
- amp meter
- ignition light
- cooling fan switch
- engine hour meter
- rpm meter

Weights

Total wt—7.6t
Front axle –2.6
Rear axle 5.0t
includes sleeper clamp
sleeper hook –15 kg
clam bucket & ram---20 kg, capacity 50 kg
mulching head ---35 kg
sleeper trenching scoop---18 kg
(note new sleeper wt ----40 kg)

Dimensions

Length of machine only----3.9m
Height of machine 2.66m
Front to rear axle pts 2.8m
Rear axle 1.66m from rear of machine

Boom Specifications

Boom is positioned at front axle 160mm off centre to the LHS
Boom lower anchor point is 100mm towards the centre of the machine from the front axle and 360mm from rail
Boom upper anchor point is 900mm from rail
Horizontal reach is 3.04m from rail, measured to swivel point (tools mounting point)
Vertical reach –2.8m
Swivel radius ---180deg
Relief valves are set for 100 kg lift at full reach of boom

Mulch Head Attachment Specifications

Weight 35 kg
Width 1.5m
Width of cut 1.3m
Depth 300mm from mounting point

10. L/H rail track jack
11. R/H rail track jack
12.sleeper clamp
13.boom height

Valves 7-13 are set on relief at 1600psi.

14.scarifier drum
15.boom travel
16.main drive

Valves 14-16 set on relief at 2500psi.

Safety Factors

Travel Safety Indicators

Senser switches are connected to

Park brake
Turntable
Left & right jacks
Left & right rail clamps
Scarifier

These activate a large red light & buzzer if the vehicle is attempted to be moved while they are in working positions.

Horns

Rear and front twin electric air horns
Lower pitch worker warning horn

Lighting

Large driving 70w head lamps 8in diam protected by mesh
Revolving orange work lights, front mounted (worker warning & travel) & centre roof, with indicator lights on instrument panel

Travel safety Straps

Four travel locking straps & safety clips on boom prevent slew & dipper movement and hold the boom in the travel mode

Drive System

Variable speed
Driven by a hydraulic motor 8000 lb drive force
Driven through a double chain ratio 3.45/1
Max speed 20 kph
Drive bolt to connect the axle chain sprocket with the axle drive hub is removable for free wheel or towing

Brakes

Hydraulic disc type on both axles
Mechanical hand park brake on rear axle
Braking distance loaded from 20kph----7m

Wheels, Axles & Bearings

Front & rear axles same, with a drive key on the front
Two 65mm bearings each end with one 75mm centre bearing with side thrust locking device
Wheel hubs 65mm 2deg taper to 50mm threaded lock nuts & spacers

Flail type retractable on a drive drum
RPM 2000
Hydraulic power 80 l/min
Over run clutch
Swivel head chain drive by hydraulic motor
Rotation 270 deg
Chain brake
Independent lock in specified positions

Mulch Head when mounted on machine

Cutting height –3.45m from rail
Max. reach –3.04m

Mulch Head Attachment Specifications

Weight 35 kg
Width 1.5m
Width of cut 1.3m
Depth 300mm from mounting point
Flail type retractable on a drive drum
RPM 2000
Hydraulic power 80 l/min
Over run clutch
Swivel head chain drive by hydraulic motor
Rotation 270 deg
Chain brake
Independent lock in specified positions

Mulch Head when mounted on machine

Cutting height –3.45m from rail
Max. reach –3.04m

Accessories carried on machine:

Annie's foot
Snatch
Pinch bar
Spare parts box
Chain & lock
Knapsack or carrier for dogs
Shovel
Lockable holder for operator's manual & records
Chain & padlock
Locking straps

Tool box:

Shift spanners , drive bolt spanner, spanners for special hydraulic fittings
wheel nut spanner.
Pliers, hammers, screwdrivers, oil can, grease gun, fan belt, radiator hose, spare safety clips for drawbar, coil wire, electric wire, supply of chain oil, spare bolts, brake calipers.

Alan Whittle has signed off this machine as being in good condition and suitable for use on SteamRanger Tourist Railway as inspected on 8/7/05 19

Service Schedule

Service Items	Materials	Daily	Regul-larly	10 hrs	100 hrs	250 hrs	500 hrs	100 sleepers	1000 hrs or yearly	
Engine [1]	Lube oil Delvac 1330	CK			R					
[2]	Oil Filter				R					
[3]	Fuel Filter	CK							R	
[4]	Coolant	CK							Y	
[5]	Air cleaner				CL					
[6]	Inject. Pump				CK					
[7]	Fan belts				I & A					
[8]	Injectors		C				CL			
Hydraul-ics	Dte25 dte 26			CK						
	Filters		When Ind							
Drive chain	Chain bar oil			L						
	Sprocket		L							
Extractor And rollers	MG							L		
Crane	CG							L		
General Crane	CG			L						
Wheel Bearings	WB grease						L			
Battery	Clean		C L							
Brakes	Fluid		CK							
Safety equip.		CK								

Lubricate L
Check CK
Clean CL
Replace R
Adjust A
Yearly Y
Multipurpose grease MG
Inspect I

A. All fabricated components steel tubing 70 x 70 x 5mm

B. Front wheel set moved forward 400mm

C. Steel tubing strengthening added 70 x 70 x 3mm

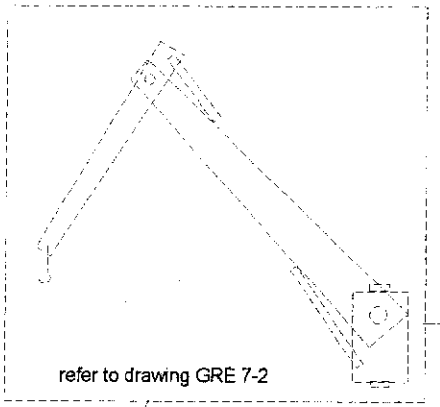
D. Crane attachment here

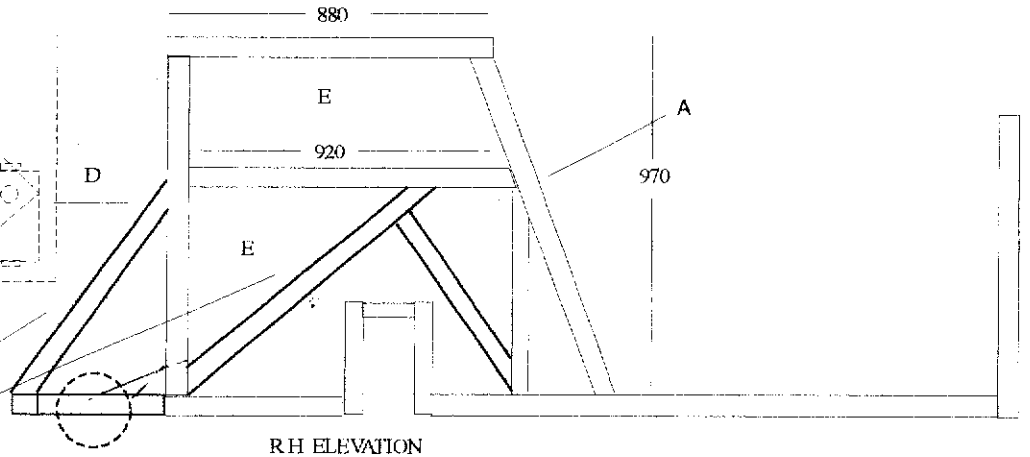
E. This area boxed in with steel plate against the outer faces of the tubing

Estimated weight on axles
Front - 1 ton
Rear - 5.5 tons

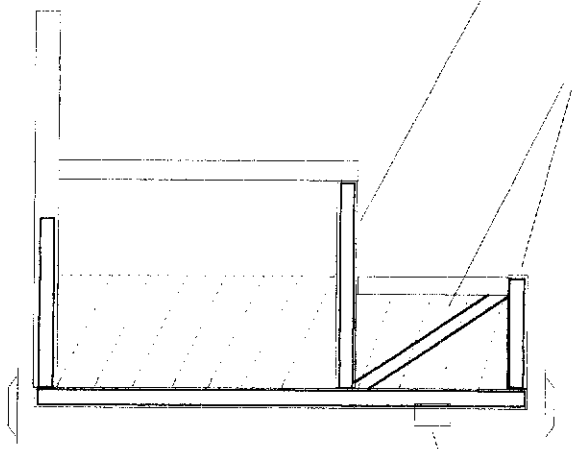
F. Hydraulic traction drive motor, and chain

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

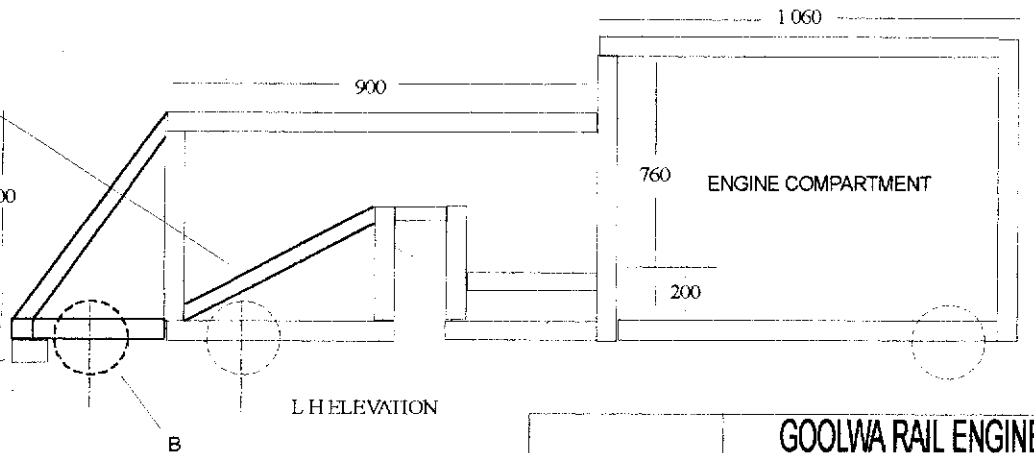




R H ELEVATION



FRONT ELEVATION



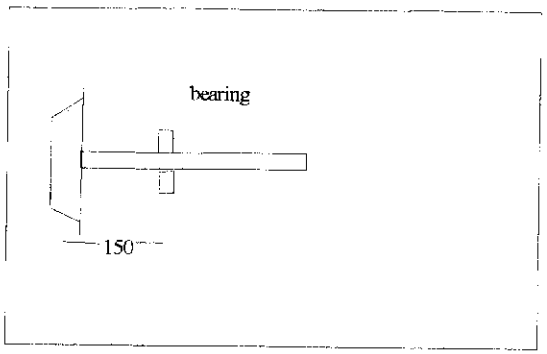
L H ELEVATION

C

F

B

	GOOLWA RAIL ENGINEERS	
	GEMCO MODIFICATION FOR ATTACHMENT OF CRANE	
	SIZE A3 / DWG NO GRE 7 / REV WJ	
All Dimensions Approx.	SCALE none August 2003 / SHEET	

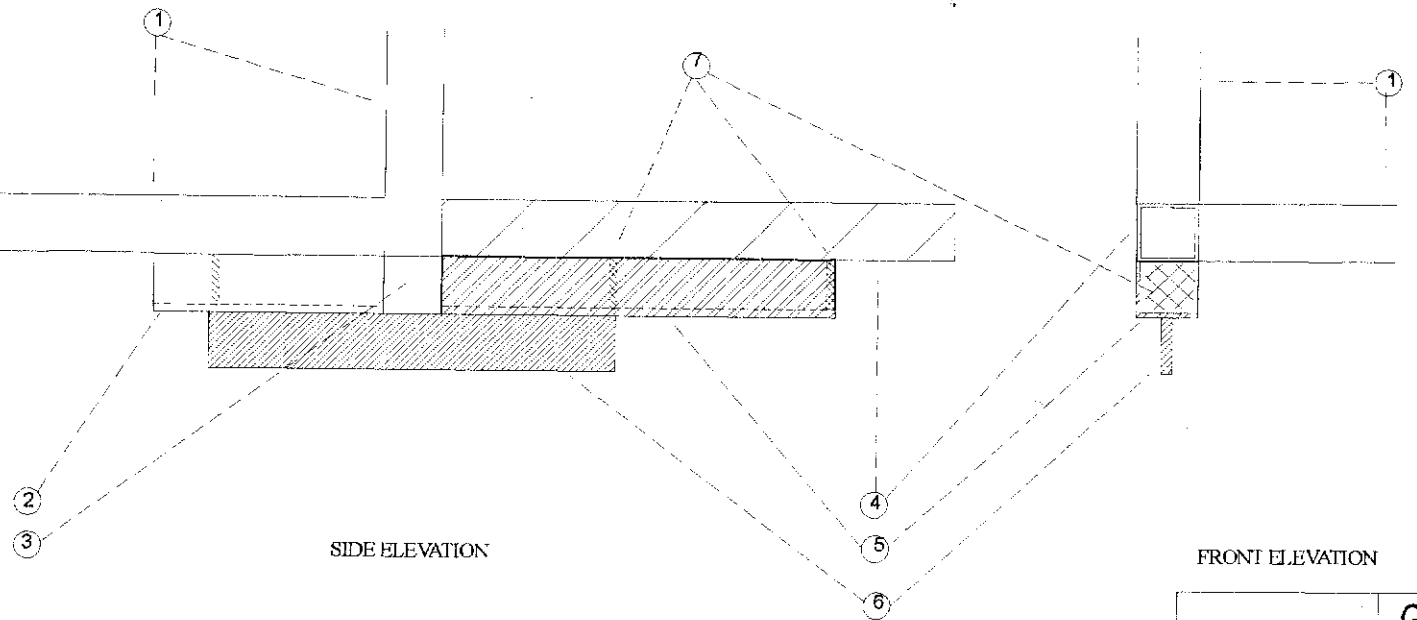


REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

1. Existing chassis square tube 75 x 75 x 5
2. Existing chassis angle 300 x 75 x 75 x 10
3. existing chassis square tube extension 75 x 75 x 75 x 5
4. Added square tube 680 x 75 x 75 x 5
5. Added angle 500 x 75 x 75 x 10
6. Added flat 540 x 75 x 20
7. Added flat strengthening plates 70 x 60 x 8, welded to angle iron and tubuing

