# VM 135

## Operation, Safety & Maintenance Manual


***Gardner Denver UK Ltd***
*P O Box 468, Cross Lane, Tong, Bradford BD4 0SU*
*Tel: 01274 683131 Fax: 01274 651006*

# SAFETY

Throughout this manual there are various warnings of dangers to be avoided in the use of the platform. It is not possible to list every danger**. The prevention of accidents is the responsibility of the operator by ensuring safe working practices are observed at all times.**

Only properly trained operators should be allowed to use the platform. Platform operators should ensure that they have a means of communication with them at all times.

**MISUSE OF THE PLATFORM AND/OR DISREGARD OF SAFETY CAN RESULT IN DEATH OR SERIOUS INJURY**

# WELDING

**This vehicle has sensitive electronic equipment installed.**
**If any electric welding is undertaken on this vehicle or platform, then the earth clamp must be fixed to a good clean earth point within 1 metre of the welding point.**
**Where this is not possible, then Gardner Denver UK Ltd Service department MUST be called to disconnect the electronics prior to any electric welding.**

# INDEX

# INTRODUCTION

The VM135 is a vehicle mounted aerial work platform and is one of a comprehensive range designed and manufactured by Gardner Denver UK.

These platforms are designed for installation on a variety of chassis-cab commercial vehicles.

The twin boom configuration with additional tele–boom section allows excellent manoeuvrability in confined spaces. The machine incorporates standard features specifically designed to ensure operator confidence and ease of operation.

This manual is intended to assist the owner/operator in gaining a thorough understanding of the safe operation of the machine, its capabilities and the routine maintenance necessary.

Gardner Denver UK operate a policy of continuous improvement and reserve the right to change specification and equipment without notice. Therefore, some illustrations or text within this manual may differ from your machine.

## ENQUIRIES

In case of any query concerning your machine, contact the service manager at the address below quoting the serial number of the unit.

The serial number is marked on a plate fitted on the nearside of the column or chassis.

The Service Manager
Gardner Denver UK
P O Box 468
Cross Lane
Tong, Bradford
West Yorkshire
BD4 OSU

Tel: 01274 683131
Fax: 01274 655221

**GARDNER DENVER UK LTD**

# WARRANTY STATEMENT

The Gardner Denver UK Powered Access platform is engineered and designed to perform as stated on published specifications. Only quality material and workmanship are used in the manufacture of this product. With regular maintenance and periodic repair service, the equipment will provide excellent service.

The parts of the Priestman lift are warranted for one year from date of registration. The warranty is issued only to the original user and promises that these products are free from defects in material and factory workmanship when serviced, and operated under normal conditions, according to the manufacturer's instructions.

Gardner Denver UK Ltd's obligation under this warranty is limited to correcting without charge, at one of its facilities or authorised distributors, any part or parts thereof, transportation charges prepaid, within one year after being put into service, and which upon examination shall disclose to the manufacturer's satisfaction to have been originally defective.

Fulfilment of these obligations shall be by correction of such defects by Gardner Denver UK Ltd, or by supplying replacements parts. Labour incurred will be paid at standard hours after return of the faulty parts and agreement by Gardner Denver UK Ltd.

This warranty shall not apply to any of the manufacturer's products which must be replaced because of normal wear, which have been subject to misuses, negligence or accident, or which shall have been repaired or altered outside of the manufacturer's factory unless authorised by the manufacturer.

The manufacturer shall not be liable for loss, damage, or expense directly or indirectly from the use of its product or from any cause.

The above warranty supersedes and is in lieu of all other warranties, expressed or implied, and of all other liabilities or obligations on part of manufacturer. No person, agent or dealer is authorised to give any warranties on behalf of the manufacturer nor to assume for the manufacturer any other liability in connection with any of its products unless made in writing and signed by an officer of the manufacturer.

# TRAINING

It is essential that only properly trained personnel are allowed to use Mobile Elevating Work Platforms.

**AN UNTRAINED OPERATOR SUBJECTS HIM OR HERSELF AND OTHERS TO RISK OF DEATH OR SERIOUS INJURY.**

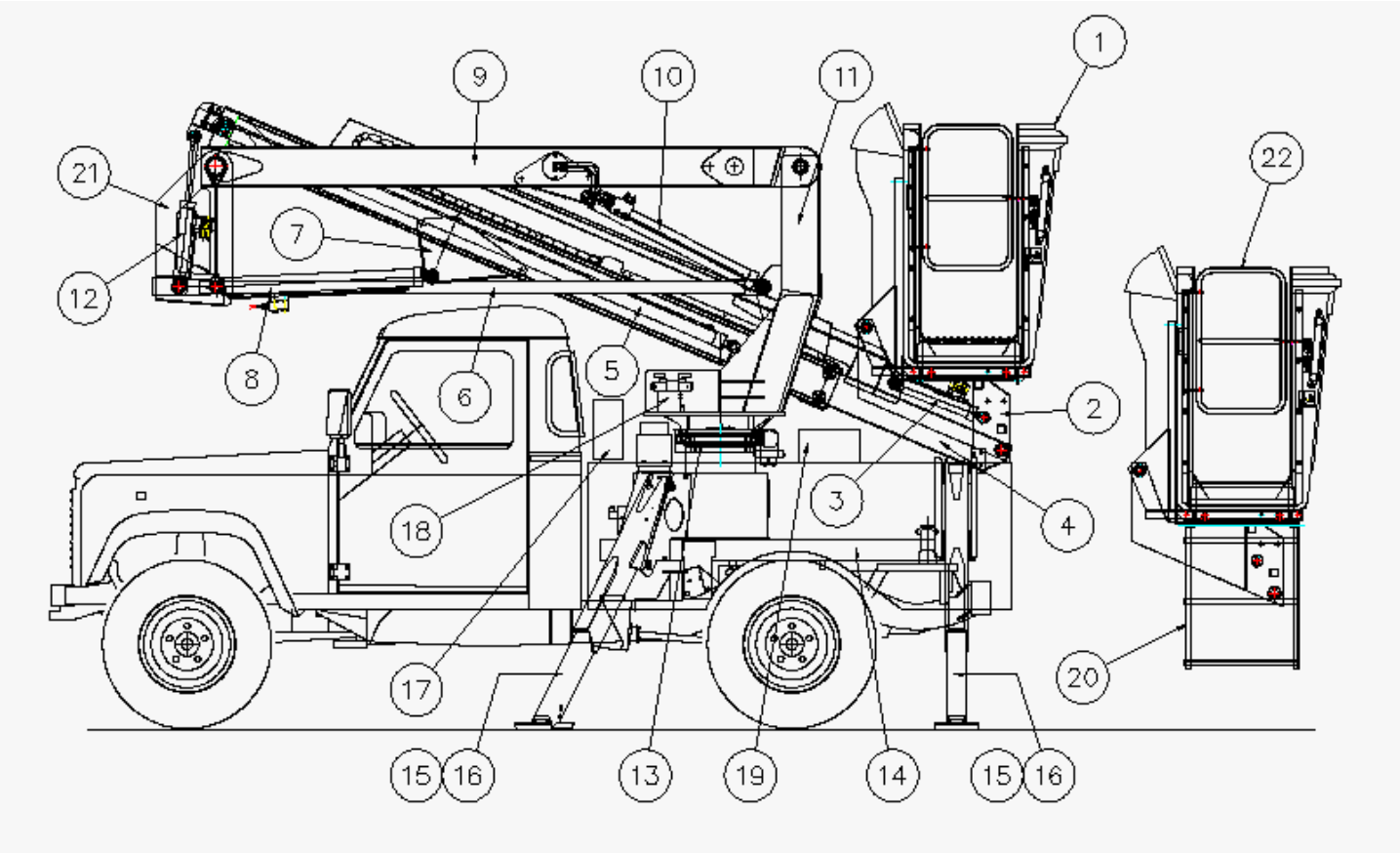
GARDNER DENVER UK LTD can undertake training in the correct use and maintenance of platforms.

To arrange for training to IPAF Standards, contact:-

The Service Manager
Gardner Denver UK Ltd
P O Box 468
Cross Lane
Tong
Bradford
West Yorkshire
BD4 0SU

Tel: 01274 683131
Fax: 01274 655221

# TERMINOLOGY




1. BASKET
2. CRADLE
3. LEVELLING CYLINDER – SLAVE
4. TELE - BOOM
5. TELE - CYLINDER
6. BASE LINK
7. MIDDLE BOOM
8. MIDDLE CYLINDER
9. BASE BOOM
10. BASE CYLINDER
11. 'A'-FRAME
12. LEVELLING CYLINDER-MASTER
13. SLEW DRIVE
14. SUBFRAME
15. STABILISER LEGS
16. STABILISER CYLINDERS
17. CONTROL PANEL
18. HYDRAULIC MANIFOLD-BOOMS/SLEW
19. HYDRAULIC MANIFOLD-STABILISERS
20. ACCESS LADDER
21. BELLCRANK
22. WALK-IN BASKET (OPTIONAL)

# SPECIFICATION

| Performances | Metric | Imperial |
|---|---|---|
| Maximum working height | 13.50m | 44' 4" |
| Maximum height to cage floor | 11.50m | 37' 9" |
| Maximum outreach | 6.4m | 21' 0" |
| Safe working load ** | 200 kg | 440 lb |
| **Hydraulic System** | | |
| Hydraulic pump | Gear type | |
| Hydraulic system pressure (Working) | 130 bar | 1885 psi |
| Hydraulic system pressure (Maximum) | 200 bar | 2900 psi |
| Maximum flow rate | 7.0 ltrs/min | 1.5 gpm |
| Suction filter | 125 micron (no bypass) | |
| Maximum operating temperature | 80 C | 140 F |
| Hydraulic reservoir capacity | 25 ltrs | 5.5 gallons |
| Hydraulic oil grade | ISO 32 | |
| Auxiliary hydraulic power | DC Power Pack | |
| Electrical system | 12v DC | |
| **Dimensions and Weight** | | |
| Overall length * | 4.4m | 14' 5" |
| Overall width | 1.8m | 5' 11" |
| Overall height * | 2.9m | 9' 6" |
| Overall weight * (including platform, driver, passenger and full fuel tank) | 3255 kg | 7176 lbs. |
| **Limitations of Use** | | |
| Max manual force at basket | 400N | |
| Max wind speed | 12.5m/s | |
| Max inclination downhill | 5º | |
| Max inclination uphill | 8º | |
| Max lateral inclination | 2º | |
| Temperature operating limits | -10º to +30º | |

Vibration levels at the work platform are less than 2.5m/s².

(Based on Land Rover 110" Pick-up)

# CONSTRUCTION

**SADDLE ASSEMBY**

Manufactured from 5mm steel plate the saddle assembly has an integral hydraulic oil reservoir, access to which is via a removable cover. The saddle assembly is mounted directly onto the sub chassis.

**STABILISERS**

The platform is equipped with four hydraulically powered stabilisers. They are enclosed in removable box section legs that are part of the saddle/subframe assembly and when stowed are within the vehicle width.

Each stabiliser may be independently operated from the control valve, each leg has sufficient travel to level the platform on uneven ground.

**BOOM STRUCTURE**

The structure consists of two articulating booms and one telescopic boom fabricated from structural steel. The platform has a wide operating range with movement limited by ram stroke. The full payload can be supported in all positions of the booms.