All joints welded

Track gauge width 1 600 (Broad gauge 5'3")
Axle shaft dia. ~~75~~



SIDE ELEVATION

FRONT ELEVATION

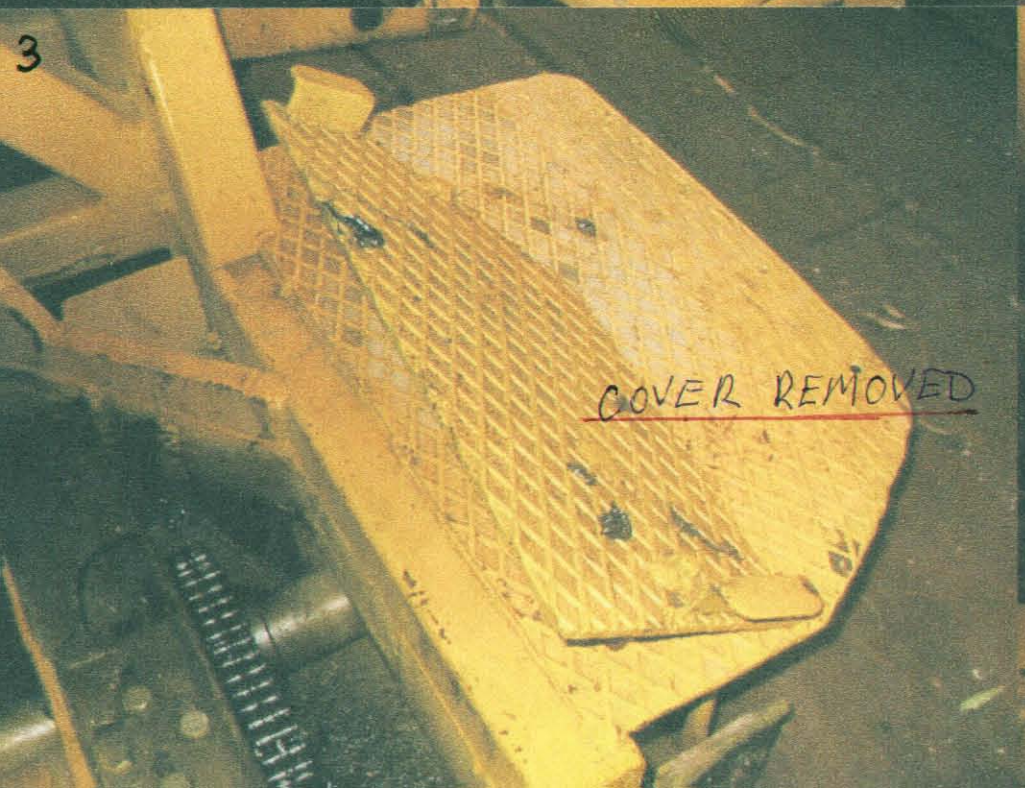
GOOLWA RAIL ENGINEERS

GEMCO
Front wheel relocation

SIZE	FSCM NO	DWG NO	REV
		GRE 7.5	wj
Jan. 2004	SCALE none	SHEET	


1
ANNYS FOOT BAR
SNATCH
SPARS BOX
TOOL BOX
SHOVEL
OLD DOGS BIN

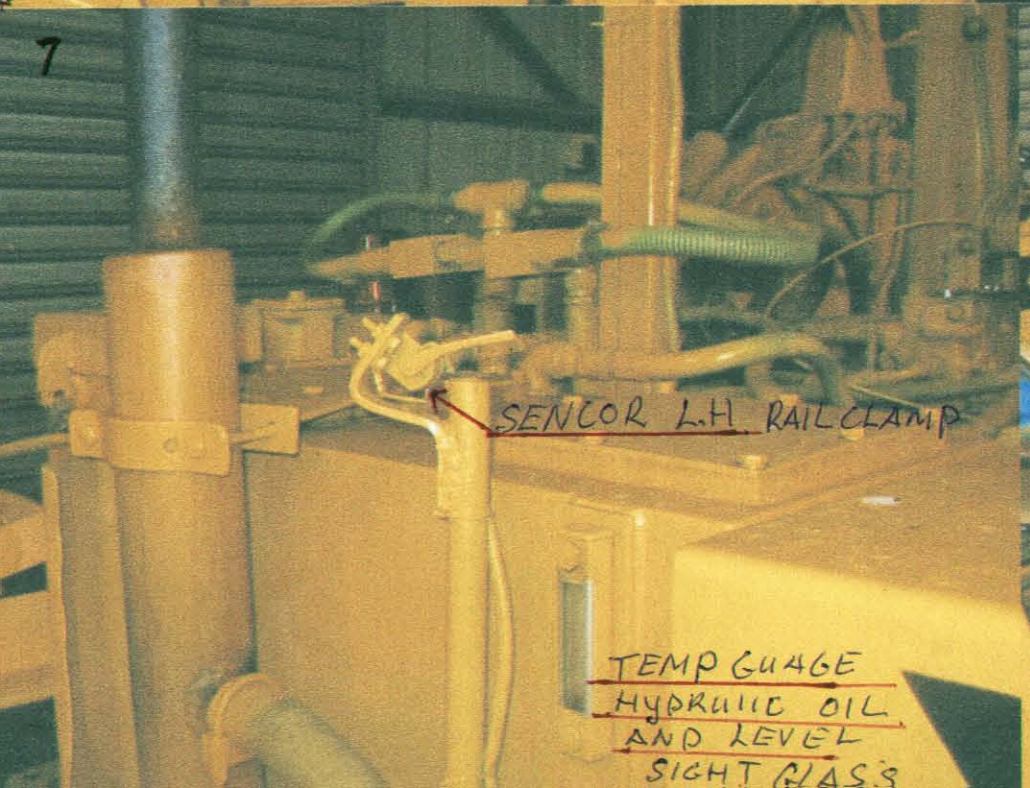

2
DRIVE BOLT REMOVABLE
DRIVE MOTOR AND CHAIN


3
COVER REMOVED

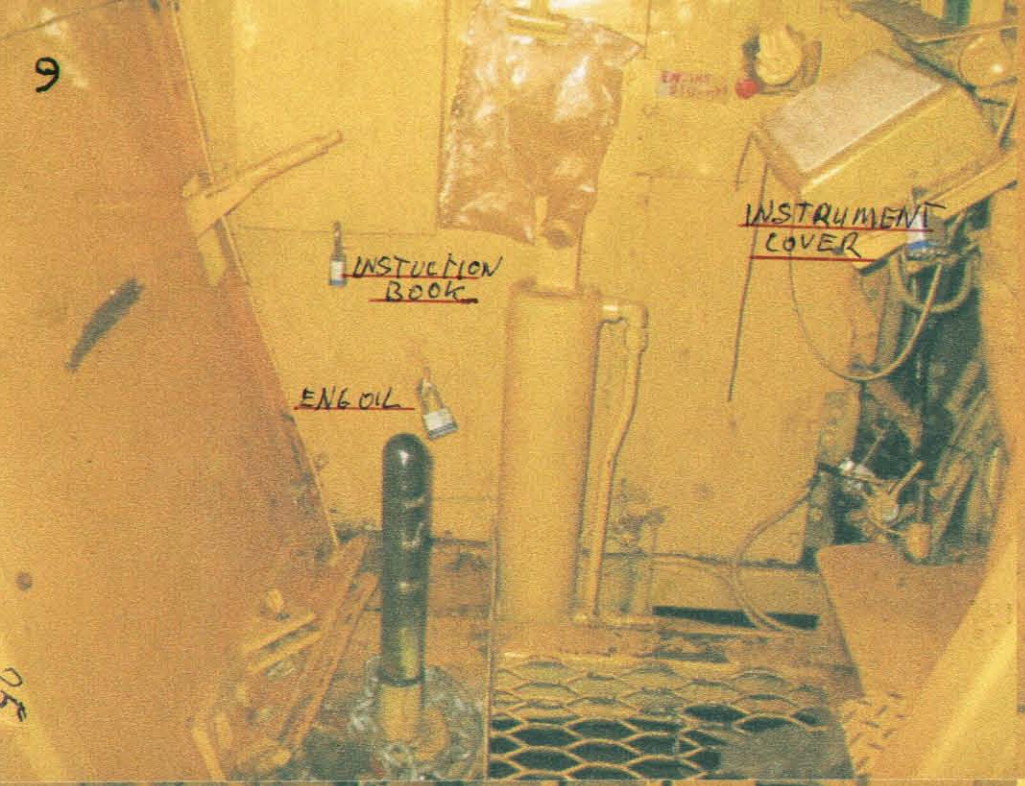

4
COVER DRIVE CHAIN

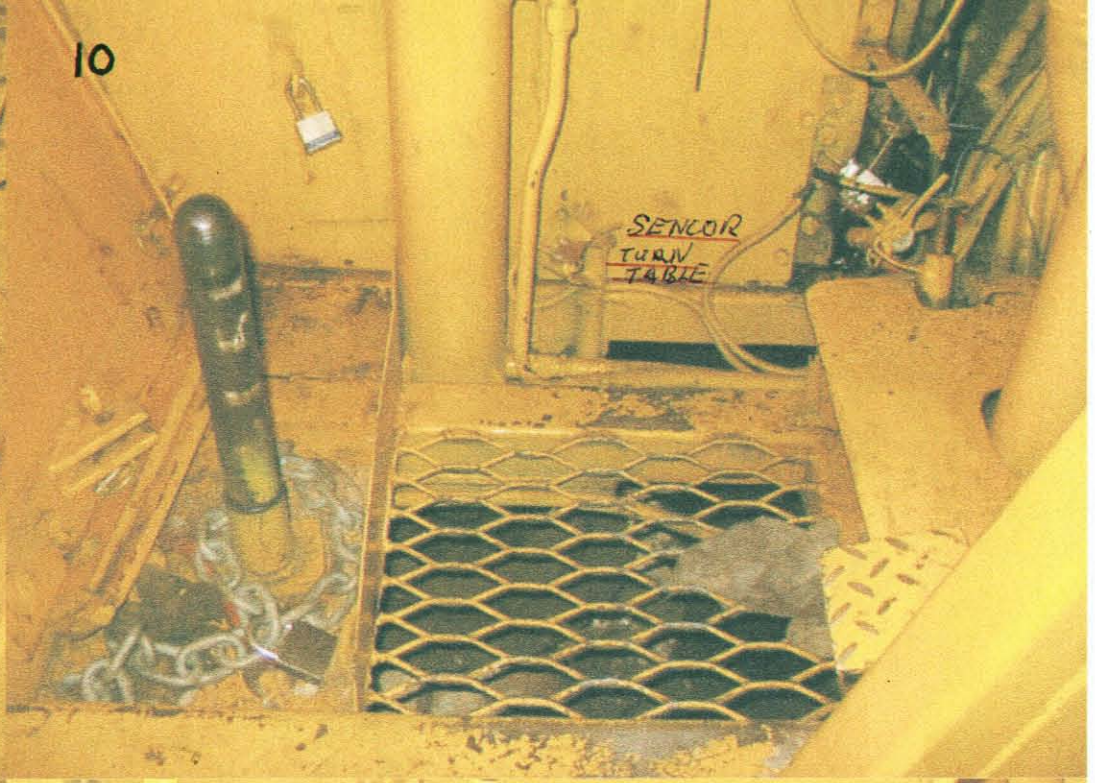

5
CONTROL VALVE
FILTER
REMOTES

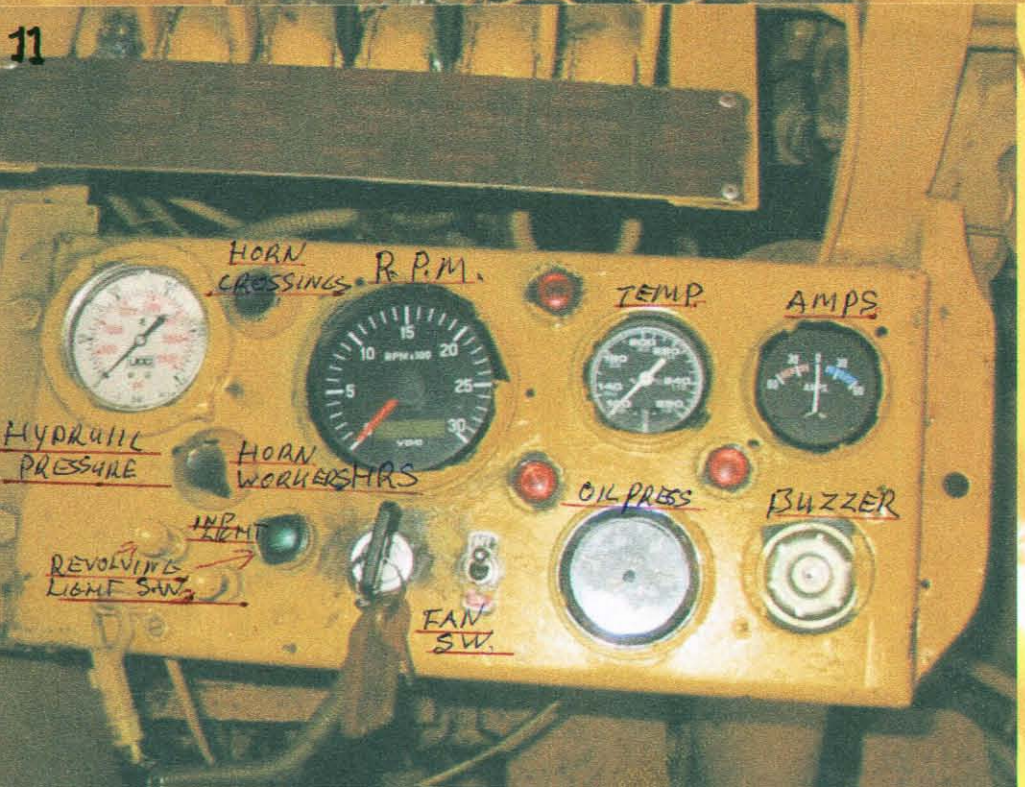

6
KEEP CLEAR
WHILST MACHINE
OPERATING

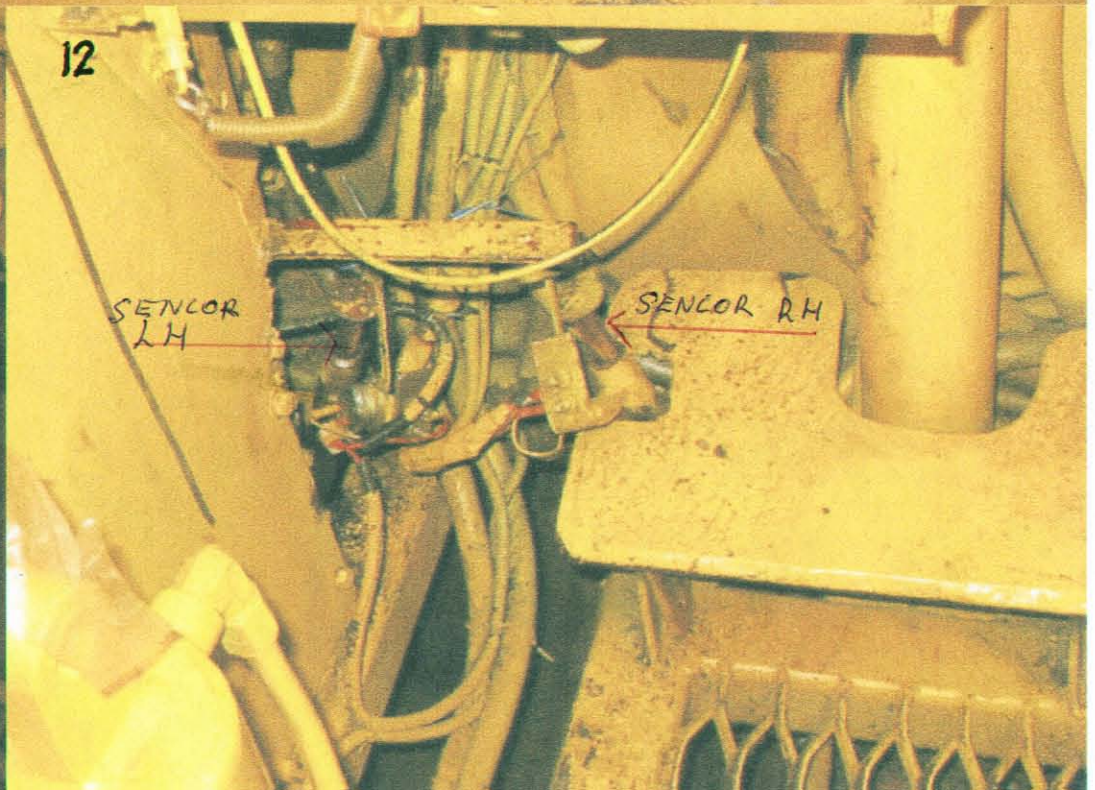

7
SENCOR L.H RAIL CLAMP
TEMP GUAGE
HYDRULIC OIL
AND LEVEL
SIGHT GLASS


8
SENSOR R H RAIL

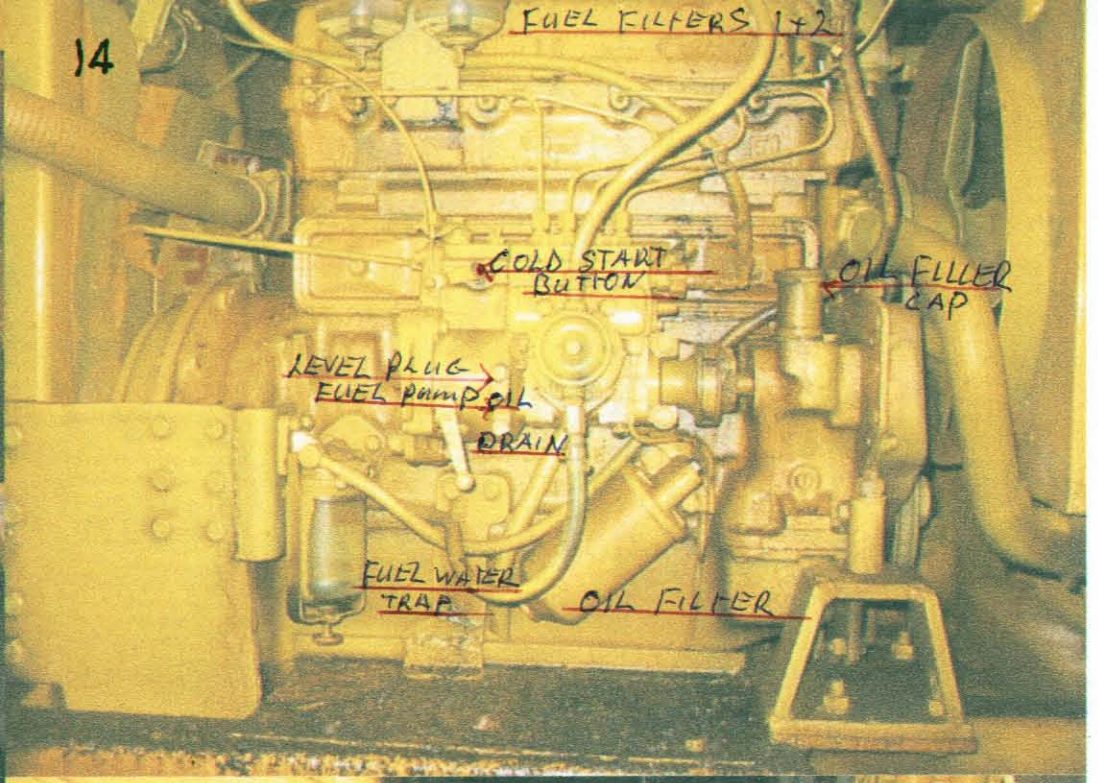

9
INSTRUMENT COVER
INSTUCTION BOOK
ENG OIL


10
SENCOR TURN TABLE

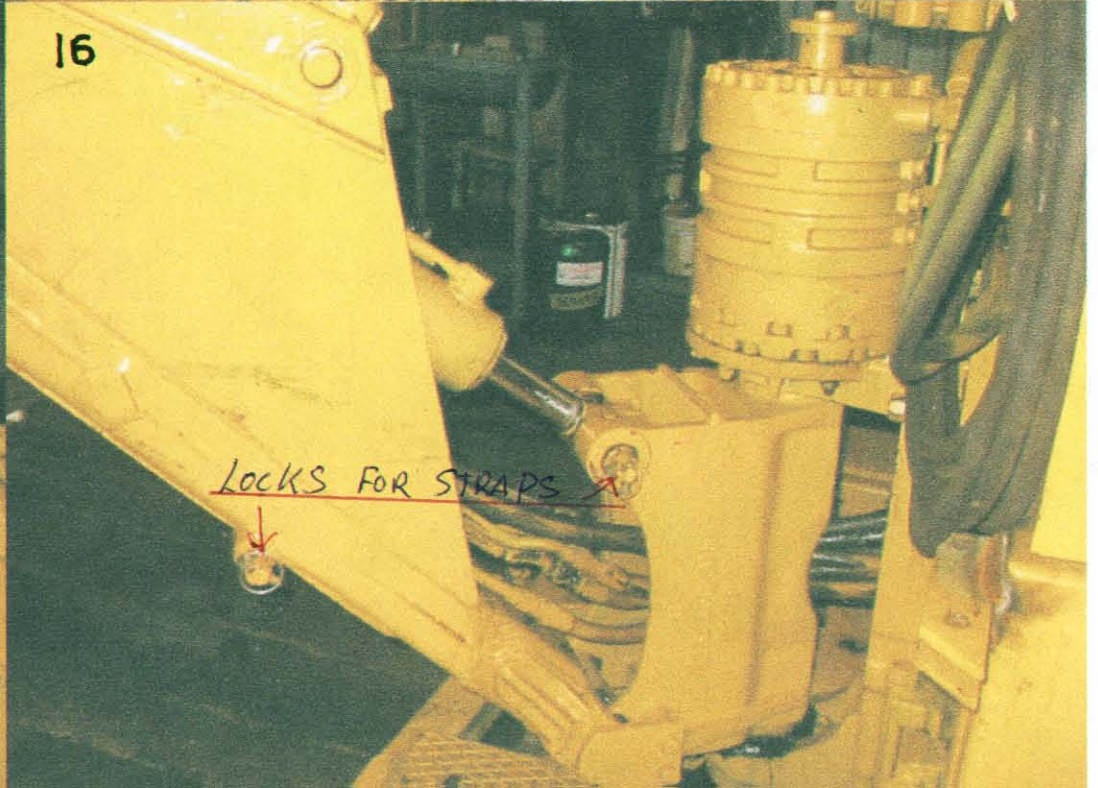

11
HORN CRESSINGS
R.P.M.
TEMP
AMPS
HYDRULIC PRESSURE
HORN
WORK HRS
OIL PRESS
BUZZER
REVOLVING LIGHT SW
FAN SW


12
SENCOR LH
SENCOR RH


13
LOCKS ON ENG DOOR

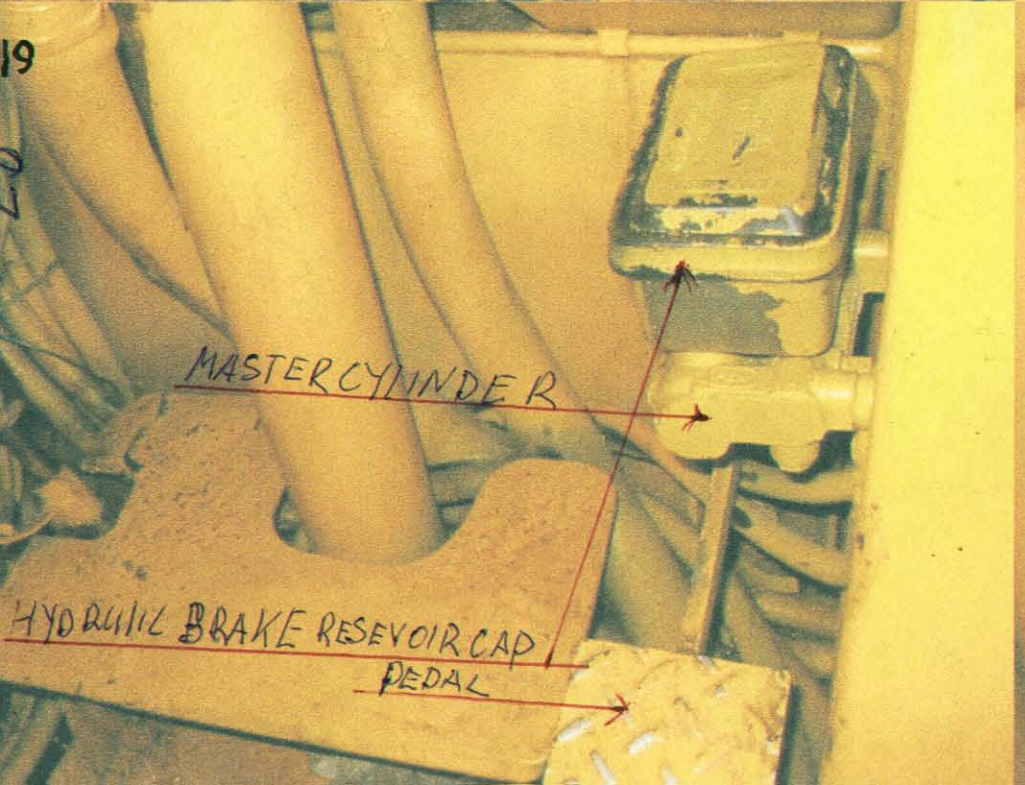

14
FUEL FILTERS 1+2
COLD START BUTTON
OIL FILLER CAP
LEVEL PLUG FUEL PUMP
OIL DRAIN
FUEL WATER TRAP
OIL FILTER


15
KEEP CLEAR WHILST MACHINE OPERATING
LOCKS FOR STRAP CATCHES

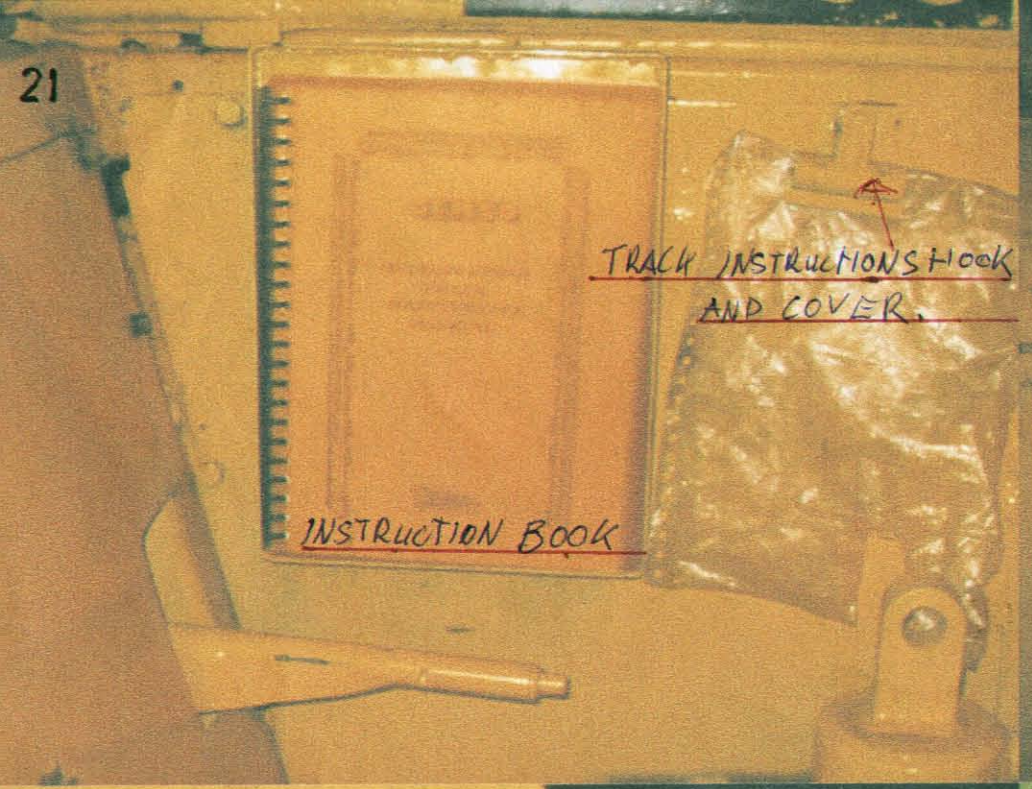

16
LOCKS FOR STRAPS

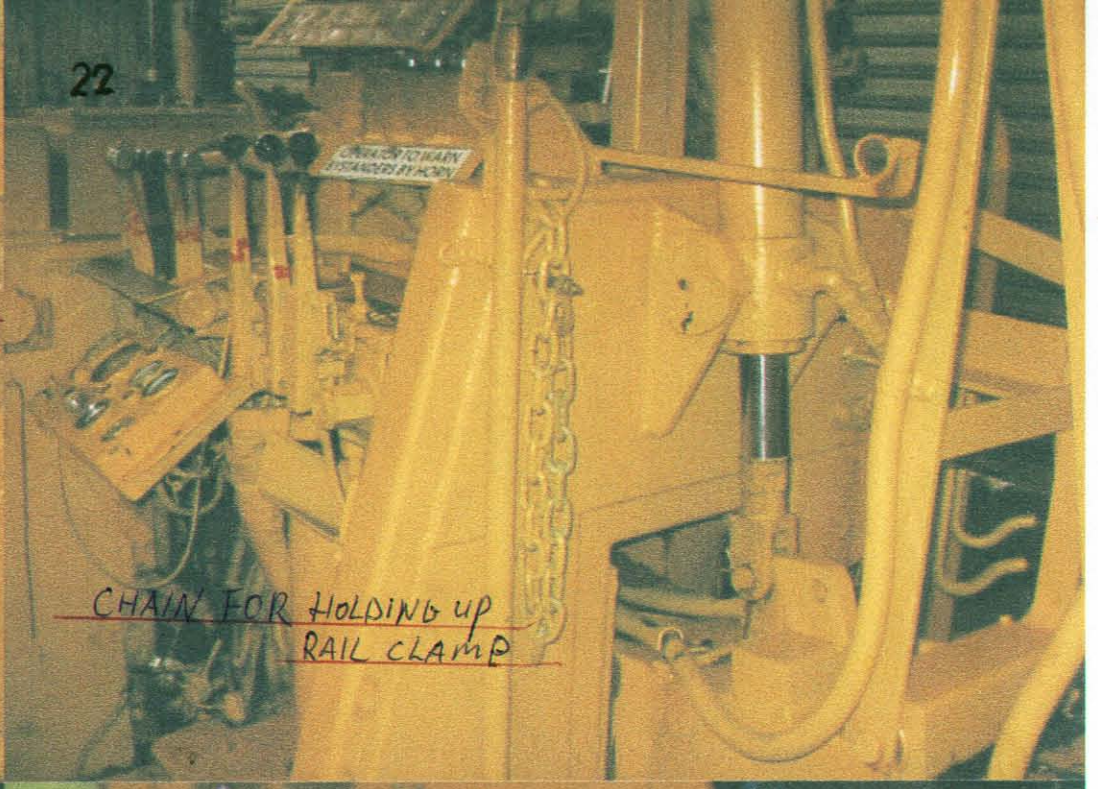

17
SEAT REMOVABLE
SWIVALS
VISION THROUGH
FLOOR FOR
JACK OPERATIONS
TO CLEAR SLEEPER

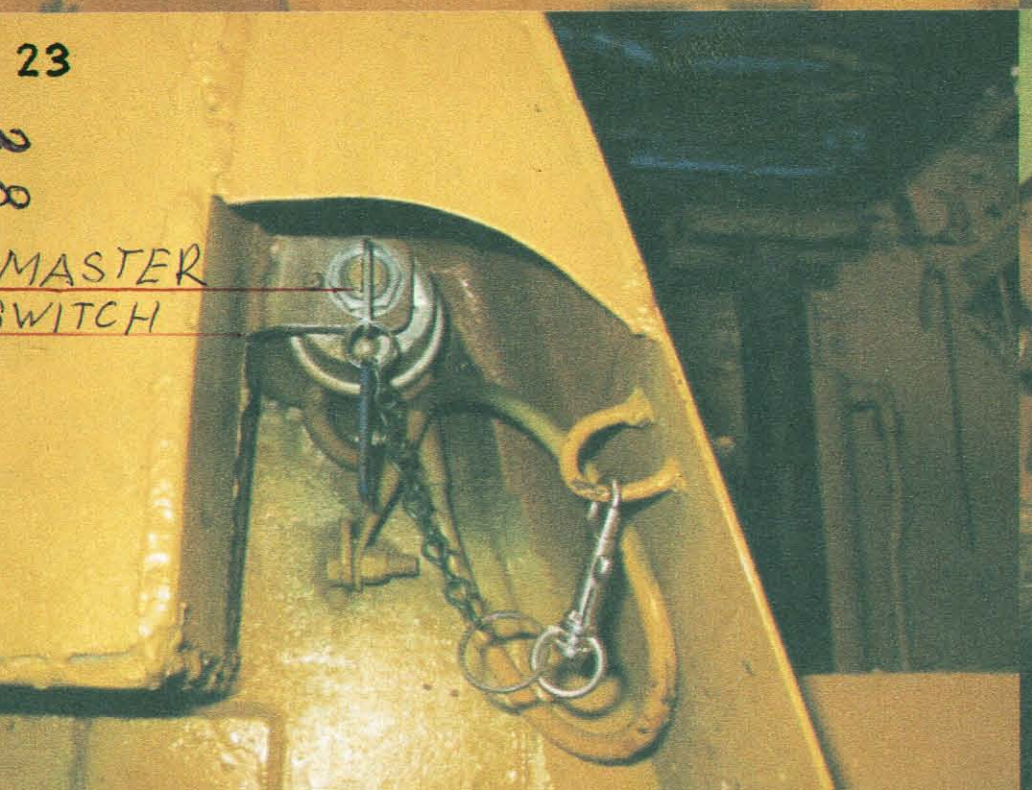

18
LOCKING STRAPS
FOR SLEEPER CRANE
FOR TRANSPORTING
CHAN FOR SECURING
TO RAIL

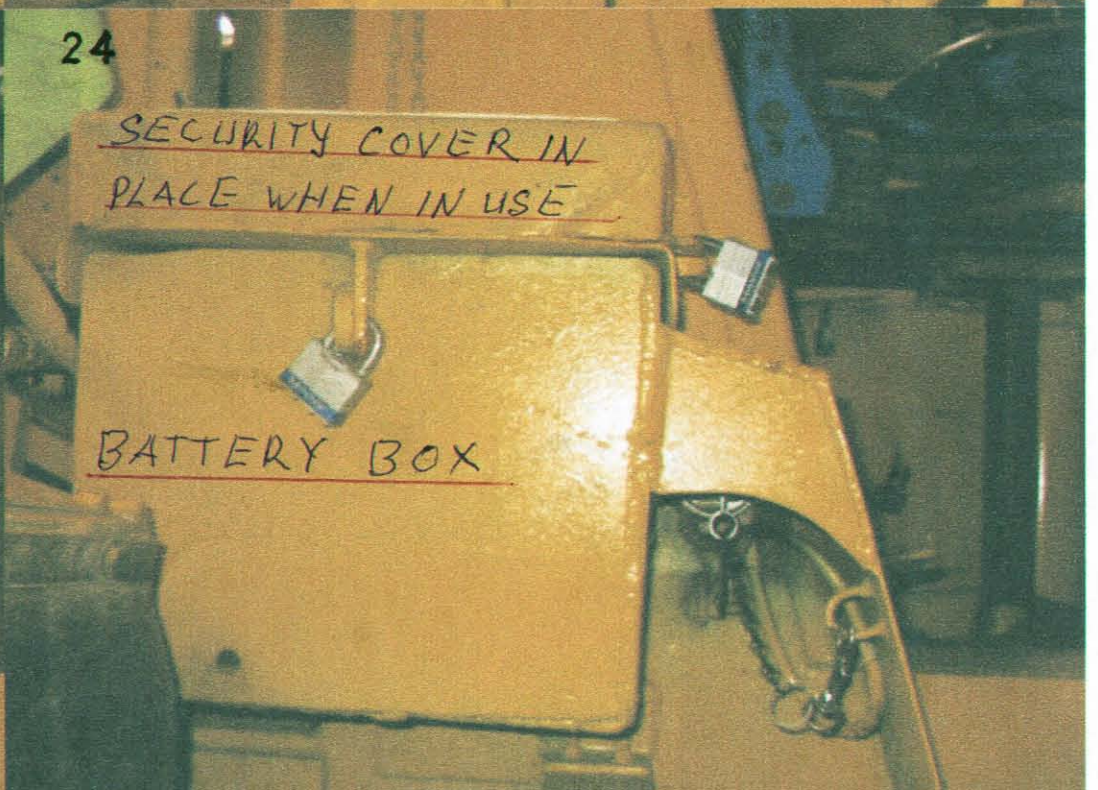

19
MASTER CYLINDER
HYDRULIC BRAKE RESEVOIR CAP
PEDAL


20
LEFT HAND JACK SENCER
TURNTABLE SENCIOR
RIGHT HAND JACK SENCER