**HYDRAULIC CYLINDERS**

Double acting hydraulic cylinders control the raising and lowering of the boom structure. The cylinders are manufactured from honed tube and are fitted with hard chromium plated piston rods.

**SLEWING MECHANISM**

360º non-continuous slewing is provided by means of a worm drive slew ring. This combination is self-locking when stationary and gives precise control during operation. A manual rotation facility is provided for use in the event of either a loss of hydraulic power or engine failure.

**CAGE LEVELLING**

A master / slave hydraulic cylinder arrangement ensures positive leveling of the personnel cage in all positions.

**PERSONNEL CAGE**

For two-man operation a precision moulded polyethylene cage is supplied as standard, a moulded handrail is incorporated along the top edge of the cage. Two safety harness anchor points are provided inside, which conform to EN795. The cage is electrically insulated to 1kv. The work platform is not intended for live line working.

**NOISE LEVELS**

The platform power is provided by the vehicle engine driving a hydraulic pump. The unit operates at the same noise level as the carrier vehicle.

Noise level at the operating position is approximately 70dbA.

**VIBRATION**

No vibration is present at the operating position that would constitute a danger to the operator.

**POWER SUPPLIES**

The platform is hydraulically powered by a pump driven by a geared power take-off unit. Electrical power for the platform is derived from the vehicle's electrical system and is energised simultaneously with the engagement of the hydraulic power source.

**SAFETY INTERLOCK**

To ensure the correct sequence of platform operation, a stabiliser/boom interlock system is fitted to achieve the following conditions:

1) The booms cannot be operated until stabilisers are correctly deployed.

2) The stabilisers cannot be operated unless the booms are correctly stowed.

**HYDRAULIC LOCK VALVES**

Each hydraulic cylinder is fitted with an integral lock valve which prevents movement in the event of a hydraulic hose failure.

**BACK-UP POWER**

Back up power for all functions is provided by a DC motor driven pump unit.
The vehicle battery must be in good condition for this system to work.

**MODIFICATION**

The platform must not be modified in any way which changes its stability, or would deviate from the original type approved design. A variant type approval from a notified platform approval body is required in this case.

# OPERATING INSTRUCTIONS

## DAILY INSPECTION

Before leaving the depot for the day's work, it is recommended that the following procedure be carried out:

1) Inspect the vehicle and platform for overall integrity, paying particular attention to structural members, hydraulic lines, and electrical cables.

.

2) A safe un-manned functional test of the platform should be performed using the ground pendant control. Space permitting, the booms should be fully extended and the slew operated through full travel to confirm function.

3) Check that tyre pressures conform to vehicle manufacturer's specifications, as this can affect the stability of the platform.

4) Check the oil level in the hydraulic reservoir with the stabilisers and booms stowed and the vehicle on level ground. Correct level is to the maximum marks on the gauge.

5) Check the vehicle fuel level, and that the battery and alternator are in good condition.

6) Carry out other routine daily checks on the vehicle as detailed in the manufacturer's manual.

## THE OPERATING SITE

Select a site for the vehicle from where the platform will reach the required work area. A visual inspection of the operating site shall be made before setting up the machine, paying particular attention to: -

1) Ability of the ground to sustain jacking loads. It may be necessary on unmetalled roads to provide load-spreading pads in order to reduce the ground pressure. Be aware of possible changes in ground conditions, particularly those caused by water logging. Avoid manhole covers, drain gullies, cellar grilles etc. Typical maximum stabiliser ground load is 1500kg.

2) Overhead obstructions

   Ensure adequate clearance around and above the platform, paying particular attention to overhead cables,

3) Gradients and ground flatness
   Where the platform is required to operate on an incline, It is essential that:-

   i) The vehicle faces uphill, and
   ii) The booms are operated on the uphill side only.

   Overtravel is provided on each stabiliser leg to enable the platform to be levelled on cambers which slope across the vehicle. Refer to section "Stabiliser Control" in the next section with regard to the levelling procedure.

3) Do not operate the platform in severe weather conditions and in particular ensure that the prevailing wind strength does not exceed 12.5 m/sec, Beaufort scale 6. Refer to the wind strength section in "Safety Rules" for guidance

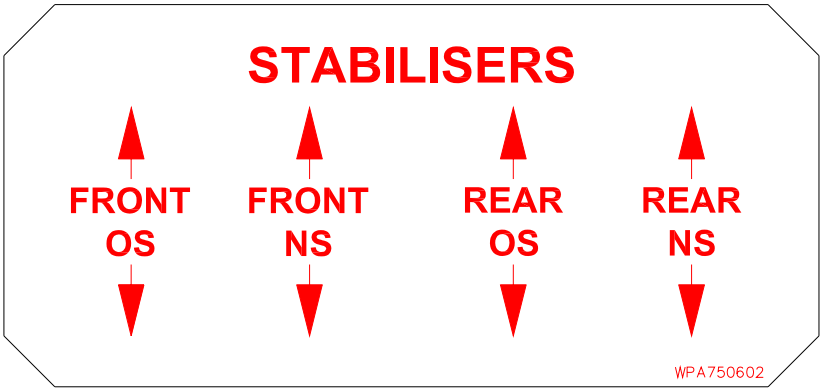
## HYDRAULIC POWER – PTO (Power Take-Off)-(Landrover)

The geared power take off unit is engaged by a cable-operated lever. Engagement of the PTO unit is as follows:-

1. Set the transfer gearbox to neutral position, diff lock selected.
2. Depress clutch and engage 5th gear.
3. Move PTO lever to engage the PTO.
4. Release the clutch pedal.

An amber warning light on the dashboard will become illuminated to indicate that the PTO unit is in operation. The platform cannot be operated until the control knob is engaged.

## VEHICLE LEVELLING




The hydraulic stabilisers are controlled by hand operated valves, mounted on the nearside of the platform pick-up body above the wheel arch.

Indicator lamps shows whether stabilisers are in stowed or set conditions:-

Red = non-stowed lamp in cab

Green = stabilisers correctly deployed (lamp is on side face of control panel.

Each stabiliser can be controlled independently to allow for levelling on uneven ground.

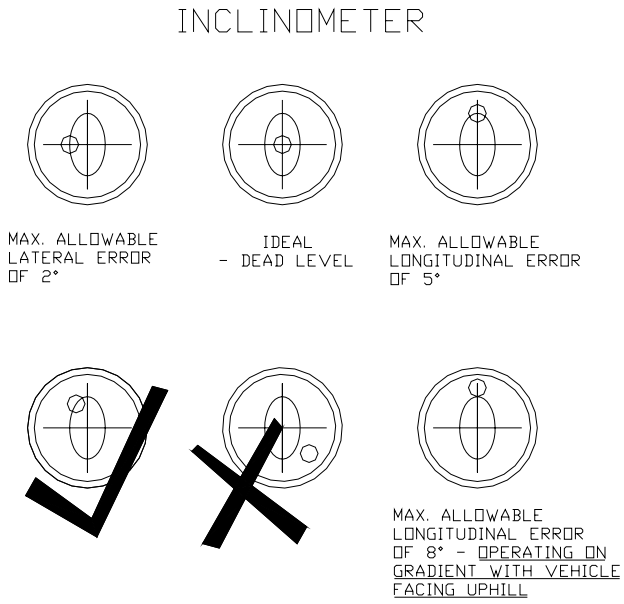
To lower the stabilisers and level the vehicle:-

1. Ensure that the area surrounding the stabilisers is clear.

2. Operate handbrake and chock the wheels.
   **This is critical when operating on a gradient.**

3. With the PTO engaged, operate the stabiliser valve to lower the stabilisers to ground level.

4. Continue to lower the front stabilisers until the weight is taken off the vehicle's suspension, fully extend the front stabilisers for maximum stability, leave one 'short' to level the platform if required. Continue extending the rear legs to level the vehicle and illuminate the leg-set light on the panel.




**The platform must not be operated under any circumstances if the lateral slope exceeds 2º.**

**If the platform is to be operated on a hill, it is permissible to allow up to 5º longitudinal slope as long as the vehicle faces uphill and the booms are only operated on the uphill side.**

To stow the stabilisers:-

Raise them until they are fully retracted and check that the red NON STOWED indicator light (on the vehicle dashboard) is out.

NOTE: When the booms and stabilisers are correctly stowed and the PTO disengaged, all lights will be out.

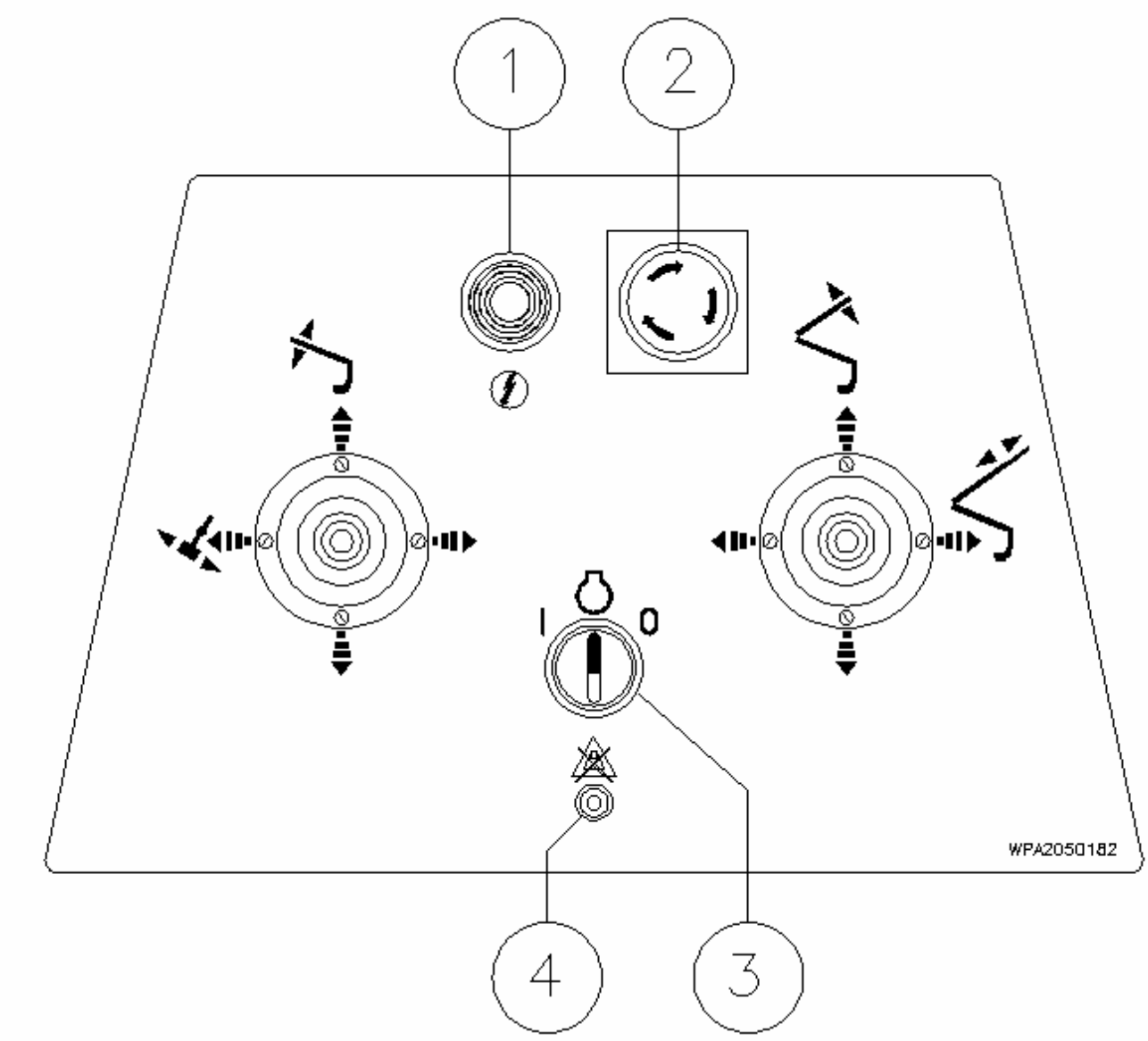
If specified, the platform may be fitted with interlocks, which will stop the engine if the power take-off is not disengaged or the platform equipment is not correctly stowed when the vehicle handbrake is released.

## WALK IN BASKET

If specified the work platform can be provided with an opening door arrangement for easy access. This door has a simple hinge and latch arrangement and must always be latched closed before the platform is operated. The integrity of the door and latch should be checked on a daily basis to ensure safe operation.

A grab handle is provided on the outside of the cage to assist entry. This handle is not a lifting point and must not be used for anything other than helping operators climb in and out of the basket.


## PLATFORM CAGE CONTROLS



## PLATFORM CAGE CONTROLS

Dual axis joysticks in the cage, electrically control proportional valves which operate the four principal functions of the platform. Simultaneous boom movements can be performed at reduced speed. For smooth operation the controls have an automatic soft start / stop feature. The controls are protected against accidental use by an integral deadman switch.

**OPERATION**

Once the stabilsers are correctly deployed the platform can be operated from the cage. Operators must always wear a work restraint harness. They must ensure that their combined weight plus tools and equipment does not exceed 200Kg, which is the maximum payload for this type of platform.

**PUSH BUTTON CONTROLS**.

1. **D.C Power**
   This pushbutton when pressed and held down stops the vehicle engine and energises the DC hydraulic power unit, the cage controls can then be operated as normal. This system relies on the vehicle battery being in good condition, prolonged use of this system will flatten the battery.

2. **Emergency Stop**
   This cuts the power from the hydraulic circuit. The engine will also stop if the legs are deployed. Releasing the push-button will restore full hydraulic power (after re-starting engine).

3. **Engine Start/Engine Stop**
   This switch when turned starts (I) or stops (O) the vehicle engine.The vehicle ignition must already be on in the cab. The engine must be running and the PTO engaged to run the hydraulic pump.

**4. Cage Load**

A warning LED on the control panel illuminates, and a buzzer sounds, when the permitted work platform load is exceeded. The platform controls are disabled until the load is removed.

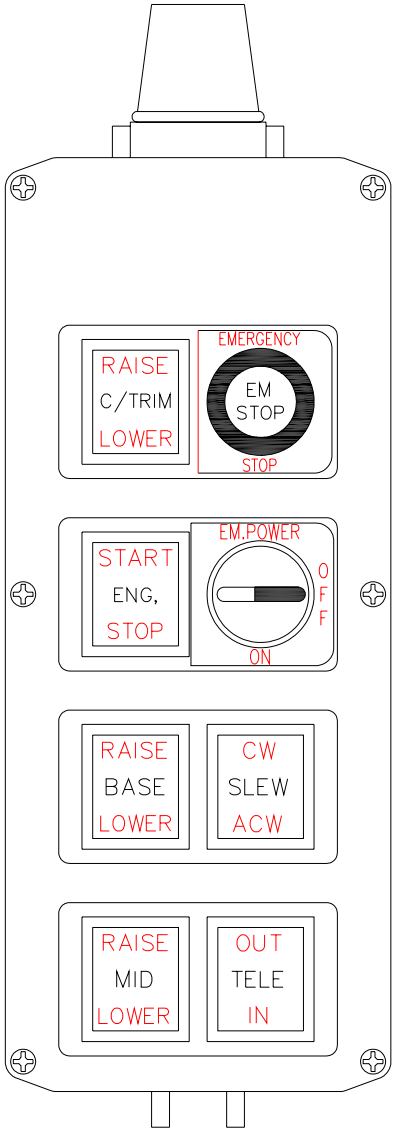
**Ground Control Pendant**
A ground level control pendant is provided to allow remote operation of the platform. This must be activated using the key switch on the column before use.

**Note**: The operator in the cage has no control of the booms with the system in ground control mode.

Take extra care when operating the booms from ground level to avoid collision with overhead objects.

Note:- The cage trim operation only works when the booms are in stow

## GROUND CONTROL PENDANT



## OPERATING METHOD

Before operating the platform the stabilisers must be deployed, they should be extended to lift the vehicle 50 to 75mm above its normal ride height. Once the stabiliser legs are deployed and the leg set light is illuminated, the boom set can be operated. To enter the basket drop the vehicle tail gate and select the platform ground controls, fully extend the tele-boom and lower the cage ladder. Set the platform controls to cage and climb into the basket, the cage controls can now be used to raise the platform. At low level the slew function is disabled to prevent damage to the vehicle and platform by operator error. Ensure the ladder is stowed after entry.
Once the mid boom is parallel with the base boom all cage controls can be used. Care should be taken to avoid collisions between the booms and surrounding objects, and also roof beacons if fitted.

Returning to the stow position is the reverse of the above procedure. Before stowing the machine ensure that the areas where personnel or equipment could be crushed are clear – boom rest, cage rail, rear of vehicle, etc.

Safety rules must be followed at all times.

## LOAD SENSING SYSTEM

The VM135 platform is equipped with a load sensing system to protect the operators from risk of overturning, the system monitors the load in the basket and limits the payload to 200kg. If the maximum value is reached the machine is brought to a halt and an LED lights on the cage controls, and a buzzer sounds. All functions are inhibited until the overload is reduced below the safe operating limit. When this is done full control is restored.

## PREPARATION FOR TRAVELLING

Ensure the booms are fully stowed, close the vehicle tail gate and fully raise the stabiliser legs.

Ensure all equipment in the vehicle load is area is secured for travel.

Raise all legs until the red NON STOWED indicator light in the cab goes out.

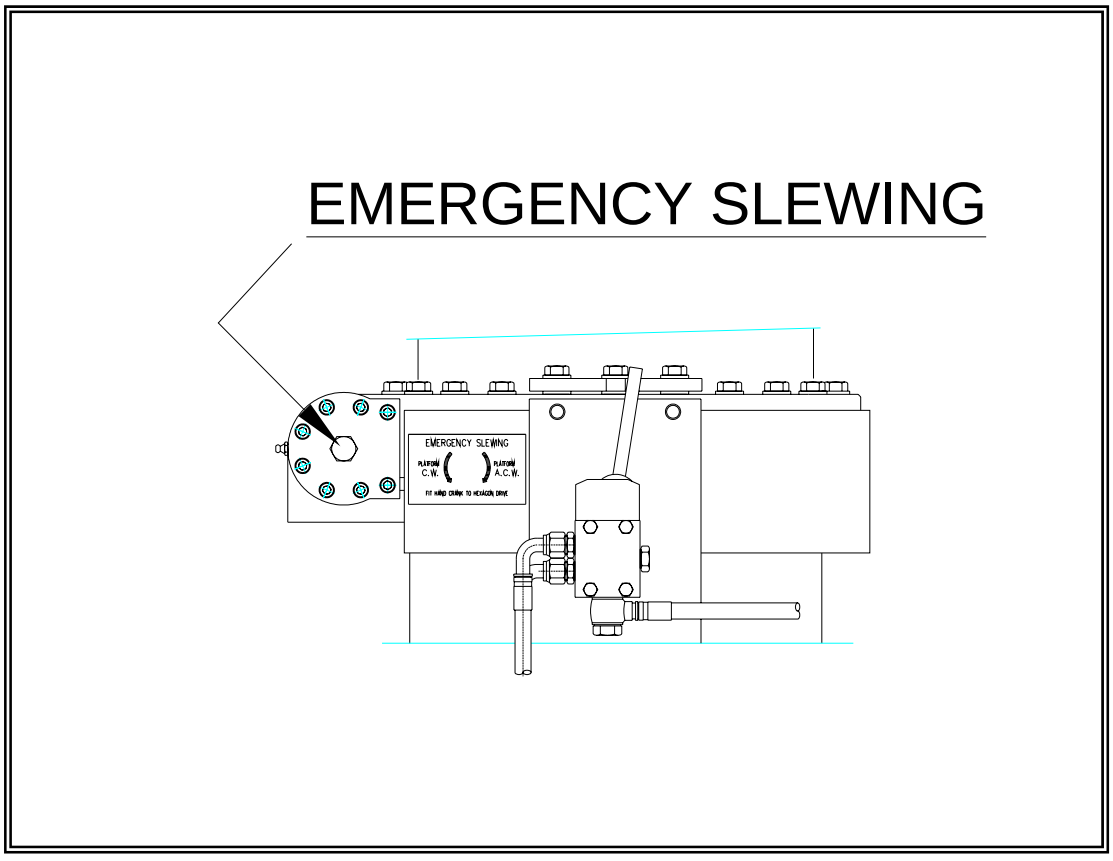
**NOTE**: When the booms and stabilisers are correctly stowed and the PTO disengaged, all lights will be out and the vehicle may be driven away.

The Platform is fitted with interlocks which will sound a buzzer in the cab if the power take-off is not disengaged, or the platform equipment is not correctly stowed when the vehicle handbrake is released. A warning light will also illuminate.