21
TRACK INSTRUCTIONS HOOK AND COVER.
INSTRUCTION BOOK

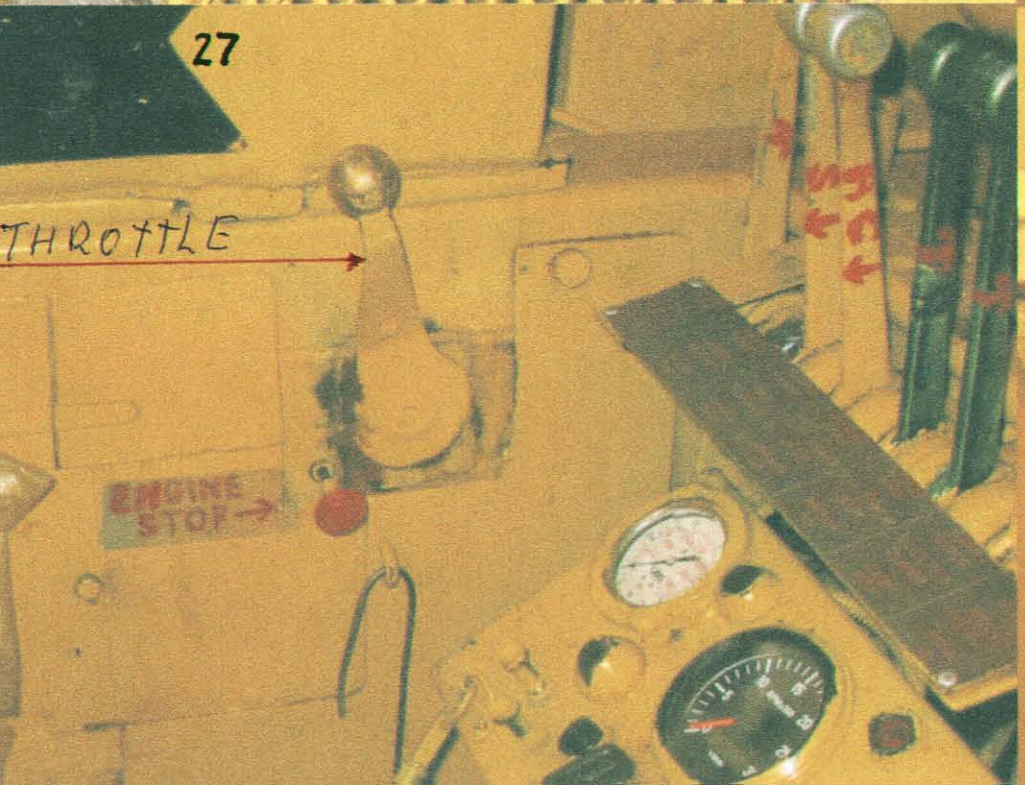

22
CHAIN FOR HOLDING UP RAIL CLAMP


23
MASTER
WITCH

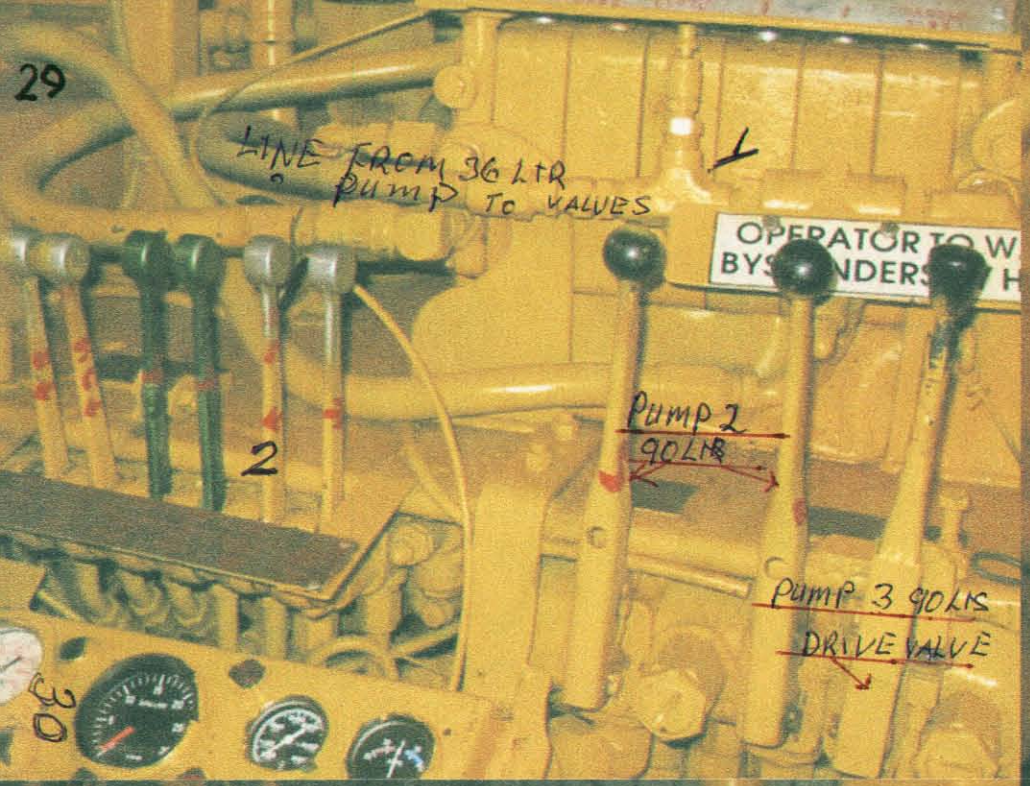

24
SECURITY COVER IN PLACE WHEN IN USE
BATTERY BOX


25
VISION OF JACKS
THROUGH FLOOR
24

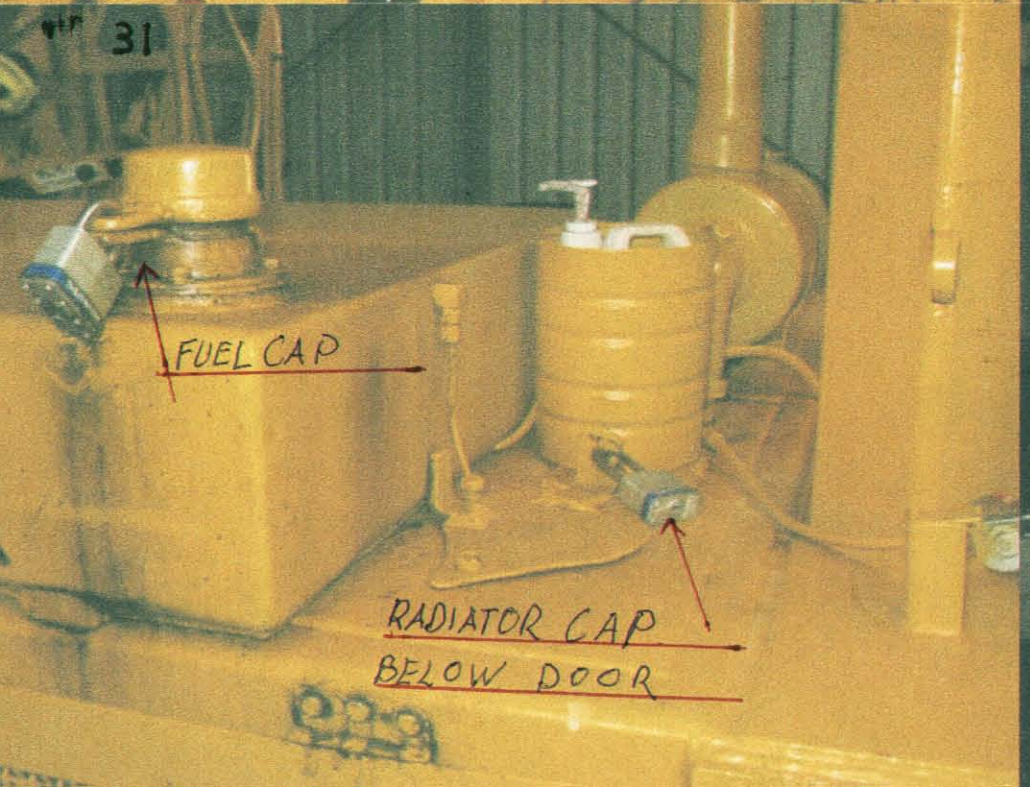

26
UP
OPEN
SLEW
STICK
BUCKET
DIPPER
BOOM
CLAMP
DOWN
CLOSE
SLEEPER CRANE CONTROLLS


27
THROTTLE
ENGINE STOP


28
PARK BRAKE INDEPENDANT OF FOOT BRAKE
DIP STICK ENGINE
THROUGH DOOR

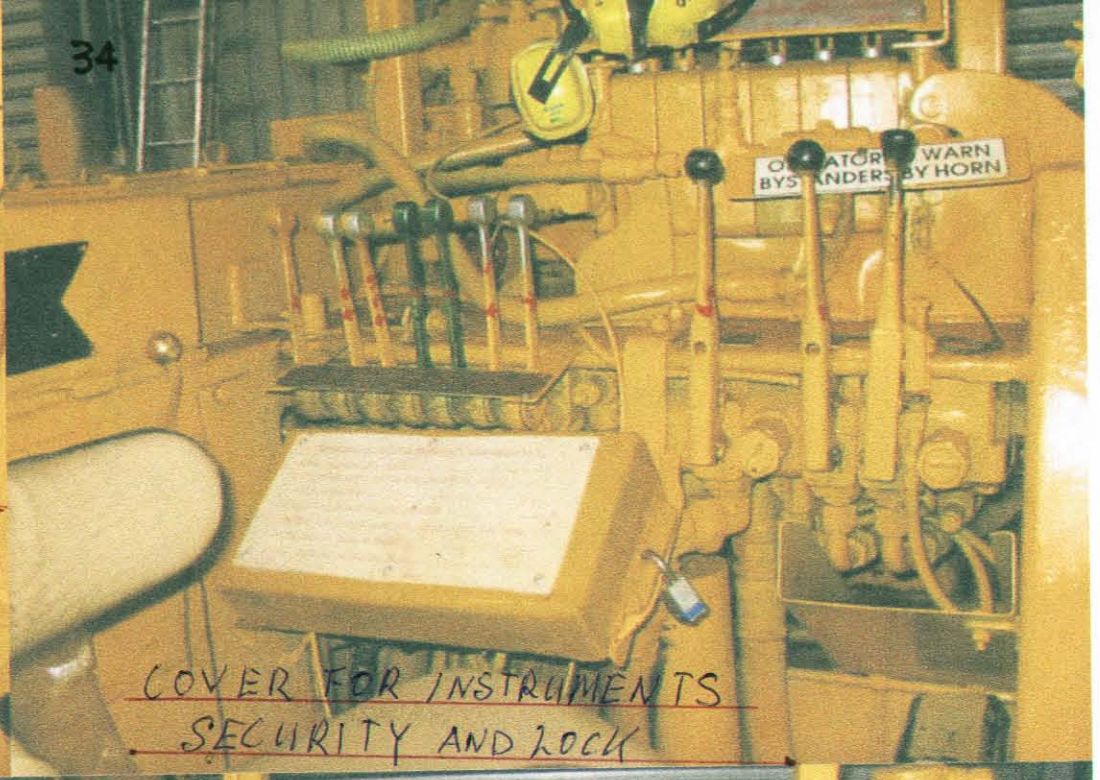

29
LINE FROM 36 LTR PUMP TO VALVES
OPERATOR TO W
BYS NDERS H
2
PUMP 2 90LTR
PUMP 3 90LTS DRIVE VALVE

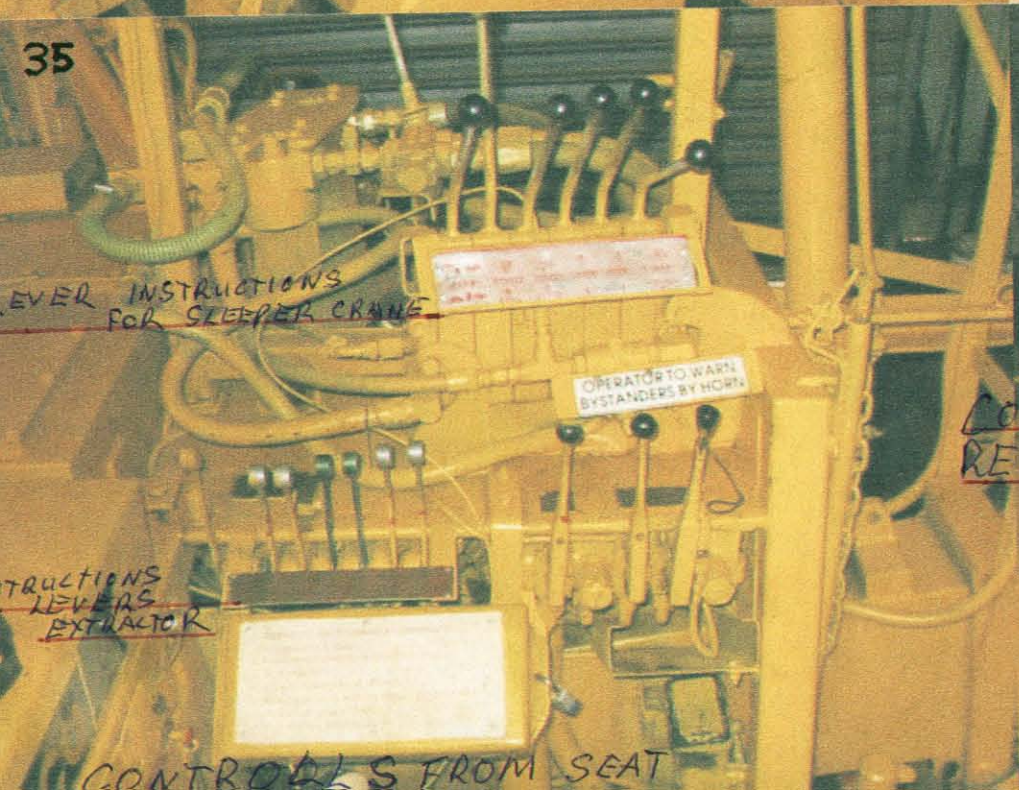

30
CHAIN TO HOLD UP RAIL CLAMPS


31
FUEL CAP
RADIATOR CAP BELOW DOOR

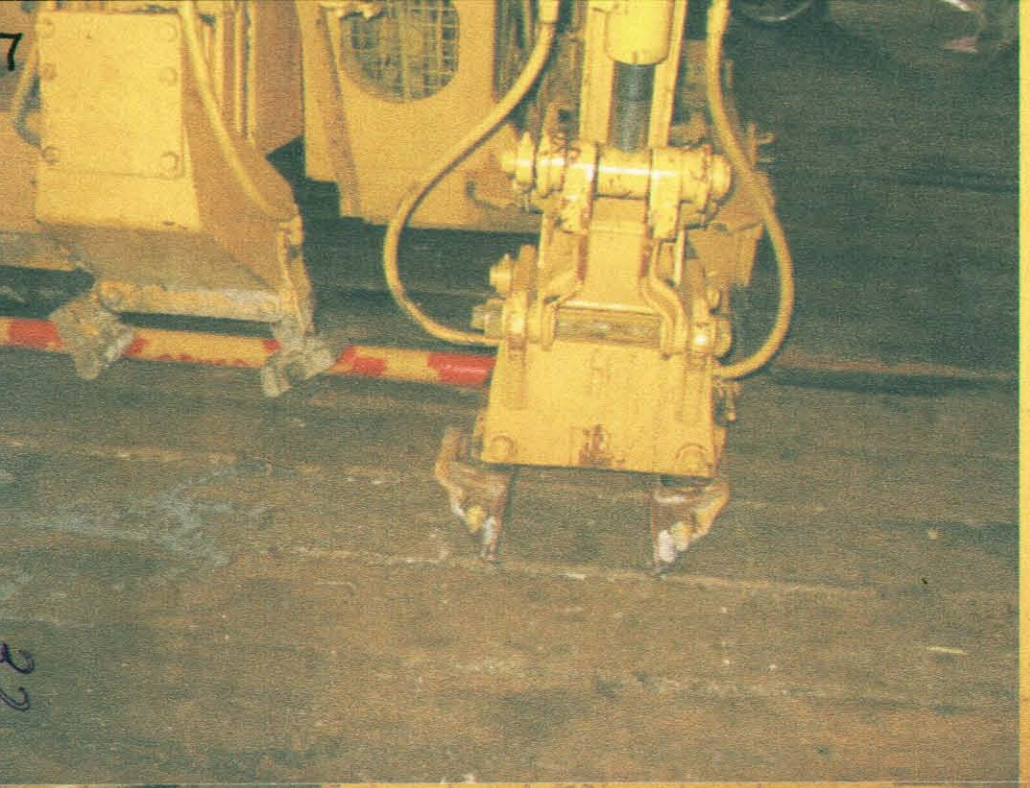

32
RELIEF VALVES TO OIL FILTERS
HYDRULIC TANK VENT AND FILLER CAP

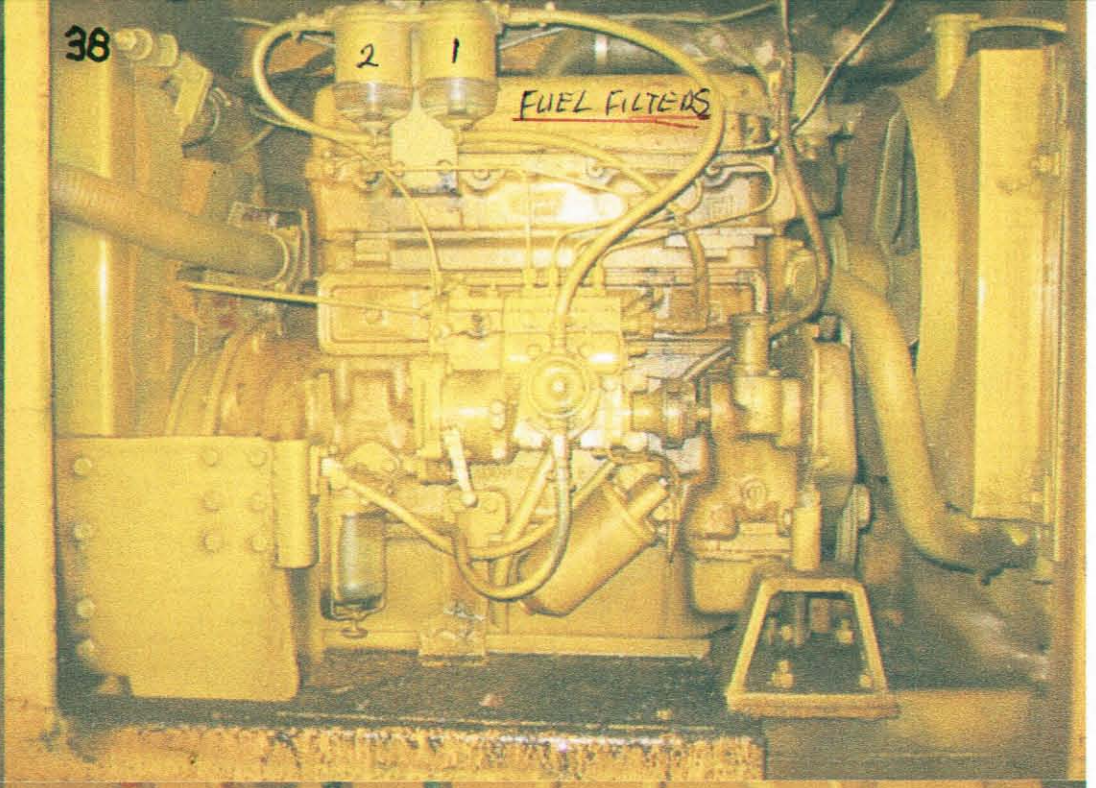

REMOTE HOSES
CLAMP FOR CRANE
FOR TRANSPORT

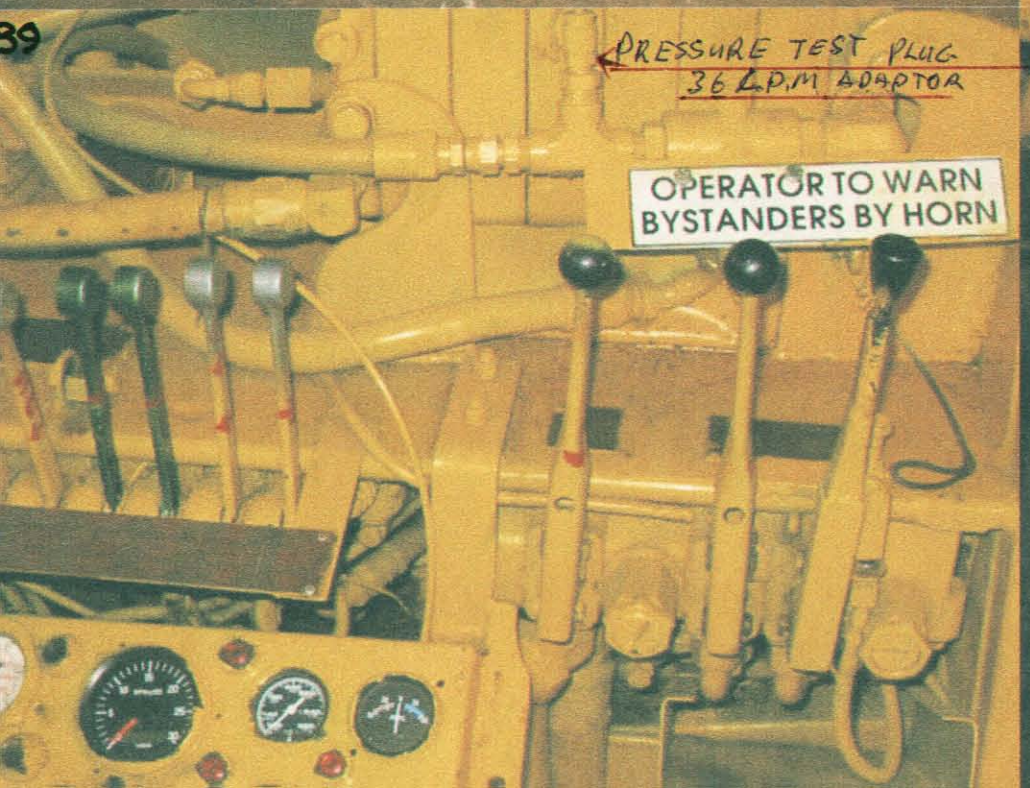

34
COVER FOR INSTRUMENTS
SECURITY AND LOCK

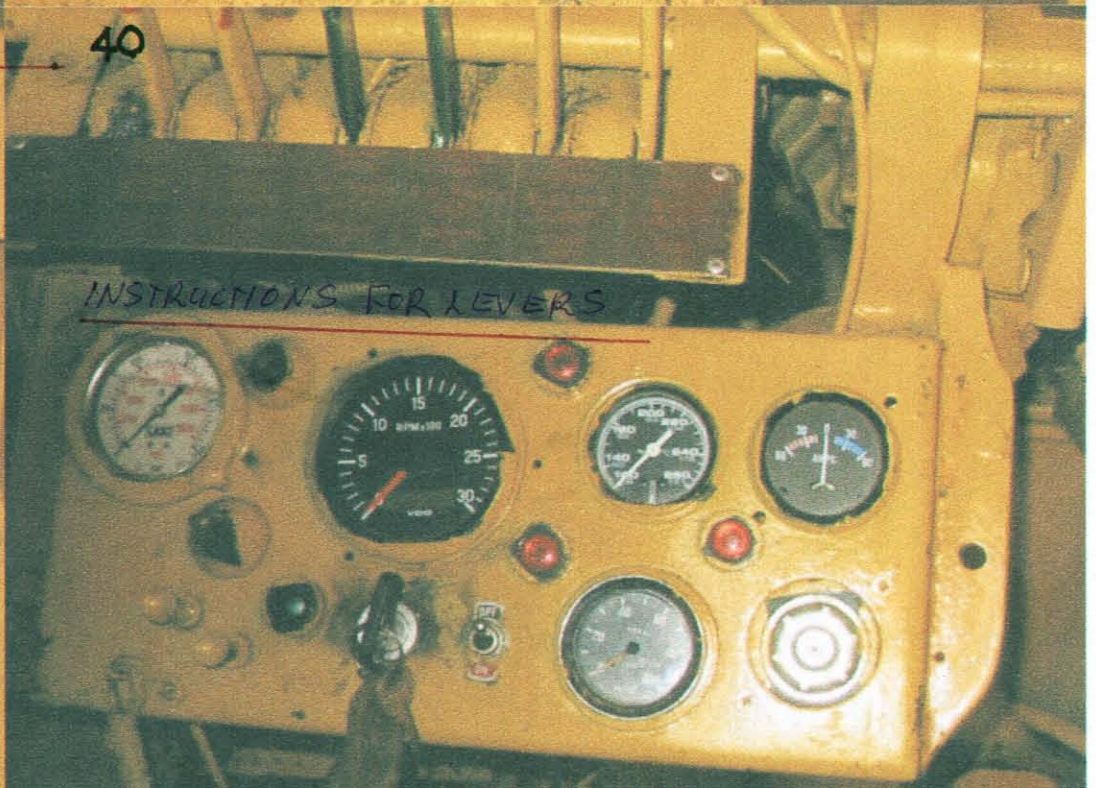

35
EVER INSTRUCTIONS
FOR SLEEPER CRANE
OPERATOR TO WARN BYSTANDERS BY HORN
TRUCTIONS
LEVERS
EXTRACTOR
CONTROLS FROM SEAT


36
CONTROL LEVER FOR
REMOTE OR SCARIFIER
OPERATOR TO WARN BYSTANDERS BY HORN




38
2
1
FUEL FILTERS


39
PRESSURE TEST PLUG
36 L.P.M ADAPTOR
OPERATOR TO WARN
BYSTANDERS BY HORN


40
INSTRUCTIONS FOR LEVERS

41


SCRAPERS
KEEP IN ORDER

42


SCRAPER
WHEEL NUTS TO BE KEPT
TIGHT 300 Ft LBS.

43


LEVEL
SIGHT
GLASS
HYDRAULIC
OIL

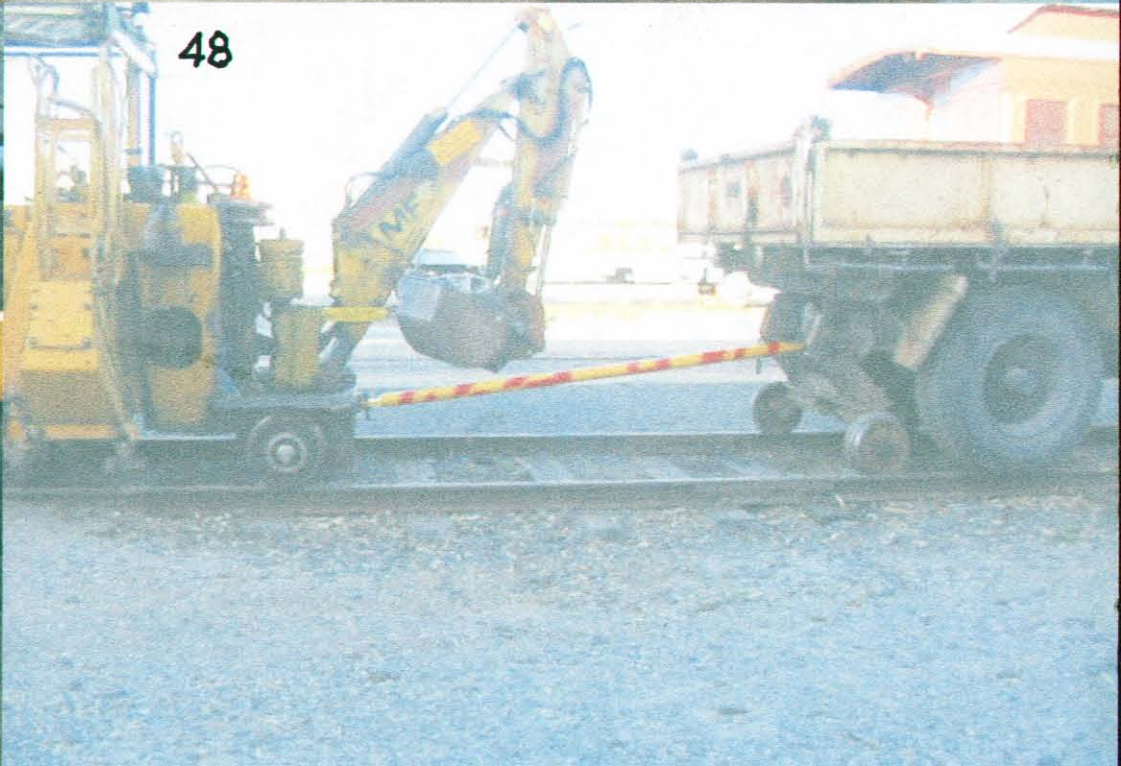
44


DRAW BAR
TO TOW MACHIE
SLEEPER
CLAMPS


45


46
MF


47
GEMCO

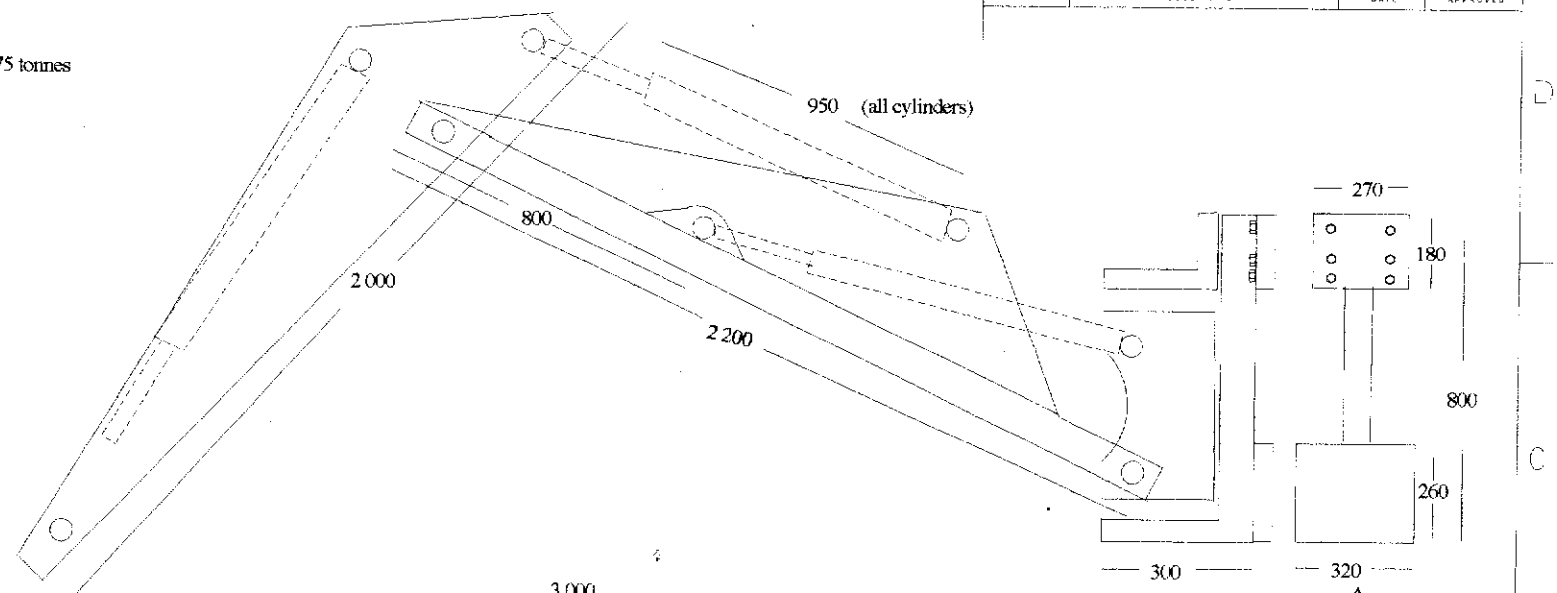

48

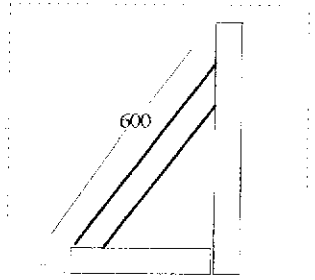
Estimated weight of backhoe kit
including operating controls 1.1 tonnes