# EMERGENCY OPERATION

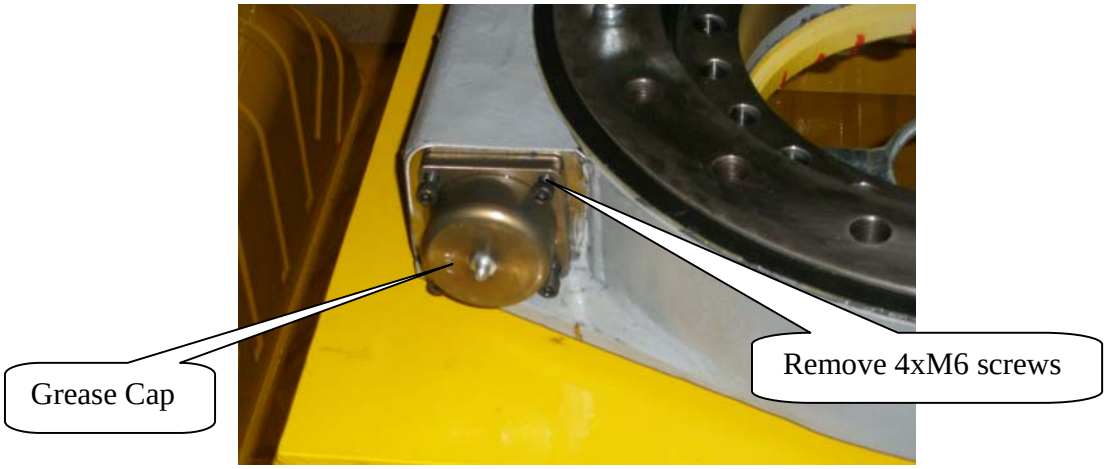
### EMERGENCY SLEWING-GDK SLEW WORMDRIVE (EARLY MODELS)

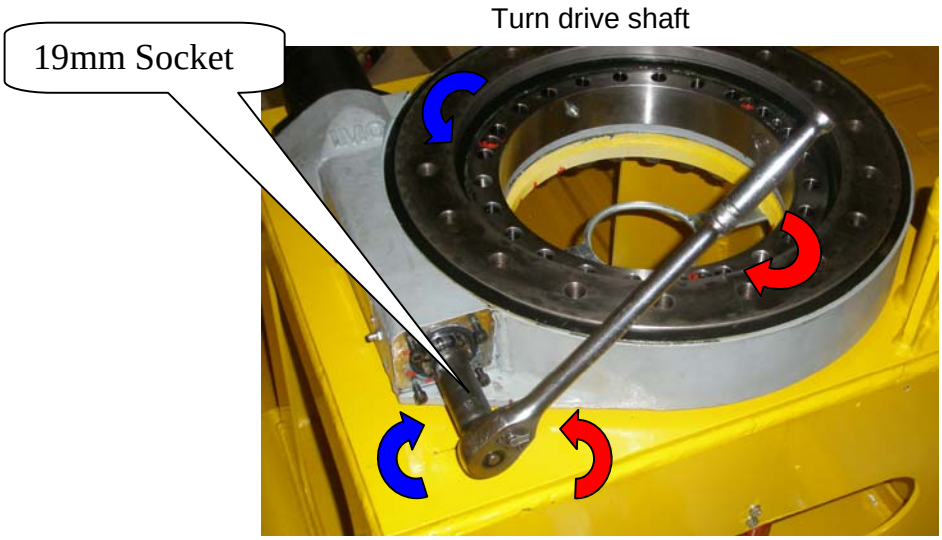
The platform may be slewed manually by cranking the hydraulic motor-input shaft, this is achieved by fitting the hand crank to the hexagon drive shaft (17mm A/F).
To slew the platform clockwise, turn the hand crank anti-clockwise and vice versa.



**EMERGENCY SLEWING-IMO SLEW WORMDRIVE**

The platform may be slewed manually by cranking the slew drive directly.
To do this remove the grease cap.




To slew the platform clockwise, turn the hand crank anti-clockwise and vice versa.

**EMERGENCY LOWERING**

If no hydraulic power is available, the cage may be lowered under gravity by operating the emergency lowering valves. These are the two red taps mounted on the A-frame.

The left-hand tap controls the descent of the middle boom, the right hand tap controls the base boom. To lower the booms, turn the taps anti-clockwise.

**NOTE : ENSURE THAT BOTH TAPS ARE CLOSED AFTER USE**


**CAUTION**:-
DO NOT LOWER BOOMS ONTO VEHICLE CAB OR INTO TRAFFIC FLOW
IF REQUIRED MANUALLY CRANK THE BOOM SET TO CLEAR THE CAB OR TRAFFIC FLOW, SEE PAGE 20 FOR HAND CRANKING INSTRUCTIONS.

Before stowing the machine ensure that the areas where personnel could be crushed are clear – boom rest, cage rail, rear of vehicle, etc.

The D.C power button in the basket activates the battery operated power pack. This is for use when the vehicle engine will not run, such as when the fuel has run out. Vehicle electrical power must still be present for the power pack and platform controls to operate. The vehicle engine will stop if this button is pressed while the engine is running.

To stow the platform using D.C power, press and hold the D.C power button, then operate the platform controls as normal. Fully retract the telescopic boom, slew the platform into alignment with the pointer on the slew guard / A-Frame, fully lower the base, fully lower the middle boom.

D.C power is also available on the ground control pendant: Turn the key switch on the control panel to Ground Controls. Turn the D.C power switch on the pendant to ON (this will stop the engine if it is running). Pushing any of the boom function buttons on the pendant will activate the power pack to drive the boom or slew movements, assuming the stabiliser legs are correctly deployed.
Note:- the system is self interlocking. The stabilisers cannot be raised until the booms are stowed.
To raise the stabilisers using back-up power, open the main electrical panel, throw the rocker switch in the panel, and turn the DC power switch on the ground control pendant to ON. The DC power pack will now be running and the legs can be raised using the control valve. There may be a delay while the power pack pressurises the system.

When the non-stowed indicator lights are out, disengage the PTO.
When the PTO light is out the vehicle can be driven away.

NOTE:- if the booms or stabilisers are not stowed, or the PTO is not disengaged when the handbrake is released, a buzzer will sound and a warning light will illuminate.

Prolonged use of the power pack will flatten the vehicle battery.

# SAFETY RULES

**Only trained operators are qualified to operate the platform.**

**MIS-USE OF THE PLATFORM AND / OR DISREGARD OF SAFETY CAN RESULT IN DEATH OR SERIOUS INJURY**

Before leaving the depot for the days work, carry out the following procedures:-

**1. DAILY INSPECTION**

As detailed in 'Operating Instructions'.

**2. SAFE WORKING PRACTICE**

**NEVER** Suspend loads by chains or slings from the boom structure.

**NEVER** Apply external side loads to the boom structure.

**NEVER** Exceed the SWL of the cage.

**NEVER** Stretch out from the cage, or climb out to increase work area – move the machine closer.

**NEVER** Use the platform as a crane.

**NEVER** Rest the booms or cage against objects.

**NEVER** Deploy stabilisers on soft ground.

**NEVER** Raise loads or carry out work which increases the wind area of the platform.

**NEVER** Exit the work platform at height.

**ALWAYS** Adhere to appropriate traffic regulations including.

**ALWAYS** the site is adequately illuminated.

**ALWAYS** Chock wheels, particularly when working on a gradient.

**ALWAYS** Ensure the cage door is closed and latched.

**ALWAYS** Wear a safety harness when operating.

**ALWAYS** Be aware of overhead obstructions and electrical lines when elevating and lowering.

**ALWAYS** Use the cage controls smoothly and avoid sudden reversals.

## 3. OPERATING NEAR TO POWER LINES

It is essential that anyone working **near** to live electrical conductors is fully conversant with the appropriate national and local regulation.

**NOTE**: The VM135 Platform is '**not insulated**' and should **not** therefore be used for live line working.

The **minimum** safe working distance from live overhead power lines for work platforms is 15m from steel towers and 9m from concrete, steel and wooden poles (BS8460:2005). Measurement must be taken at ground level with the booms pointing towards the lines.

If work is to be carried out at LESS than the stated working distance, the electricity supply MUST be switched off and a written PERMIT TO WORK must be obtained from a responsible person representing the authority operating the power lines.

**NOTE**: See Health and Safety Executive Guidance Note G.S.G. entitled '**Avoidance of Danger from Overhead Electric Lines**' for more detailed information.

## 4. WIND STRENGTH

The platform must not be used in wind speeds above BEAUFORT SCALE 6 (25/31 mph / 12.5 m/sec). See table below for comparisons.

| Force | Description | Effect | MPH | M/Sec |
|---|---|---|---|---|
| 4 | Moderate breeze | Dust and loose paper blows about. Small branches move. | 12/16 | 6 |
| 5 | Fresh breeze | Small trees in leaf sway. | 17/24 | 9 |
| 6 | Strong breeze | Large branches move. Wires whistle. | 25/31 | 12.5 |
| 7 | Moderate gale | Whole trees sway. Hard to walk into wind. | 32/38 | 16 |
| 8 | Fresh gale | Twigs break off trees. Very hard to walk into wind. | 39/45 | 20 |

**SUMMARY**

**FAILURE TO COMPLY WITH THESE SAFETY RULES MAY CAUSE DEATH OR SERIOUS INJURY.**

# SERVICE INSTRUCTIONS

**INITIAL USE**

The machine has been designed to keep maintenance to a minimum, but it is advisable for the first 500 hours (or three months) of operation that all hydraulic components and pipe fittings are inspected regularly for leaks.

**ROUTINE MAINTENANCE**
**Schedule**

| | Daily | Weekly | Monthly | Annually |
|---|---|---|---|---|
| Check cage & platform for signs of damage. Pay particular attention to the elevating structure and stabilisers. | [ √ ] | [ ] | [ ] | [ ] |
| Check vehicle's fuel level | [ √ ] | [ ] | [ ] | [ ] |
| Check vehicle's engine oil level | [ √ ] | [ ] | [ ] | [ ] |
| Check hydraulic oil level | [ √ ] | [ ] | [ ] | [ ] |
| Check function of the stabiliser/boom interlock | [ √ ] | [ ] | [ ] | [ ] |
| Check function of the emergency stop system | [ √ ] | [ ] | [ ] | [ ] |
| Grease all stabiliser leg slides and swivel feet | [ ] | [ √ ] | [ ] | [ ] |
| Check the function of the cage load sensing system | [ ] | [ √ ] | [ ] | [ ] |
| Check all critical fasteners (see drawing) | [ ] | [ ] | [ √ ] | [ ] |
| Grease slewring | [ ] | [ ] | [ √ ] | [ ] |
| Check all pin keep plates for security | [ ] | [ ] | [ √ ] | [ ] |
| Examine all flexible hoses for security | [ ] | [ ] | [ √ ] | [ ] |
| Examine and repair any damage to paintwork | [ ] | [ ] | [ √ ] | [ ] |
| Calibrate the cage load sensing system | [ ] | [ ] | [ ] | [ √ ] |
| Change hydraulic oil | [ ] | [ ] | [ ] | [ √ ] |
| Clean hydraulic oil reservoir | [ ] | [ ] | [ ] | [ √ ] |
| Clean hydraulic oil suction strainer | [ ] | [ ] | [ ] | [ √ ] |
| Replace return filter element cartridge | [ ] | [ ] | [ ] | [ √ ] |

**GENERAL**
All service or maintenance work should be carried out by competent qualified engineers. Only genuine spare parts supplied by Gardner Denver UK should be used. All pivots including cylinder mountings comprise hard chrome plated pins which run in self lubricating plastic bearings.

## HYDRAULIC OIL LEVEL

The reservoir oil level is visible through a sight gauge. The oil level is correct when it is on the maximum limit, with the stabiliser legs and booms stowed and the vehicle on level ground.

## DRAINING AND RE-FILLING THE HYDRAULIC SYSTEM

**Note:** Return-line Multi-flow Filter (mounted on top of oil reservoir)

The disposable cartridge element of the filter will require renewal every 2000 hours or every year of operation unless the visual indicator shows otherwise.

Before draining and refilling the system, check the indictor with the hydraulic oil at its normal operating temperature and the PTO unit engaged. If the indicator needle enters the red zone on the scale, change the element as indicated during the following procedure.

**Carry out the following sequence of operations:**

### DRAIN SYSTEM

1. Place a container (or containers) with a total capacity of 70 litres (15 gallons) beneath the vehicle and provide a funnel and hose to collect the oil from the reservoir.

2. Open the drain valve (fitted either beneath or on the offside front of the reservoir) and allow the oil to drain away.

3. Remove and drain the pump suction hose.

### CLEAN SUCTION STRAINER

1. Remove the tank lid assembly from hydraulic reservoir.

2. Remove, clean and dry the strainer.

**CHANGE MULTI-FLOW FILTER ELEMENT** (if necessary – see note above)

1. Disconnect the flexible hose from the filter and direct it into a container.

2. Remove the filter cap.

3. Lift the cartridge element out of the filter body.

4. Detach the bayonet fitting and down-pipe assembly from the cartridge. Clean and dry it and fit it to the new cartridge.

5. Thoroughly clean and dry the filter body and cap.

**DO NOT FIT THE CARTRIDGE INTO THE FILTER UNTIL THE RESERVOIR HAS BEEN CLEANED. RECONNECT THE FLEXIBLE HOSE WHEN INDICATED DURING THE PRIMING PROCEDURE.**

**CLEAN OIL RESERVOIR**

1. Remove the return line filter assy and the oil reservoir tank lid assembly

2. Clean the reservoir.

3. Re-fit the oil reservoir tank lid assembly, applying ‘Hylomar’ jointing compound to the gasket.

4. Re-fit the return line filter c/w new cartridge.

5. Close the drain valve.

6. Reconnect the suction hose to the pump.

7. Replenish the reservoir with fresh hydraulic oil.

8. Slacken the suction hose connections at the pump, allow it to fill with oil and re-tighten the connections.

**PRIME SYSTEM**

Start the vehicle’s engine. During the following procedure replenish the reservoir as necessary. Engage the PTO unit and run the system for the shortest time possible while carrying out the following operations:-

1. Raise and lower the stabilisers.

2. Raise the base boom & mid boom.

3. Extend the tele–boom.

4. Slew the boom structure.

5. Lower the booms and stow them.

6. Disengage the PTO unit and operate the DC hydraulic power unit a few times.

7. Re-engage the PTO unit and run the system for 15 seconds to prime the pressure and drain lines.

8. Reconnect the flexible hose to the Multi-flow filter, being careful to catch any spillage.

9. Wipe down the equipment to remove any spillage and secure any covers removed.

## HYDRAULIC OIL LEAKAGE

**<u>WARNING</u> High-pressure hydraulic oil spray is dangerous. Spray can puncture and become embedded beneath the skin or contaminate the eyes. Ensuer pressure is relieved by actuating the controls while the hydraulic power source is <u>off</u> and emergency lowering valves have been opened, before loosening connections.**

Loose fittings should be re-tightened.
**<u>CAUTION</u>**, do not overtighten and "stretch" threads or cause distortion to components.
Leaks occurring at flexible hose fittings cannot be rectified, the complete hose must be renewed.

The cylinder valve blocks are retained by banjo bolts, these must not be tightened to more than 25Nm.

## RECOMMENDED AND ALTERNATIVE HYDRAULIC OILS & LUBRICANTS

### 1. Platform

| Manufacturer | Hydraulic Oil | Grease (Stab legs and swivel feet) |
|---|---|---|
| Batoyle | Apollo 32 | Proteus 2EP |

Alternatives

| | | |
|---|---|---|
| BP | Energold HLP 32 | Energrease L2 |
| Castrol | Hyspin AVVSS2 | Spheerol APT2 |
| Esso | Nuto H32 | Multi H |
| Fina | Hydran HV32 | Marson HTL 2 |
| Shell | Tellus 37 | Retinax A |
| Texaco | Rando HD 32 | Multifak EP2 |
| Total | Azolla VG32 | Multis EP2 |
| Sternol (Elf) | Olina 32 | Multi 2 |

### 2. Slewring
**(4 Grease nipples, 3 shots each, during platform rotation)**

| Manufacturer | Lithium Grease Type |
|---|---|
| Batoyle | Proteus 2M (Lithium M161) |

Alternatives

| | |
|---|---|
| BP | Energrease L21M |
| Castrol | Spheerol LMM |
| Esso | Lidok EP2 Moly |
| Mobil | CVG Grease |
| Shell | Retinax HDX2 |

**TORQUE CHECKS**

| | | |
|---|---|---|
| 1. | M10 Sub-frame bolts. | 45Nm |
| 2. | Set screws in structural steel: | |
| | M6 x 1 | 5Nm |
| | M8 x 1.25 | 12Nm |
| | M10 x 1.5 | 25Nm |
| | M12 x 1.75 | 45Nm |
| 3. | **Fastenings for specific components**: | |
| | G.D.K Slew ring M12 x 1.75 | 100Nm |
| | I.M.O Slew ring M16 x 2 | 250Nm |
| | Harness Eyebolts M12 x 1.75 | 40Nm |
| | Cam plate M12 x 1.75 Soc Cap Screws (Middle Boom to Base Boom) | 45Nm |

All critical fasteners have torque seal indication markings applied during assembly. During subsequent re-tightening in service the marks should be re-applied.

# PLATFORM INSPECTION AND TESTS

**GENERAL**

To establish a good standard of care and maintenance for the vehicle, the platform and its associated equipment, it is recommended that a full structural inspection and platform test be undertaken every 1000 hours or six months of operation.

The inspection and tests are to be carried out by authorised persons and must comply with L.O.L.E.R. 1998.
The electronic moment limiting system fitted to these vehicles is an essential part of the system safety and must be checked for correct operation.
**Please contact Gardner Denver UK Service department for vehicle parameters.**

The purpose of the structural inspection is:

1. Examine the condition of the structure and check for any signs of cracking or deformation.

2. Examine the powered mechanisms for raising and slewing.

3. To ensure security of all fastenings.

All faults should be rectified before returning the platform to service.

**THE PLATFORM IS TO BE WITHDRAWN FROM SERVICE UNTIL THE FAULTS ARE CORRECTED.**

**INSPECTION OF PLASTIC CAGE**

- The cage should be inspected daily as damage may be caused by impact at any time.

- Any damage must be reported and the appropriate action taken.

- **Under no circumstances** should repairs be attempted in the area of the mountings or cage corners.

# TROUBLE SHOOTING

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| Loss of hydraulic system power. | Emergency stop button engaged. | Disengage |
| | Power take off unit not fully engaged. | Re-engage |
| | Geared power take off unit failure. | Test by replacement. |
| | Main hydraulic pump failure. | Test by replacement. |
| | Relief valve blowing off. | Pressure setting incorrect – reset to 190 Bar. |
| Stabilisers can be deployed/ stowed but no hydraulic power to boom. | Leg set switch failure. | Test using a multi meter renew if necessary. |
| | Cables damaged. | Test using a multi meter, renew if necessary. |
| | Dump valve solenoid failure. | Test using a multi meter, renew if necessary. |
| Hydraulic oil overheating | Hydraulic oil reservoir contents low. | Replenish. |
| | Worn main hydraulic pump | Connect a flow meter and pressure gauge to the pressure side of the hydraulic pump – the pump delivers approx. 8 ltrs/min @ 190 Bar – if necessary renew. |
| | Relief valve blowing | Reset at 190 Bar |
| Whilst operating the platform the stabiliser legs creep upwards | Lock valve leakage. | Stop operating as soon as possible, stow stabilisers and renew the malfunctioning lock valve cartridge. **DO NOT OPERATE PLATFORM UNTIL FAULT IS RECTIFIED.** |
| Platform booms creep downwards<br>(cont) | Lock valve leakage. | Stop operating the platform as soon as possible, stow platform and renew, the |

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| | | malfunctioning lock valve cartridge. **DO NOT OPERATE PLATFORM UNTIL FAULT IS RECTIFIED.** |
| | Cylinder bypass. | As above |
| Slew fault light illuminates | Switch dislodged or faulty. | Reset position of limit switch or replace. |
| Slew failure, manual slewing only. | Hydraulic oil leakage. | Inspect all flexible hoses and fittings, if necessary. |
| | Slew motor failure. | Test by replacement. |
| Complete slew failure | Internal damage to slew assembly worm drive. | Replace complete assembly |
| Slew failure, no manual slewing. | Seized slew motor. | Test by replacement. |
| Complete electrical failure. No indicator lights at stabiliser control panel | Blown fuse. First check main input 40 Amp fuse under dash. Then PTO fuse 10 amp in control panel (No6) then panel fuse 25 amp in control panel. | Replace and investigate cause. |

**General Note**
In the event of an electronic or electrical system failure it is advisable to contact Gardner Denver UK and request that a service engineer attends.

# PARTS ORDERING PROCEDURE

Always use Gardner Denver genuine spare parts. Failure to do so could invalidate warranty. Gardner Denver's policy is one of continuous development, therefore to ensure delivery of the correct replacement of any component required it is essential to quote the following details when ordering:-

1. **Platform model and serial number.**

2. **Make and type of chassis.**

3. **Components layout section heading.**

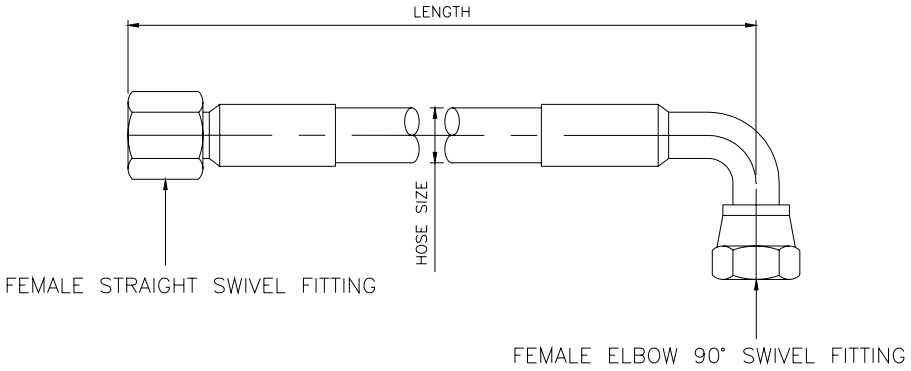
4. **Item number, component number and its description.**

5. **Quantity required.**

**Gardner Denver reserve the right to alter the design, construction, and specification of the equipment and to supply when so altered without reference to illustrations or descriptions in this publication.**

### Replacement Hoses

To ensure the correct renewal of flexible hoses, it is essential to quote the length and bore of the hose, type of fittings and their orientation. The length quoted should be measured either over or to the centre(s) of the fitting used.