Estimated weight of boom,dipper arm,
and grab attachment included in total. .75 tonnes

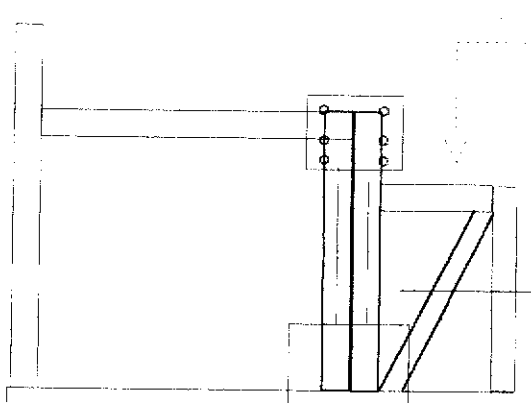
Estimated weight of component parts
- Sleeper grab 220kg
- Dipper arm 200kg
- Boom 240kg
- Slew motor and valve bank 280kg

Estimated weight of steel added
for mountings 220kg





PLAN



CHASSIS FRONT ELEVATION

Massey-Ferguson backhoe	GOOLWA RAIL ENGINEEERS	
	BACKHOE / CRANE Attachment for GEMCO	
all dimensions approx.	GRE 7-2	wj
August 2003	none	

35

SLEEPER LAYING MACHINE-HAZARD IDENTIFICATION LOG PLANT No.

Item No	HAZARD	RISK LEVEL Very Unlikely Likely Unlikely Highly Unlikely	RISK MINIMIZATION	RECORDS AMENDED ?	DATE	SIGN

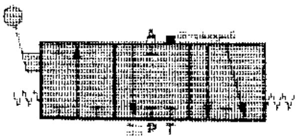
NOTE : Add any hazards encountered during operation.
If possible eliminate the risk or develop risk control measures to minimize the risk.
Ensure measures have been implemented and records amended.

SHEET NO: _____

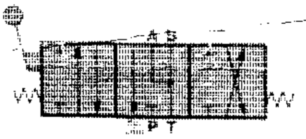
AVAILABLE SPOOL CONFIGURATIONS

D
Q Double acting
(Q for three displacements)

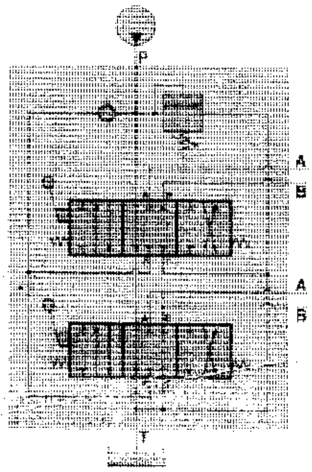
S Single acting



M Motor

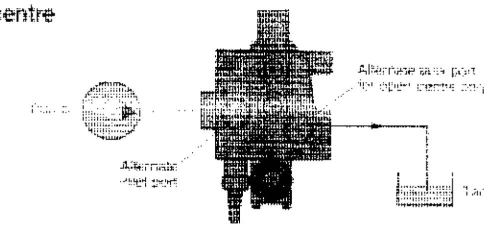


OP10: Typical circuit for 2-spool double-acting configuration

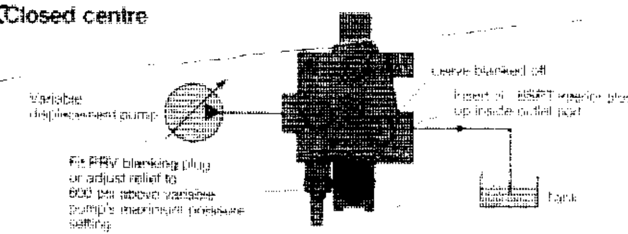


TYPICAL INSTALLATIONS

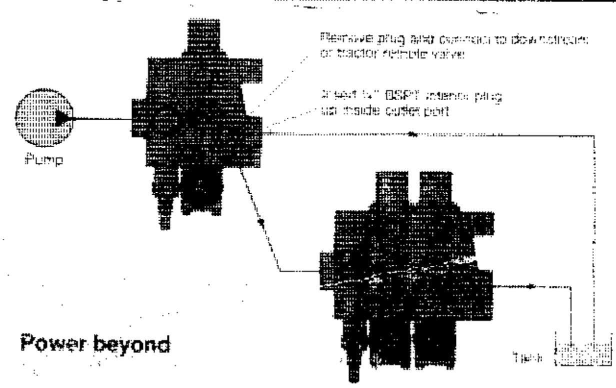
Open centre

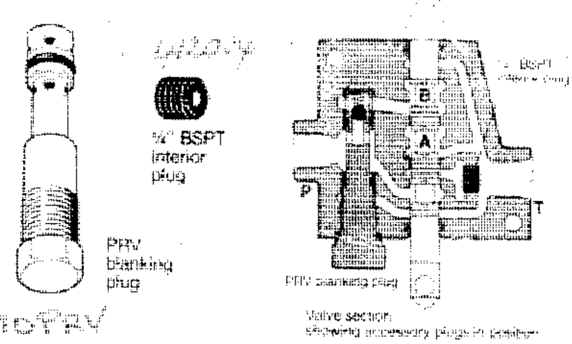


Closed centre

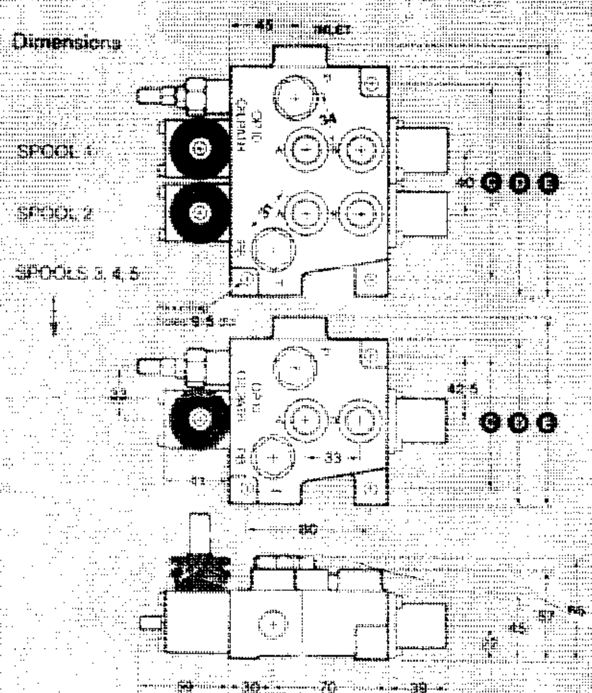


Power beyond





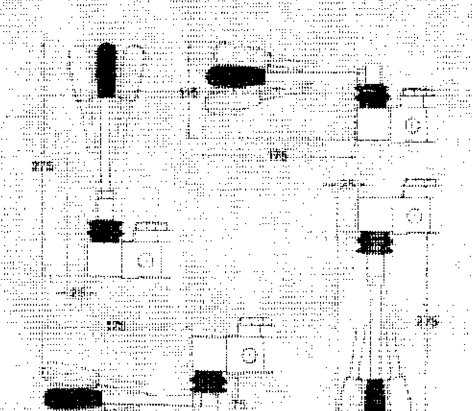
Dimensions



Variable dimensions (to preceding page)

Dim	Number of spools				
	1	2	3	4	5
C	85	125	165	205	245
D	107	[illegible]	187	227	[illegible]
E	120	160	200	240	280

Approximate clearances for 4-way handle positions



Notes:
1. Threaded holes on boss provide for end-on mounting of operating handle.
2. Dimensions shown are for minimum handle extent. Handle length can be effectively increased by 10mm.

GEMCO

VDO cockpit international

Drehzahlmesser mit Betriebsstundenzähler | **Compte-tours avec compteurs d'heures de service**
Tachometer with operating hour counter | **Cuentarrevoluciones con cuentahoras de servicio**

automotive
mannesmann VDO Kienzle

MONTAGEANLEITUNG

INSTALLATION INSTRUCTIONS | INSTRUCTIONS DE MONTAGE | INSTRUCCIONES DE MONTAJE

999 165 009

04/97 D
09/98 E

¡Evite fumar!
¡Evite las luces o los fuegos abiertos!

vehículo pueden ocasionar quemaduras en los cables, explosiones de baterías y desperfectos en los demás sistemas electrónicos. Por lo tanto, antes de iniciar los trabajos debe desembornar el polo negativo de la batería del vehículo.

En caso de que el vehículo cuente con baterías adicionales, será preciso desembornar también los polos negativos de dichas baterías.

- Las alteraciones o manipulaciones del producto pueden afectar negativamente a la seguridad. En consecuencia, no deben realizarse alteraciones ni manipulaciones.
- Durante el desmontaje/montaje de los asientos, lo revestimientos u otros, proceda con cuidado para no dañar ningún cable ni soltar ninguna conexión de enchufe.
- ¡Posible pérdida de datos!

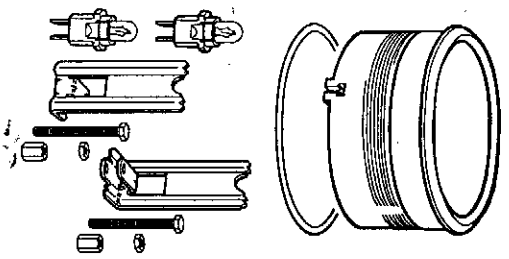
  Al desembornar el polo negativo de la batería, todas las memorias electrónicas volátiles pierden los valores que se hubieran introducido en ellas. Por lo tanto, antes de desembornar anote todos los datos pertinentes, para poder llevar a cabo posteriormente la reprogramación necesaria.

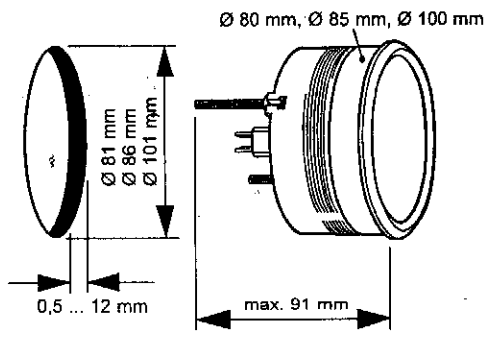
Aspectos que deben tenerse en cuenta durante la instalación:

- Durante el montaje, procure que los componentes del producto no afecten u obstaculicen o dañen las funciones del vehículo.
- Instale en el vehículo tan sólo componentes que estén en perfecto estado.
- Durante la instalación, asegúrese de que el producto no provoca ninguna disminución del campo visual, y de que el producto no quede situado en el área de impacto de las cabezas del conductor y del acompañante.
- En la zona de montaje, no olvide respetar el espacio libre necesario detrás de los orificios o de la abertura de montaje.
- Tenga en cuenta el recorrido de los cables o de los ramales de cables.
- No elija el lugar de montaje en la zona del airbag mecánico o eléctrico.
- No practique los orificios ni las aberturas de montaje en tirantes ni en brazos de soporte o de estabilización.
- Utilizando una fresa cónica, efectúe un taladrado previo, de pequeñas dimensiones, de los orificios de montaje. Si fuera necesario, agrándelos y acábelos empleando un serrucho de calado o un serrucho de puñal, o bien una lima. Desbarbe los bordes. Respete al pie de la letra las prescripciones de seguridad formuladas por los fabricantes de las herramientas.
- Para trabajos debajo del vehículo, asegúrese el mismo siguiendo las prescripciones del fabricante del vehículo.
- En caso de que sea preciso realizar cualquier trabajo en el motor en funcionamiento, extreme las precauciones. Para efectuar tales tareas, lleve puesta una vestimenta de trabajo adecuada, ya que existe riesgo de lesiones por contusiones y quemaduras. Si lleva el pelo largo, recójaselo con una redecilla apropiada.
- Para la medición de las tensiones y las corrientes que circulan en el vehículo, utilice exclusivamente multímetros o lámparas de prueba con diodo especialmente concebidas para ese fin. El empleo de lámparas de prueba convencionales puede tener como consecuencia desperfectos en los dispositivos de control o en otros sistemas eléctricos.

Aspectos a tener en cuenta después del montaje:

- Emborne firmemente el cable de masa al polo negativo de la batería del vehículo.
- Introduzca o programe de nuevo los valores de las memorias electrónicas volátiles.
- Verifique todas (!) las funciones del vehículo.





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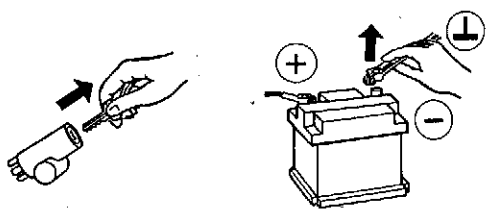

VDO cockpit international

Drehzahlmesser mit Betriebsstundenzähler | **Compte-tours avec compteurs d'heures de service**
Tachometer with operating hour counter | **Cuentarrevoluciones con cuentahoras de servicio**

automotive
mannesmann VDO Kienzle

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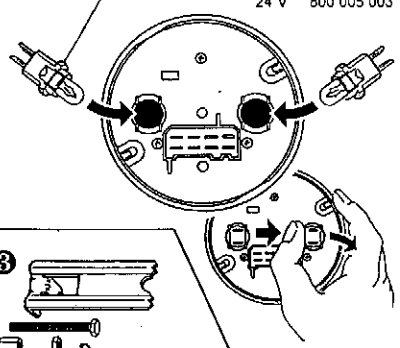

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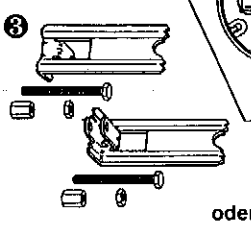

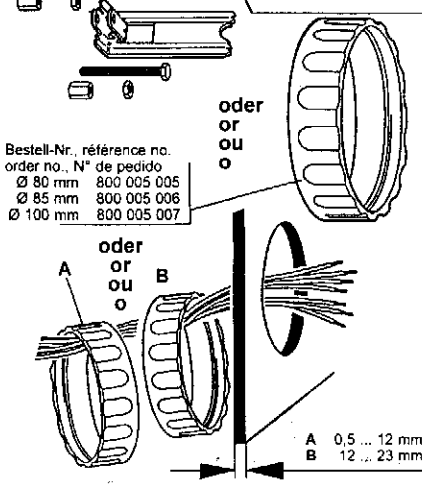

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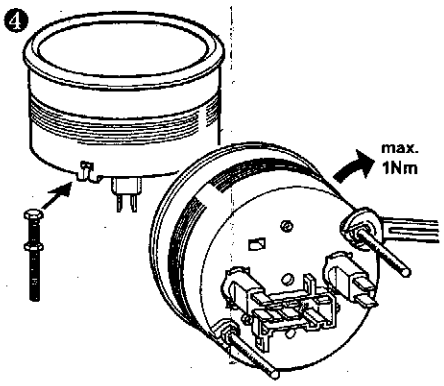

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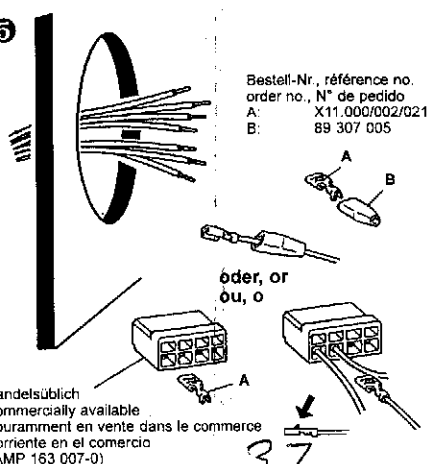

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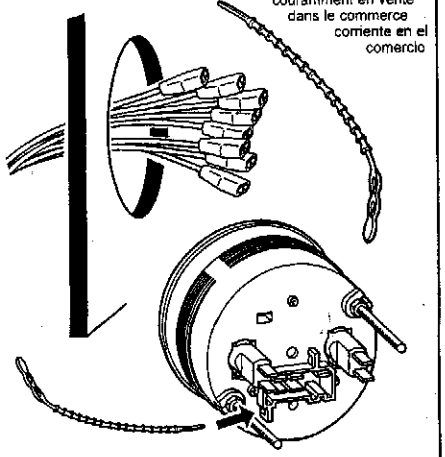

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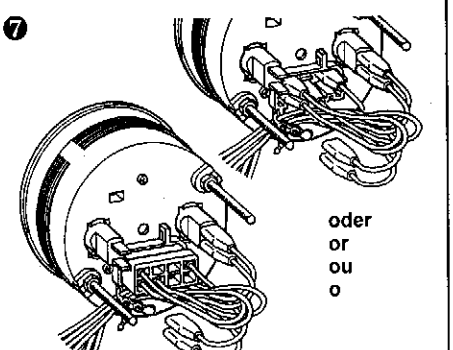

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Elektrischer Anschluß

Schließen Sie die Kabel entsprechend dem elektrischen Anschlußplan an.