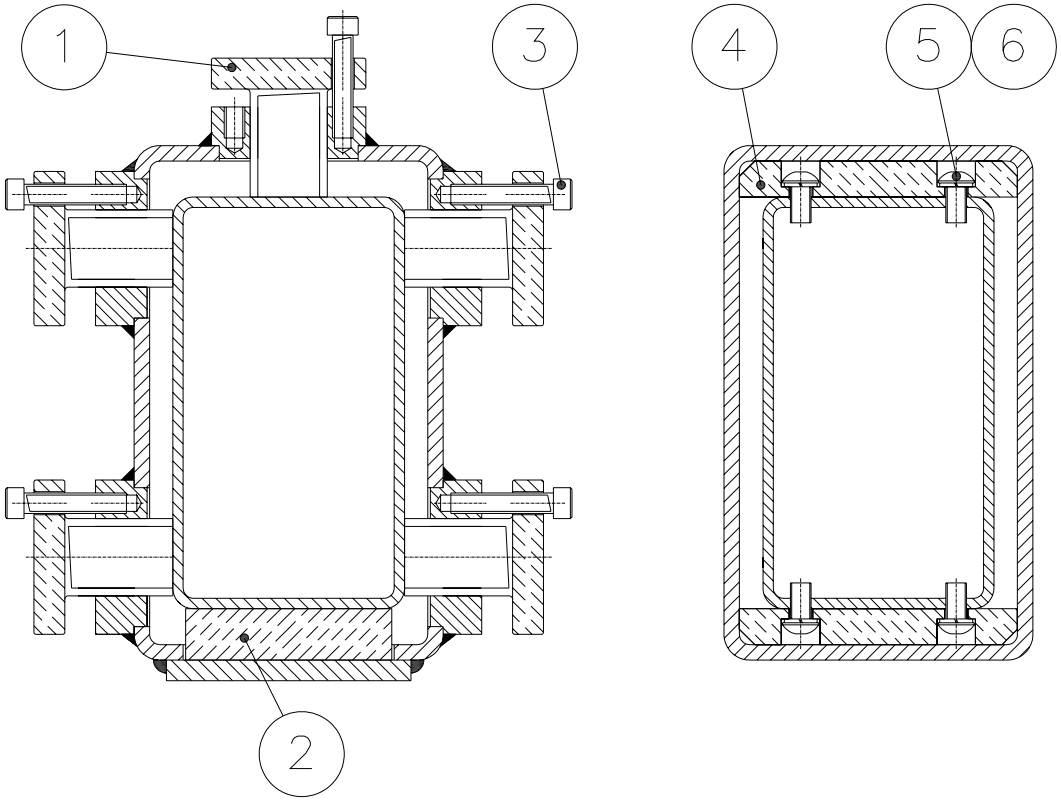


# ILLUSTRATED COMPONENT

# LAYOUT AND PARTS LISTS

| WEAR PAD AND ADJUSTER SCREW ASSEMBLY |
|---|

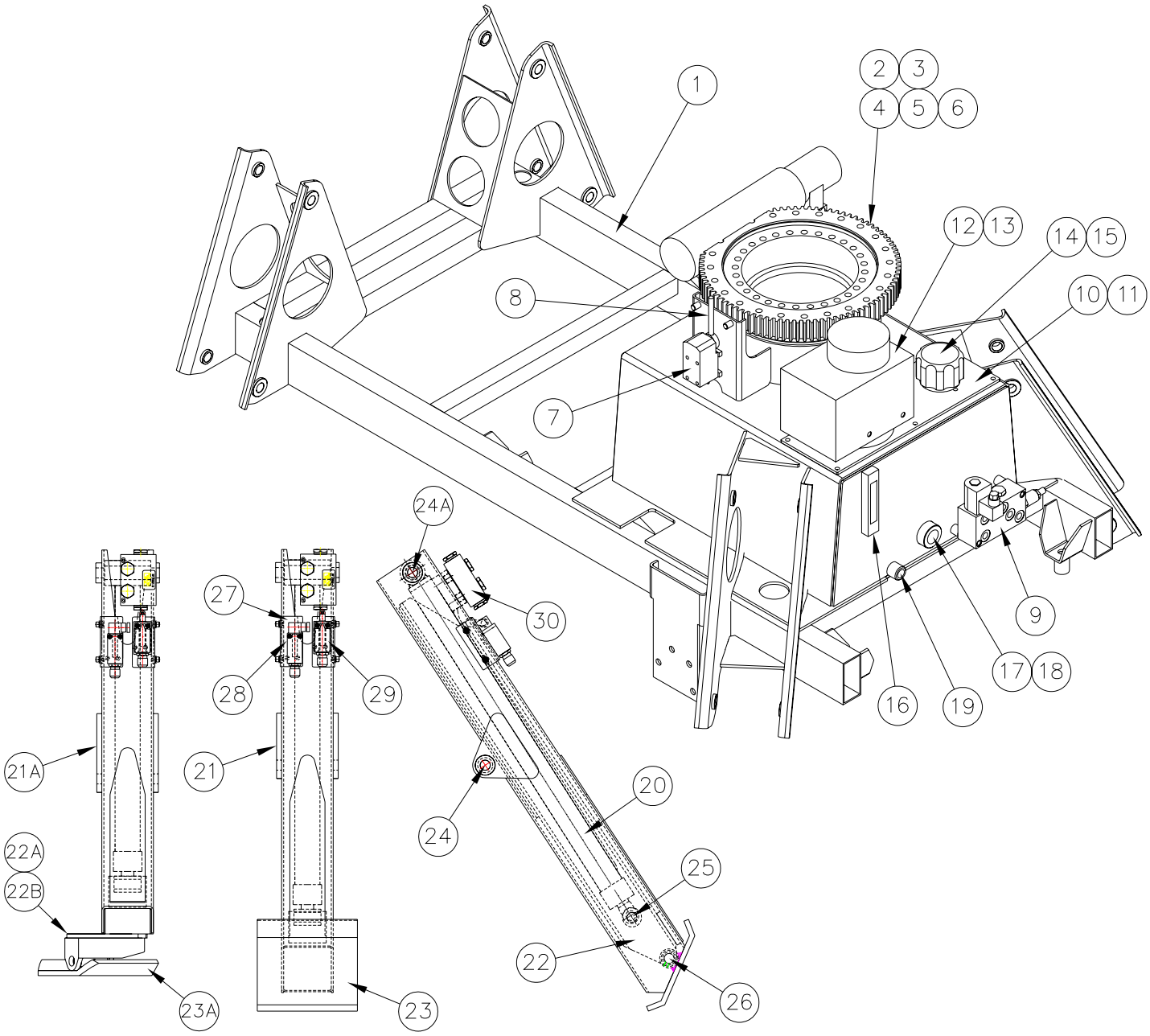
| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | WEAR ADJUSTER SCREW | 5 | WPA2065036 |
| 2 | WEAR PAD (100x80x20mm THICK) | 1 | WPA2065037 |
| 3 | LOCKING SCREW (M8x40 SOC-CAP HD) | 5 | M450087040-9 |
| 4 | WEAR PAD (108x100x14mm THICK) | 2 | WPA2065042 |
| 5 | FIXING SCREW (M8x16 SOC-BUTTON HD) | 8 | M44087016-2 |
| 6 | M8 SPRING WASHER | 8 | M610080000-5 |




After setting wear adjuster screw to face of tele-boom fit screws item 3
Screws must bottom in tapped holes not tighted onto wear screws.

**SUBFRAME/STABILISER ASSEMBLY**

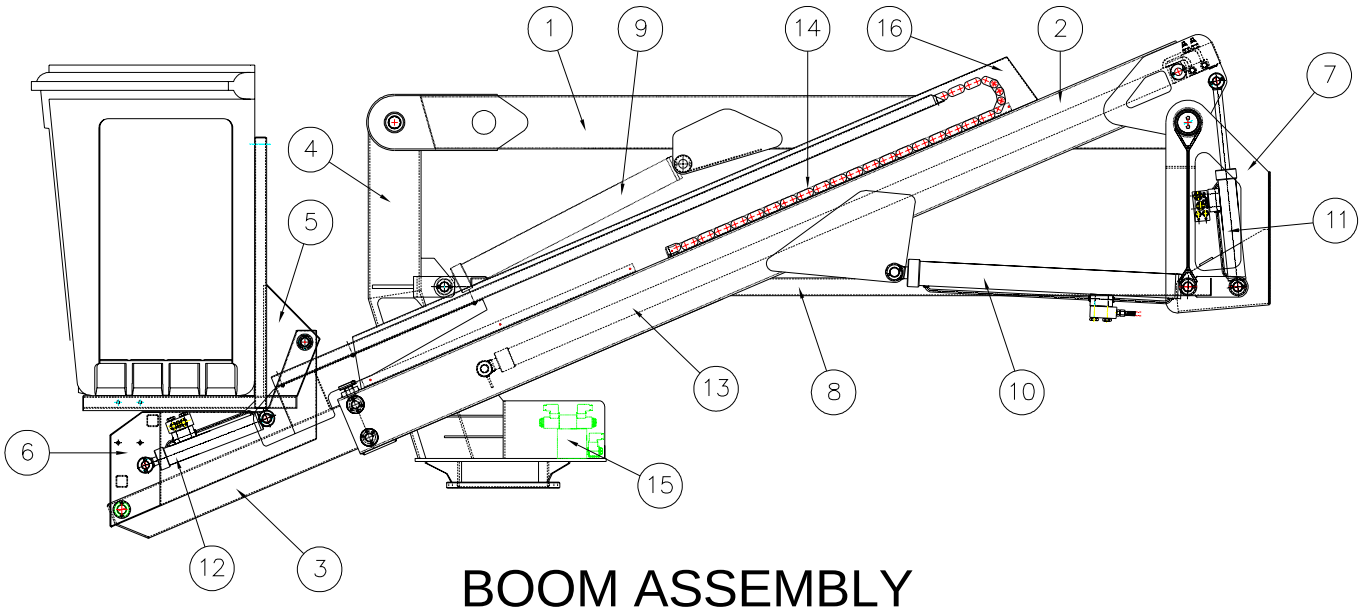
| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | SUBFRAME | 1 | WPA2002051 |
| 2 | SLEW RING | 1 | WPA2026003 |
| 3 | HARDENED WASHER | 52 | WPA3855000/2 |
| 4 | BOLT (M12x50) | 19 | WPA3855034 |
| 5 | BOLT (M12x60) | 3 | WPA1006009 |
| 6 | BOLT (M12x70) | 27 | WPA3855001 |
| 7 | SLEW STOP VALVE | 1 | WPA2114029 |
| 8 | SLEW STOP VALVE LEVER | 1 | WPA2114029A |
| 9 | DIVERT VALVE | 1 | WPA2114037 |
| 10 | OIL TANK LID | 1 | WPA2014016 |
| 11 | TANK LID GASKET | 1 | WPA2013016 |
| 12 | EMERGENCY PUMP UNIT 12vDC | 1 | WPA5746125 |
| 13 | EMERGENCY PUMP UNIT COVER | 1 | WPA2057124 |
| 14 | RETURN FILTER | 1 | WPA2105014 |
| 15 | RETURN FILTER ELEMENT | 1 | WPA2105014/1 |
| 16 | OIL SIGHT LEVEL GAUGE | 1 | WPA2705005 |
| 17 | SUCTION STRAINER | 1 | WPA2705000 |
| 18 | BALL VALVE (SUCTION) NOT SHOWN | 1 | DA400111 |
| 19 | BALL VALVE (DRAIN) NOT SHOWN | 1 | H59453000002 |
| 20 | STABILISER CYLINDER | 4 | WPA2113041 |
| 21 | STABILISER LEG OUTER (REAR LEGS) | 2 | WPA2004035 |
| 21A | STABILISER LEG OUTER (FRONT LEGS) | 2 | WPA2004037 |
| 22 | STABILISER LEG INNER (REAR LEGS) | 2 | WPA2004036 |
| 22A | STABILISER LEG INNER (FRONT LEG-N/S) | 1 | WPA2004039NS |
| 22B | STABILISER LEG INNER (FRONT LEG-O/S) | 1 | WPA2004039OS |
| 23 | STABILISER FOOT (REAR LEGS) | 2 | WPA120158 |
| 23A | STABILISER FOOT (FRONT LEGS) | 2 | WPA2035013 |
| 24 | STABILISER LEG PIN (BOTTOM) | 4 | WPA2041031M |
| 24A | STABILISER LEG PIN (TOP) | 4 | WPA2041031P |
| 25 | STABILISER CYLINDER ROD PIN | 4 | WPA2041009 |
| 26 | STABILISER FOOT PIVOT PIN | 4 | WPA2041010 |
| 27 | LEG SWITCH BRACKET | 8 | WPA2016044 |
| 28 | LIMIT SWITCH-LEVER TYPE | 4 | WPA2577104 |
| 29 | LIMIT SWITCH PLUNGER TYPE | 4 | WPA2577105 |
| 30 | DUAL PILOT OPERATED CHECK VALVE | 4 | WPA5746091 |




SUBFRAME/STABILISER ASSEMBLY

| BOOM ASSEMBLY | | | |
|---|---|---|---|

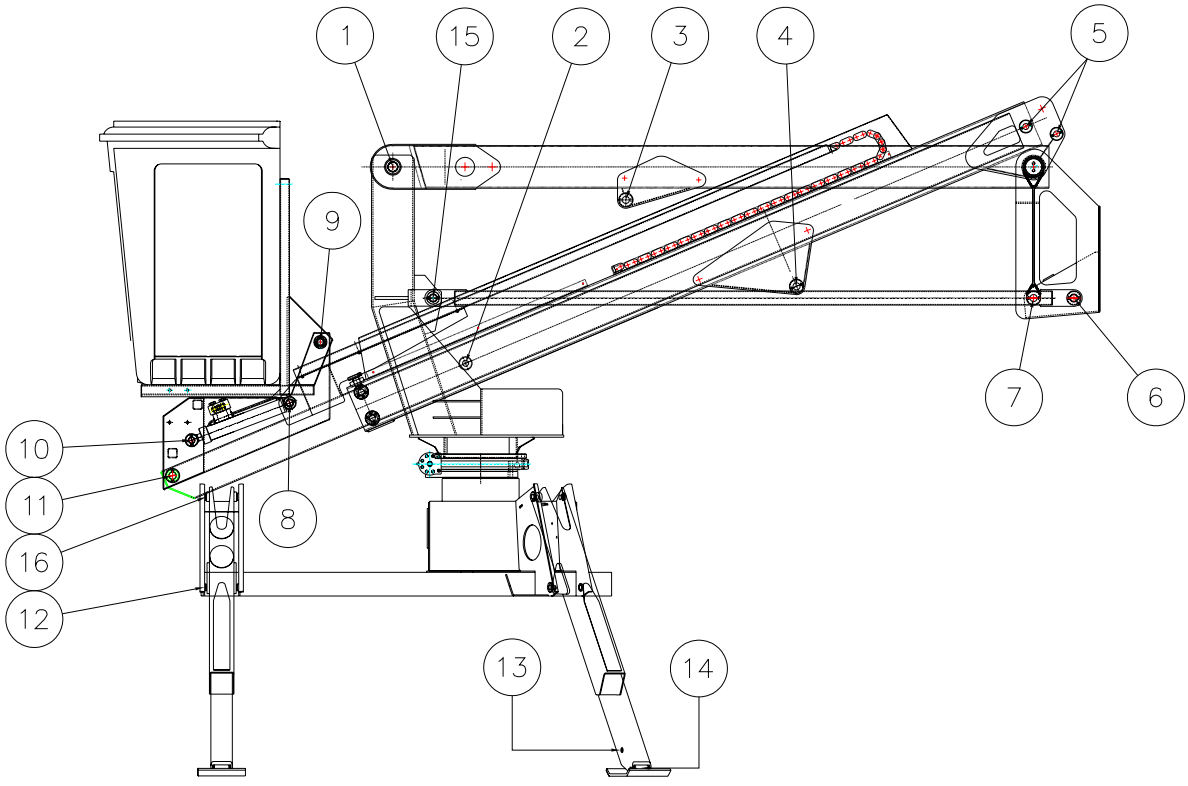
| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | BASE BOOM | 1 | WPA2008039 |
| 2 | MIDDLE BOOM | 1 | WPA2008037 |
| 3 | TELE BOOM | 1 | WPA2008038 |
| 4 | 'A'-FRAME | 1 | WPA2001066 |
| 5 | TOP WEIGHING CRADLE | 1 | WPA2118018-1 |
| 6 | BOTTOM WEIGHING CRADLE | 1 | WPA2118018-2 |
| 7 | BELLCRANK | 1 | WPA2022004 |
| 8 | BASE LINK | 1 | WPA2009012 |
| 9 | BASE CYLINDER | 1 | WPA2113036 |
| 10 | MIDDLE CYLINDER | 1 | WPA2113047 |
| 11 | CAGE LEVEL CYLINDER-MASTER | 1 | WPA2113038 |
| 12 | CAGE LEVEL CYLINDER-SLAVE | 1 | WPA2113039 |
| 13 | TELE CYLINDER | 1 | WPA2113040 |
| 14 | ENERGY CHAIN | 1 | WPA2065034 |
| 15 | PROPORTIONAL HYDRAULIC MANIFOLD | 1 | WPA2109010 |
| 16 | ENERGY CHAIN COVER | 1 | WPA2065035 |




BOOM ASSEMBLY

| PIVOT PIN KIT |
|---|

| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | BASE BOOM / 'A'-FRAME PIN | 1 | WPA2041031A |
| 2 | TELE-CYLINDER ROD PIN | | WPA2041031B |
| 3 | BASE CYLINDER ROD PIN | | WPA2041031C |
| 4 | MIDDLE CYLINDER ROD PIN | | WPA2041031D |
| 5 | TELE-CYL BASE PIN AND MASTER LEVEL CYL ROD PIN | | WPA2041031E |
| 6 | BASE LINK / AND MASTER LEVEL CYL BASE PIN | | WPA2041031F |
| 7 | MIDDLE CYLINDER BASE PIN | | WPA2041031G |
| 8 | SLAVE CYLINDER BASE PIN | | WPA2041031H |
| 9 | CRADLE REAR PIVOT PIN | | WPA2041031J |
| 10 | SLAVE CYLINDER ROD PIN | | WPA2041031K |
| 11 | CRADLE FRONT PIVOT PIN | | WPA2041031L |
| 12 | STABILISER LEG LOCATION PIN (TOP) | | WPA2041031M |
| 13 | STABILISER CYLINDER ROD PIN | | WPA2041009 |
| 14 | STABILISER FOOT PIVOT PIN | | WPA2041010 |
| 15 | BASE LINK / 'A'-FRAME PIN | | WPA2041031N |
| 16 | STABILISER LEG LOCATION PIN (BOTTOM) | | WPA2041031P |
| | | | |

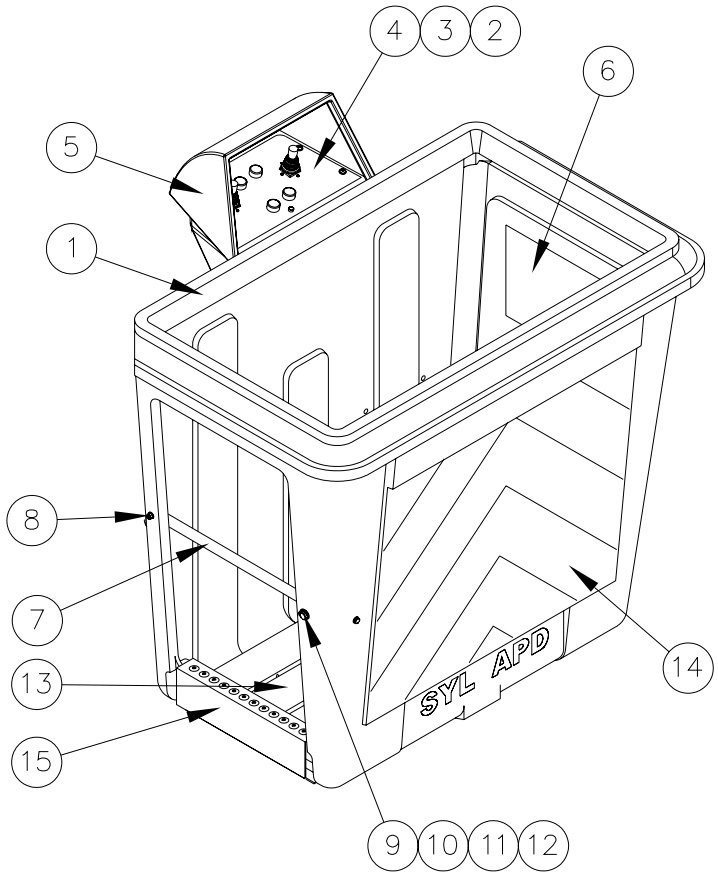



PIVOT PIN KIT

**CAGE ASSEMBLY**

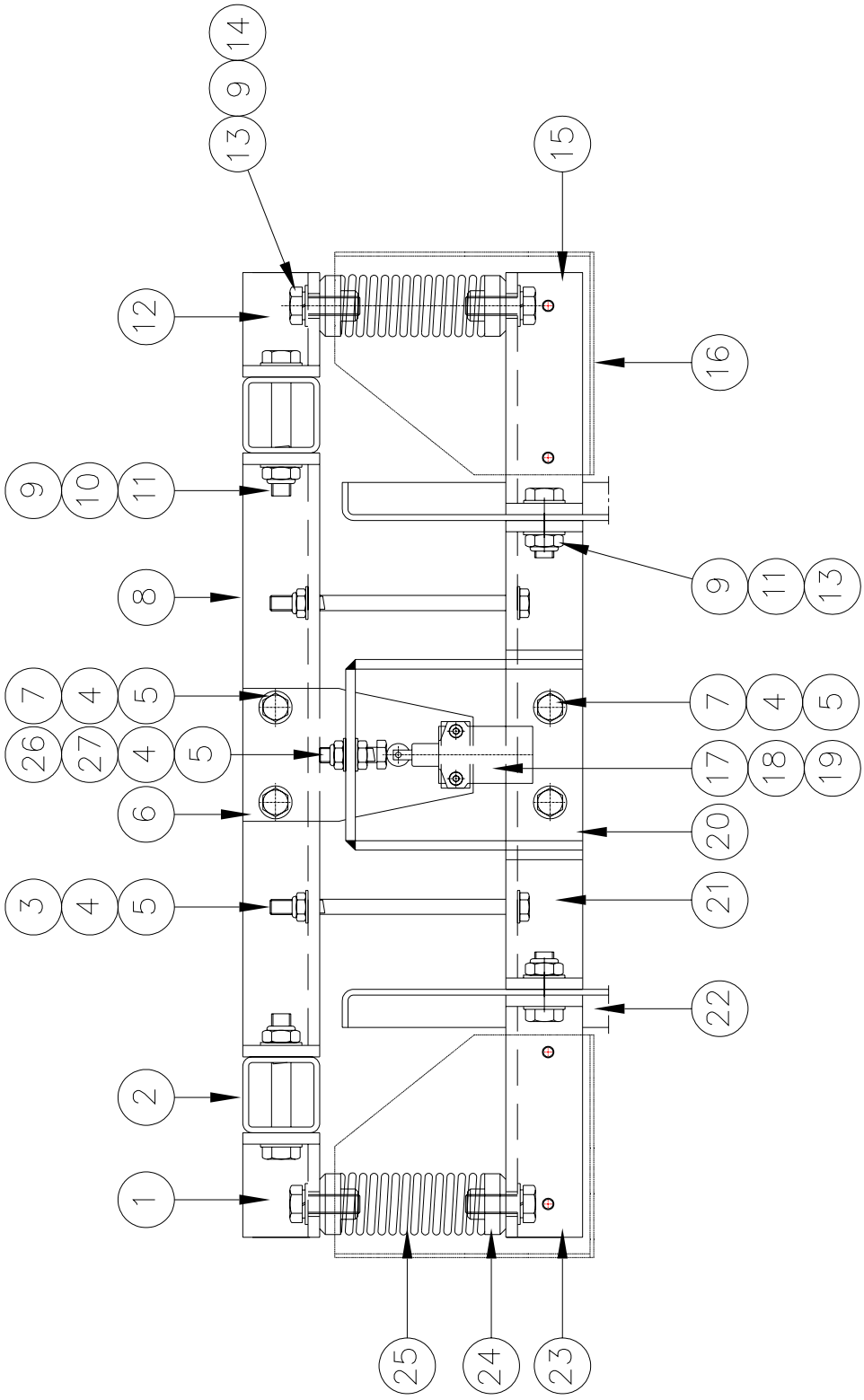
| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | PERSONNEL CAGE | 1 | * |
| 2 | ELECTRICAL CONTROLS | 1 | WPA8132-07 |
| 3 | PANEL GASKET | 1 | WPA2013007 |
| 4 | PANEL LABEL | 1 | WPA2050182 |
| 5 | CONTROLS HOUSING | 1 | * |
| 6 | CAGE SAFETY LABEL | 1 | WPA2050167 |
| 7 | KNEE BAR | 1 | WPA2055006 |
| 8 | KNEE BAR REST BOX | 1 | WPA2048102 |
| 9 | KNEE BAR PIVOT | 1 | WPA2048093 |
| 10 | KNEE BAR BRACKET | 1 | WPA2048092 |
| 11 | PIVOT BUSH | 1 | WPA2038022 |
| 12 | BRACE AND STOP ASSEMBLY | 1 | WPA2031004 |
| 13 | NON SLIP FLOOR STRIP | 4 | WPA2031005 |
| 14 | CAGE CHEVRONS (OPTIONAL) | 1 | WPA2073005 |
| 15 | STEP EDGE PROTECTOR | 1 | WPA2059023 |