Sicherheitshinweise:

- Kabelquerschnitt beachten!

Eine Verringerung des Kabelquerschnitts führt zu einer höheren Stromdichte. Dies kann zu einer Erhitzung des betreffenden Kabelabschnitts führen!

- Bei der elektrischen Kabelverlegung benutzen Sie vorhandene Kabelkanäle und Kabelstränge. Nicht die Kabel parallel zu Zündkabeln oder zu Kabel, die zu großen Stromverbrauchern führen, verlegen! Fixieren Sie die Kabel mit Kabelbändern oder Klebeband!
- Führen Sie die Kabel nicht über bewegliche Teile. Kabel nicht an der Lenksäule befestigen!
- Achten Sie darauf, daß die Kabel keinen Zug-, Druck- oder Scherkräften ausgesetzt sind!
- Wenn die Kabel durch Bohrungen geführt werden, schützen Sie sie mittels Gummitüllen oder ähnlichen Teilen.
- Abisolierung von Kabeln nur mit einer Abisolierzange vornehmen. Die Zange so einstellen, daß dabei keine Litzen beschädigt oder getrennt werden!
  Verlöten Sie neu zu schaffende Kabelverbindungen nur im Weichlötverfahren oder verwenden Sie handelsübliche Quetschverbinder!
- Quetschverbindungen nur mit einer Kabelquetschzange vornehmen. Auf die Sicherheitshinweise der Handwerkzeughersteller achten!
- Isolieren Sie freigelegte Litze so, daß keine Kurzschlüsse entstehen können!
- Kurzschlußgefahr durch fehlerhafte Verbindungsstellen oder gequetschte Kabel!
  Kurzschlüsse im Bordnetz des Kfz können Kabelbrände, Batteriexplosionen und Beschädigungen anderer elektronischer Systeme verursachen. Deshalb müssen alle Verbindungen der Spannungsversorgung entweder verlötet oder mit verschweißbaren Stoßverbindern versehen und ausreichend isoliert sein. Andere Verbindungen, wie z.B. den Abgriff des Geschwindigkeits- oder Drehzahlsignals oder den Anschluß an Bremslicht- bzw. Kupplungsschalter, können Sie mit handelsüblichen Quetschverbindern herstellen!
  Besonders auf einwandfreie Masseverbindungen achten!
- Falschanschlüsse können zu Kurzschlüssen führen. Schließen Sie die Kabel nur entsprechend dem elektrischen Anschlußplan an!

Electrical Connection

Connect the cables in accordance with the electrical connection diagram.

Safety Instructions

- Take account of the cable cross section.

A reduction in the cable cross section results in a higher current density. This can cause the cable to heat up.

- When laying electric cables, use existing cable ducts and routes but without laying cables parallel to ignition cables or cables leading to high current consumers. Fix the cables with cable tape or adhesive tape.
- Do not route cables over mobile components. Do not fasten cables to the steering column.
- Make sure that the cables are not exposed to tensile, compressive or shear forces.
- If the cables are routed through drilled holes, protect them with rubber sleeves or the like.
- Strip cables only with a cable stripper. Adjust the stripper so that no strands are damaged or severed.
  Solder new cable connections only with the soft soldering process or use standard crimp connectors.
  Crimp connections should only be made with a crimping tool. Follow the tool manufacturer's safety instructions.
  Insulate exposed strands so that no short circuiting can occur.
- Danger of short circuiting due to faulty connections or pinched cables
  Short circuits in the vehicle's wiring can cause cable fires, battery explosions and damage to other electronic systems. For this reason all connections in the voltage supply must be either soldered or provided with weldable connectors and sufficiently insulated. Other connections, such as for tapping the vehicle speed or rpm signal or the connection to brake light or coupling switches, can be made with conventional crimp connectors.
  Make particularly sure that the wiring is properly earthed.

Faulty wiring can cause short circuiting. Wire the cables only in accordance with the electrical connection diagram.

Raccordement électrique

Raccorder les câbles conformément au schéma de raccordement électrique.

Consignes en matière de sécurité

- Tenir compte de la section des câbles.

Une réduction de la section des câbles conduit à un plus forte densité du courant. Or, ceci risque d'engendrer un échauffement du tronçon de câble correspondant.

- Lors de la pose des câbles électriques, il y a lieu d'utiliser les caniveaux à câbles et les faisceaux de câbles existants. Toutefois, il y aura lieu de s'abstenir de poser les câbles parallèlement aux câbles d'allumage ou à des câbles engendrant une trop grande consommation de courant. Fixer les câbles au moyen de rubans pour câbles ou de rubans adhésifs.
- Ne pas poser les câbles par-dessus des pièces mobiles. S'abstenir de fixer les câbles à la colonne de direction.
- Veiller à ce que les câbles ne soient pas exposés à des forces de traction, de pression ou de cisaillement.
- Lorsque les câbles ou conducteurs sont posés à travers de perçages, protéger les câbles au moyen de passe-câbles en caoutchouc ou de dispositifs de protection similaires.
- Dénuder les câbles ou conducteurs uniquement au moyen d'une pince à dénuder. Régler la pince de telle manière qu'aucun des conducteurs ou torons ne soit endommagé ou que ceux-ci ne soient pas séparés.
- N'exécuter les nouveaux assemblages de câbles et conducteurs que selon la méthode du brasage tendre ou bien utiliser des machines de sertissage d'un type commercial courant.
- Les assemblages obtenus par sertissage ne pourront être exécutés qu'au moyen d'une pince de sertissage pour câbles et conducteurs. Il importera d'observer les consignes en matière de sécurité émises par les constructeurs d'outillages portatifs.
  Les conducteurs dénudés devront être isolés de telle manière que tout court-circuit soit impossible.

Danger de court-circuit dû à des points d'assemblage défectueux ou à des câbles coincés!
Des courts-circuits apparaissant dans le réseau de bord du véhicule automobile risquent d'engendrer des incendies de câbles et conducteurs, des explosions de batteries d'accumulateurs ainsi que des endommagements sur d'autres systèmes électroniques. C'est pourquoi nous vous recommandons soit d'assembler par brasage toutes les liaisons du système d'alimentation en tension, soit de pourvoir les extrémités des conducteurs de raccords bout-à-bout et de les isoler suffisamment. D'autres liaisons, telles que celles pour le branchement du signal d'indication de la vitesse ou du signal d'indication des révolutions ou encore pour le raccordement du feu stop ou du disjoncteur de l'embrayage, pourront être exécutées au moyen d'agrafes de sertissage d'un type commercial courant. Veiller tout particulièrement à une mise à la masse irréprochable.

- De mauvais raccordements pourraient mener à des courts-circuits. Raccorder les câbles et conducteurs électriques uniquement selon le schéma de raccordement électrique.

Conexión eléctrica:

Conecte los cables de acuerdo con el esquema eléctrico de conexión.

Instrucciones de seguridad

- Tenga en cuenta la sección de cable.

La disminución de la sección de cable provoca un incremento de la densidad de la corriente. Esto puede conducir a un sobrecalentamiento del tramo de cable afectado.

- Durante el cableado eléctrico, utilice los conductos para cables y los ramales de cables presentes en el vehículo, pero evite conducir o tender los cables en paralelo a los cables de encendido o a cables que se dirijan a dispositivos eléctricos importantes. Fije los cables mediante cinta para cables o cinta adhesiva.
- No conduzca los cables por encima de partes móviles. No fije los cables a la columna de la dirección.
- Cerciórese de que los cables no estén sometidos a fuerzas de tracción, presión o seccionado.
- En caso de que los cables discurran a través de orificios, protéjalos mediante vainas de

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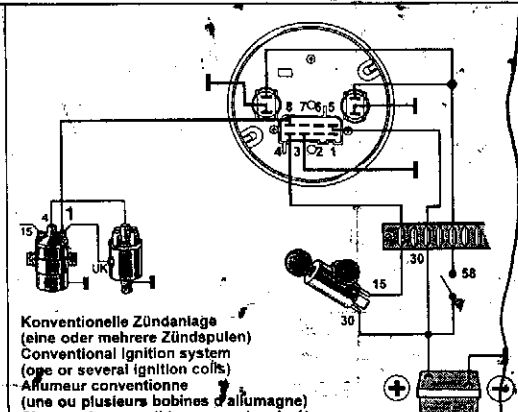
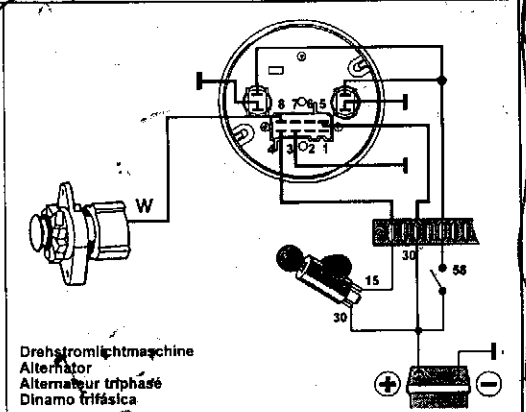
goma o similares.

- Proceda al aislamiento de los cables empleando exclusivamente unas pinzas de aislamiento. Aplique la pinza de tal forma que no dañe ni separe ningún trenzado de cables.
  Suelde las conexiones de cables nuevas, pero únicamente utilizando el procedimiento de soldadura a estaño o utilice las uniones por compresión corrientes en el mercado.
- Realice las uniones por compresión empleando exclusivamente unas tenazas de compresión de cables. Respete las prescripciones de seguridad de los fabricantes de la herramienta.
- Proceda al aislamiento de los cables expuestos, de forma que no puedan producirse cortocircuitos.
- ¡Peligro de cortocircuito debido a puntos de conexión deficientes o a cables aplastados!
  Los cortocircuitos en la red de a bordo del vehículo pueden ocasionar quemaduras de cables, explosiones de la batería y desperfectos en otros sistemas eléctricos. Por este motivo, todas las conexiones del suministro de tensión deben estar o bien soldadas o bien provistas de uniones de soldadura por electropercusión, y deben contar con el suficiente aislamiento. Puede realizar otras conexiones, como por ejemplo la toma de la señal del velocímetro o del cuentarrevoluciones, o bien la conexión a los conmutadores de la luz de freno o del embrague, empleando uniones por compresión adquiribles en los comercios del ramo.
  ¡Ponga especial cuidado en el establecimiento de unas uniones de masa impecables!
- Las conexiones defectuosas pueden provocar cortocircuitos. ¡Conecte los cables siguiendo fielmente el esquema eléctrico de conexión!

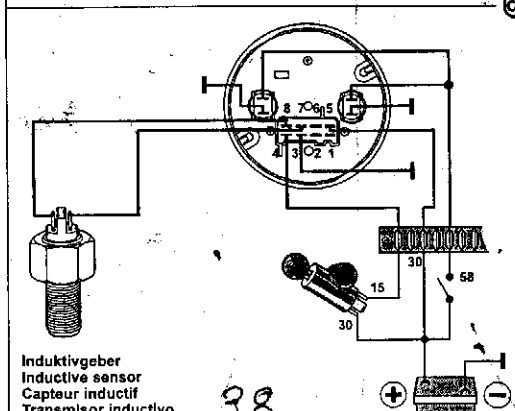


Konventionelle Zündanlage
(eine oder mehrere Zündspulen)
Conventional ignition system
(one or several ignition coils)
Allumeur conventionne
(une ou plusieurs bobines d'allumagne)
Sistema de encendido convencional sólo
(una o varias bobinas de encendido)

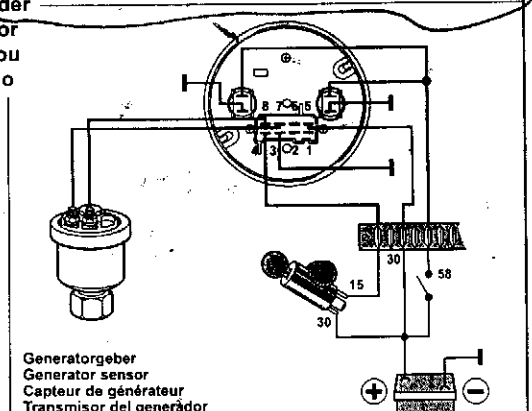


Drehstromlichtmaschine
Alternator
Alternateur triphasé
Dinamo trifásica

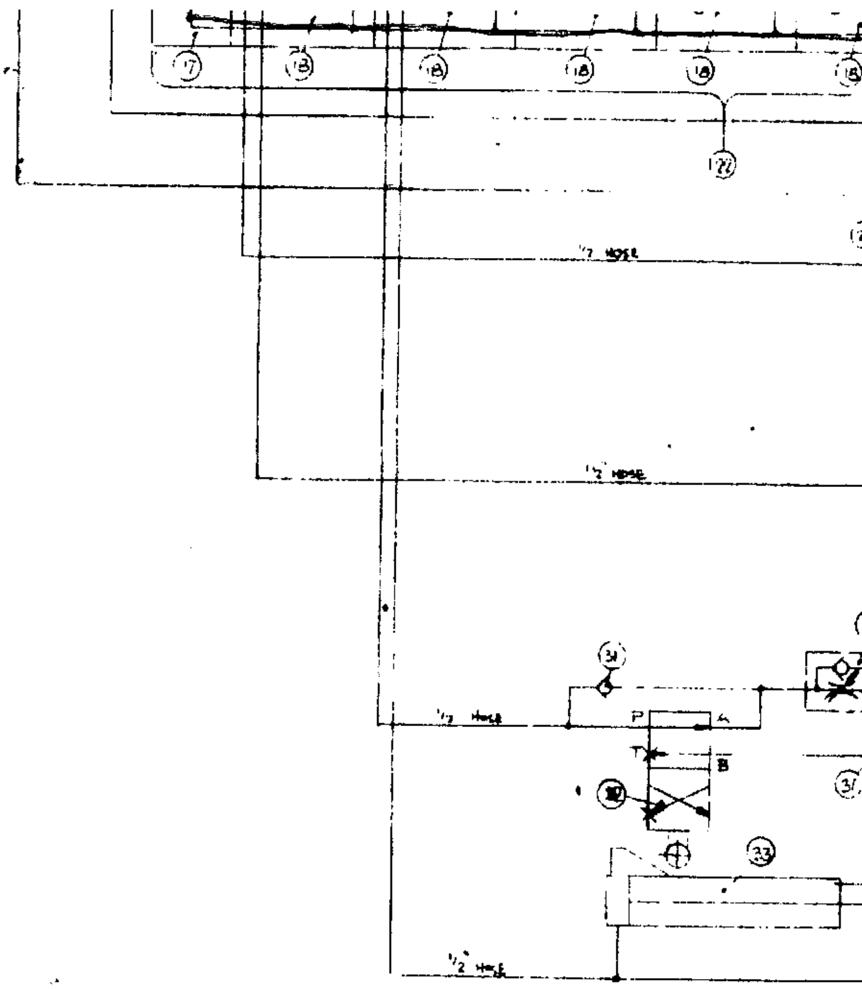
oder
or
ou
o



Induktivgeber
Inductive sensor
Capteur inductif
Transmisor inductivo



Generatorgeber
Generator sensor
Capteur de générateur
Transmisor del generador



ITEM	PART No	DESCRIPTION	QTY	REMARKS
1	B36949	HYDRAULIC TANK	1	SEE NOTE ONE
2	32128	SUCTION STRAINER	1	OCC
3	36937	RETURN LINE FILTER	1	HYDAC
4	36758	DRIVE MOTOR	1	CHAR-LYNN
5	28002	MOTION CONTROL & LOCK VALVE	1	FLUID CONTROLS
6	D36501	OIL COOLER	1	PINAKIS
7	C36946	PUMP SUCTION MANIFOLD	1	
8	E36756	PUMP		COMMERCAL
9	E36813	ENGINE	1	SEE NOTE TWO
10	C33102	RAIL CLAMP RAM	2	
11	B35917	TRACK JACK RAM	2	
12	B33321	BOOM HORIZONTAL TRAVEL RAM	1	
13	B33329	BOOM HORIZONTAL TRAVEL RAM	1	
14	30496	FLOW CONTROL VALVE	2	VICKERS
15	30569	BOOM VERTICAL TRAVEL RAM	1	
16	D18945	SLEEPER CLAMP RAM	1	
17	29096	CLOSURE SECTION	1	
18	27478	PLUNGER SECTION	5	
19	35640	PLUNGER SECTION	1	
20	35637	PLUNGER SECTION	1	
21	35641	INLET SECTION	1	
22	35916	VALVE BANK - HUSCO 5000	1	SEE NOTE THREE

ITEM	PART N…
23	3676…
24	3676…
25	3676…
26	3676…
27	3676…
28	3676
29	
30	B3423…
31	19997
32	37014
33	B3652…
34	C3704…
35	3675…
36	D3655…
37	
38	3719…
39	D3707…
40	3688…
41	
42	
43	
44	

REVISIONS

PARTS LIST No	DESCRIPTION	QTY
1660	HYD. CONN'S TIE'S & TRES. SHAL OLL	1

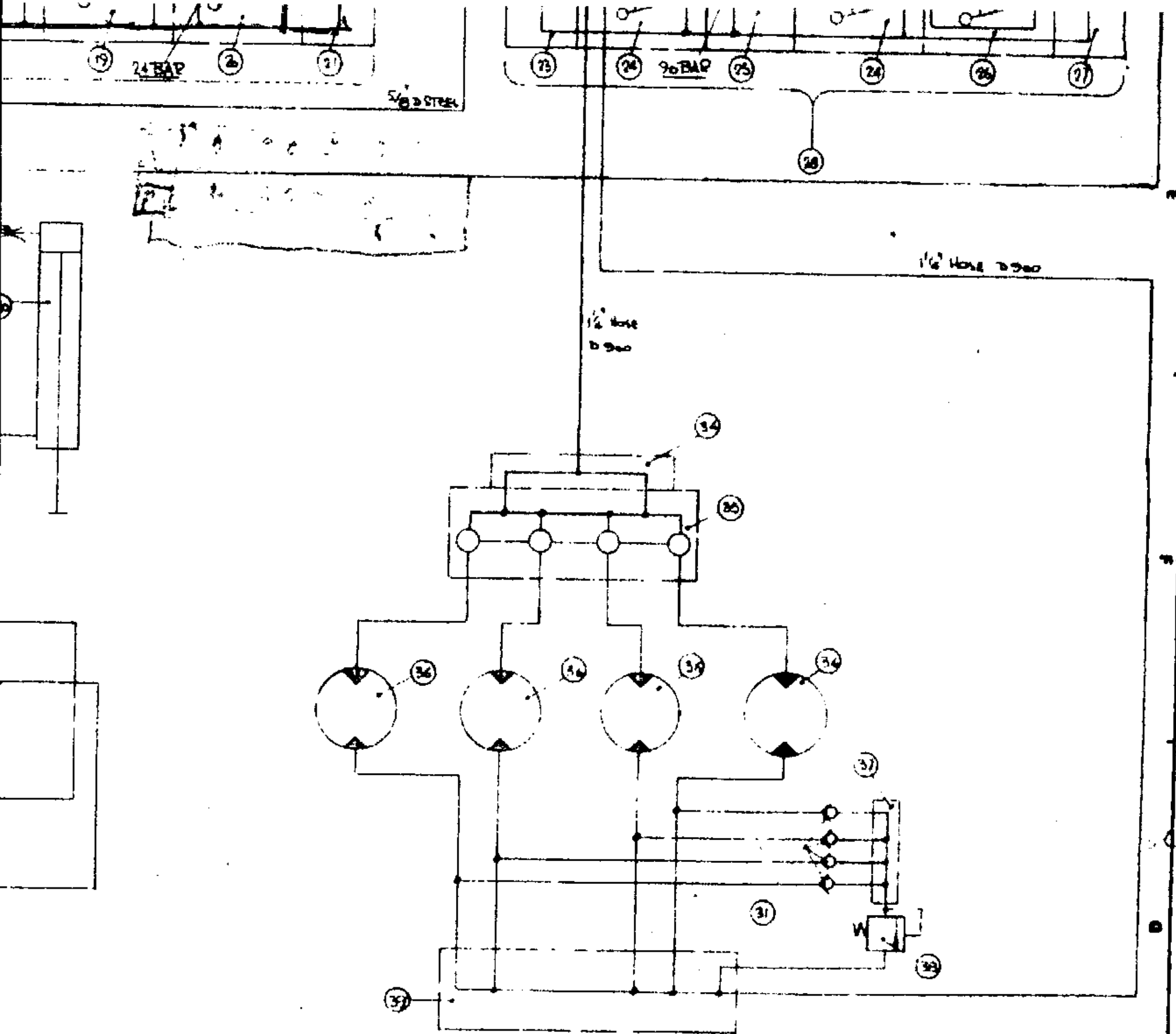
GEORGE MOSS PTY. LTD.
461-466 Scarborough Beach Road
Osborne Park W.A.

DR'N D.T.C DATE 3.7.78
CH'KD
MATERIAL
SCALE /

TITLE CIRCUIT — HYDRAULIC
DUAL GAUGE ROTARY
TIE BED SCARIFIER &
TELESCOPIC R&M

DRG No B 3724

39 - 40



DESCRIPTION	QTY	REMARKS
CLOSURE SECTION	1	
PLUNGER SECTION	2	
MID INLET SECTION	1	
PLUNGER SECTION	1	
INLET SECTION	1	
VALVE BANK - COMMERCIAL - A35	1	SEE NOTE FOUR
FIXED CHOKE	1	ϕ 1.5
OFF TRACKING RAM	1	
CHECK VALVE	6	S.D.N.R
STROKE LIMITING VALVE	1	REXROTH
DRUM RAISE/LOWER RAM	1	
FLOW DIVIDER MANIFOLD	1	
FLOW DIVIDER	1	COMMERCIAL
SCARIFIER MOTORS	4	CHAR - LYNN
OVERLOAD PROTECTION MANIFOLD	1	
PRESSURE RELIEF VALVE	1	PARKER HANNIFIN
RETURN MANIFOLD	1	
MOTOR & FAN	1	

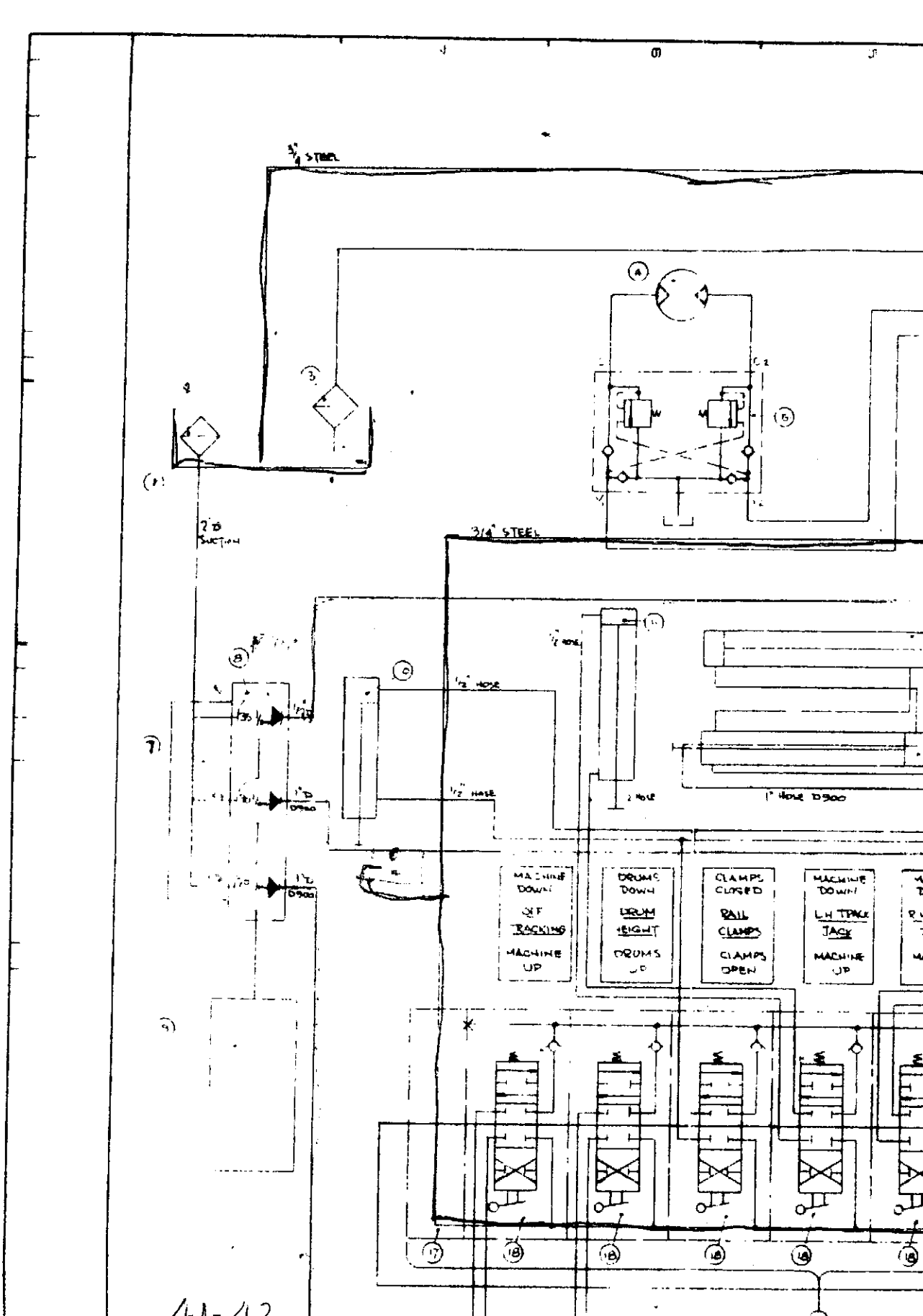
NOTES

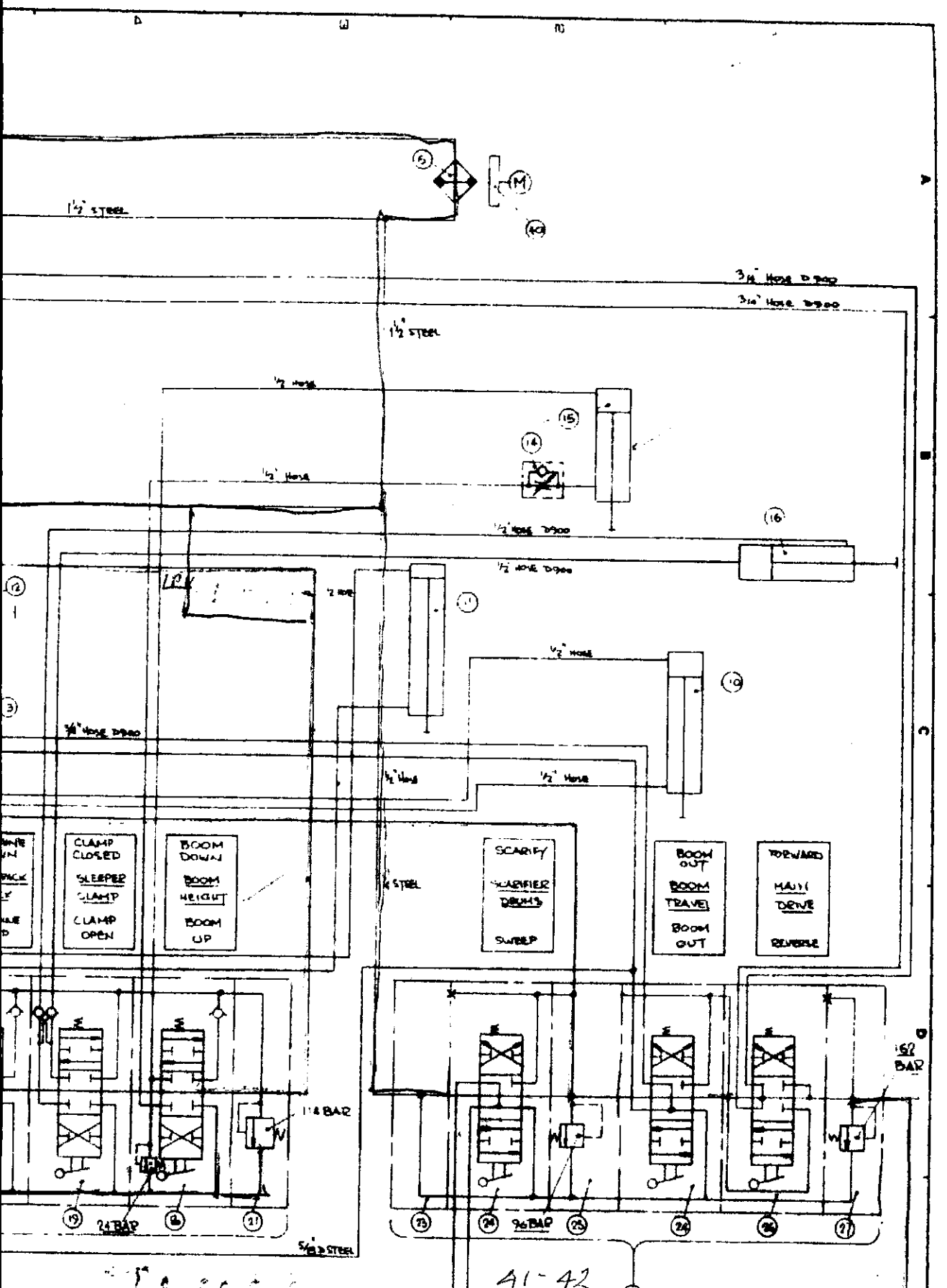
1. HYDRAULIC TANK CAPACITY 190 LITRES
2. ITEM NINE IS A HOLDEN 202 PETROL ENGINE GOVERNED TO 2400 RPM.
3. ITEM TWENTY TWO CONSISTS OF ITEMS 19, 18, 19, 20, & 21.
4. ITEM TWENTY EIGHT CONSISTS OF ITEMS 23, 24, 25, 26 & 27
5. VALVE FUNCTIONS NOMINATED REPRESENT VALVE HANDLE POSITIONS
6. UNLESS OTHERWISE NOTED, HOSES D800 SECTION

Scarifier 40 BAR · 15   2440

Dmotor 162 BAR × 15   2430

Jacks clamp Tools 20-25   360


3/4" STEEL
2" ID SUCTION
3/4" STEEL
1/2" HOSE
1/2" HOSE
2 HOSE
1" HOSE ID 900
MACHINE DOWN
OFF RACKING
MACHINE UP
DRUMS DOWN
DRUM HEIGHT
DRUMS UP
CLAMPS CLOSED
RAIL CLAMPS
CLAMPS OPEN
MACHINE DOWN
L.H TRACK JACK
MACHINE UP


1½" STEEL
½" HOSE
CLAMP CLOSED
SLEEPER CLAMP
CLAMP OPEN
BOOM DOWN
BOOM HEIGHT
BOOM UP
SCARIFY
SCARIFIER DRUMS
SWEEP
BOOM OUT
BOOM TRAVEL
BOOM OUT
FORWARD
MAIN DRIVE
REVERSE
114 BAR
152 BAR
24 BAR
96 BAR
STEEL