For Items marked * consult **Gardner Denver UK** service department



**CRADLE WEIGHING SYSTEM ASSEMBLY**

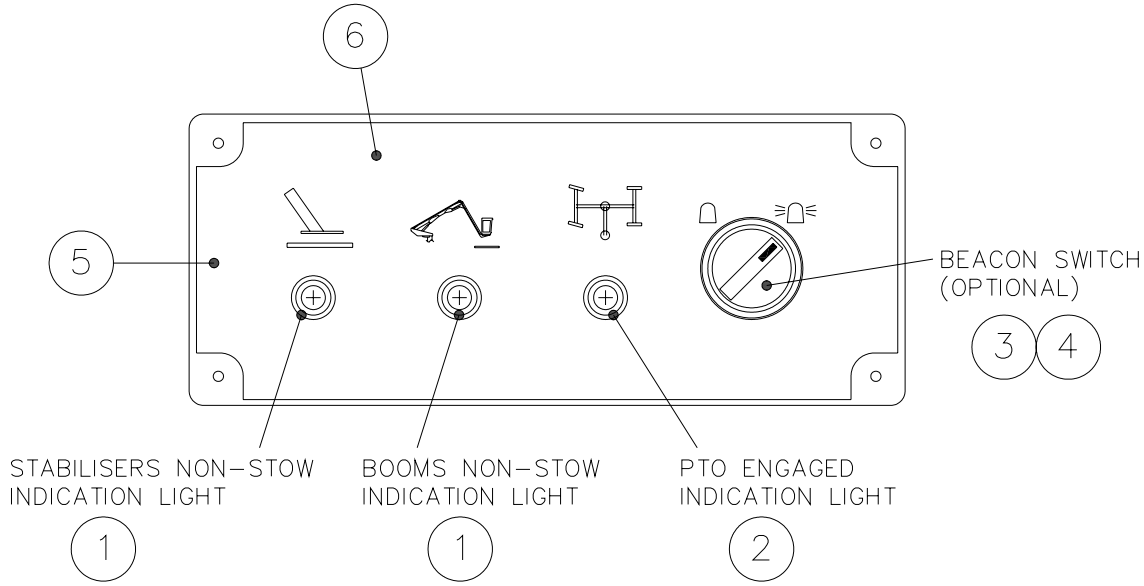
| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | TOP BEAM | 1 | WPA2065053A |
| 2 | TOP WEIGHING CRADLE | 1 | WPA2118018-1 |
| 3 | TRAVEL LIMITING BOLT (M8x130 HX-HD) | 2 | M100087130-2 |
| 4 | M8 FLAT WASHER | 14 | M60008000-2 |
| 5 | M8 NYLOC HEX NUT | 7 | M720087000-2 |
| 6 | LIMIT SWITCH MOUNTING PLATE | 1 | WPA2065051 |
| 7 | FIXING SCREW (M8x25 HX-HD) | 4 | M470087025-2 |
| 8 | TOP BEAM | 1 | WPA2065048 |
| 9 | M10 FLAT WASHER | 20 | M600100000-2 |
| 10 | FIXING BOLT (M10x70 HX-HD) | 4 | M470107000-2 |
| 11 | M10 NYLOC HEX NUT | 8 | M720107000-2 |
| 12 | TOP BEAM | 1 | WPA2065053B |
| 13 | FIXING SCREW (M10x30 HX-HD) | 8 | M470107030-2 |
| 14 | M10 SPRING WASHER | 4 | M61010000-5 |
| 15 | BOTTOM BEAM | 1 | WPA2065054A |
| 16 | SPRING COVER | 2 | WPA2057139 |
| 17 | ROLLER PLUNGER LIMIT SWITCH | 1 | WPA2577202 |
| 18 | FIXING SCREW (M4x20 SOC-HD) | 2 | M450047020-9 |
| 19 | M4 SPRING WASHER | 2 | M61004000-5 |
| 20 | TRIP SCREW MOUNTING BRACKET | 1 | WPA2065063 |
| 21 | BOTTOM SUPPORT BEAM | 1 | WPA2065049 |
| 22 | BOTTOM WEIGHING CRADLE | 1 | WPA2118018-2 |
| 23 | BOTTOM BEAM | 1 | WPA2065054B |
| 24 | SPRING COLLAR | 4 | WPA2065052 |
| 25 | DIE SPRING | 2 | WPA2037008 |
| 26 | TRIP SCREW (M8x30 HX-HD) | 1 | M470087030-2 |
| 27 | M8 HEX NUT | 1 | M250087000-2 |




CRADLE WEIGHING SYSTEM ASSEMBLY

**CAB ENCLOSURE ASSEMBLY**

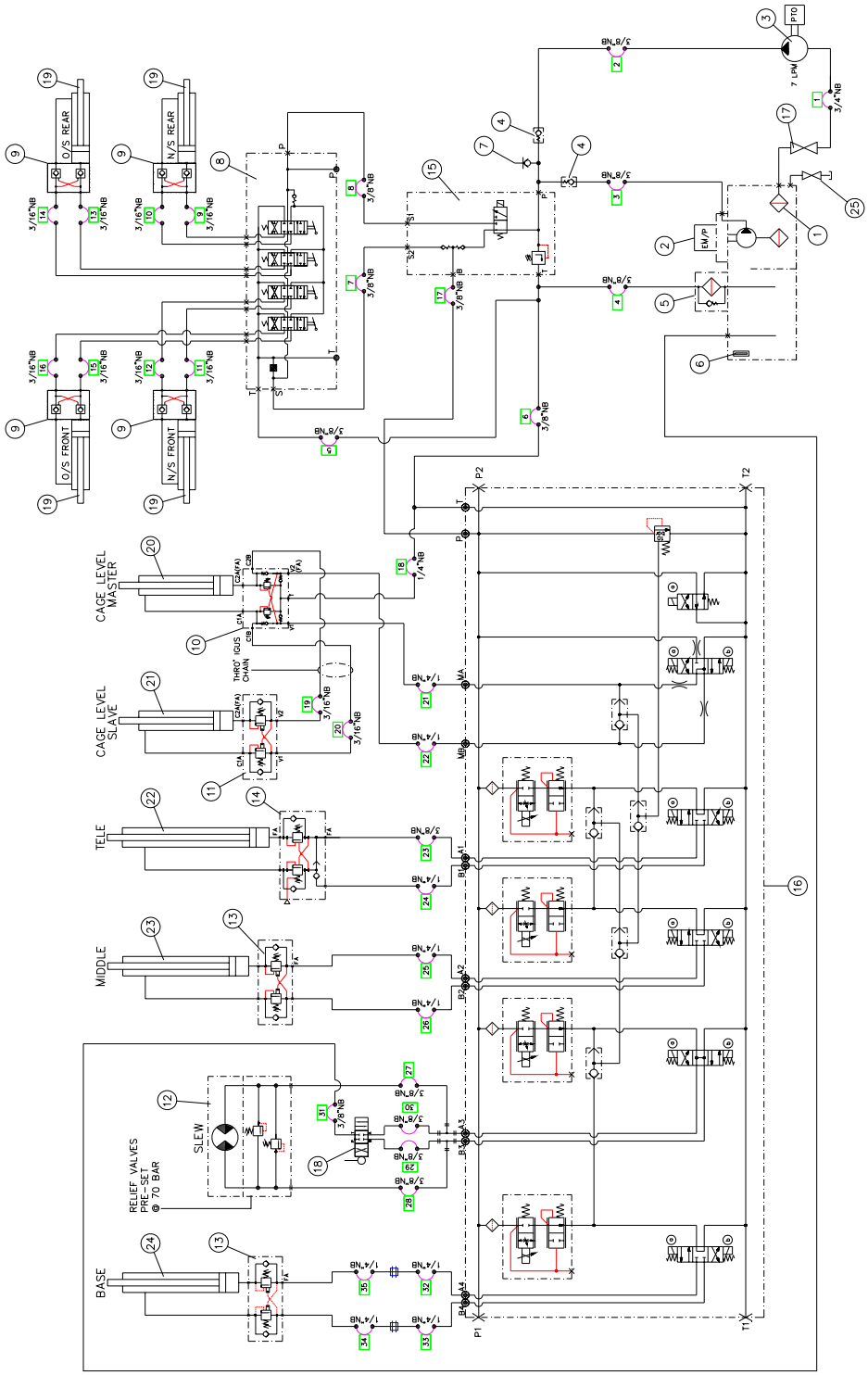
| ITEM | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | RED L.E.D 12v | 2 | WPA2577150 |
| 2 | YELLOW L.E.D 12v | 1 | WPA2577151 |
| 3 | ROTARY SWITCH | 1 | WPA2577081 |
| 4 | L.E.D + CONTACT BLOCK | 1 | WPA2577088 |
| 5 | WARNING BUZZER (UNDER PANEL) | 1 | WPA248-038 |
| 6 | BUZZER | 1 | WPA249-429 |
| 7 | LABEL | 1 | WPA2050181 |

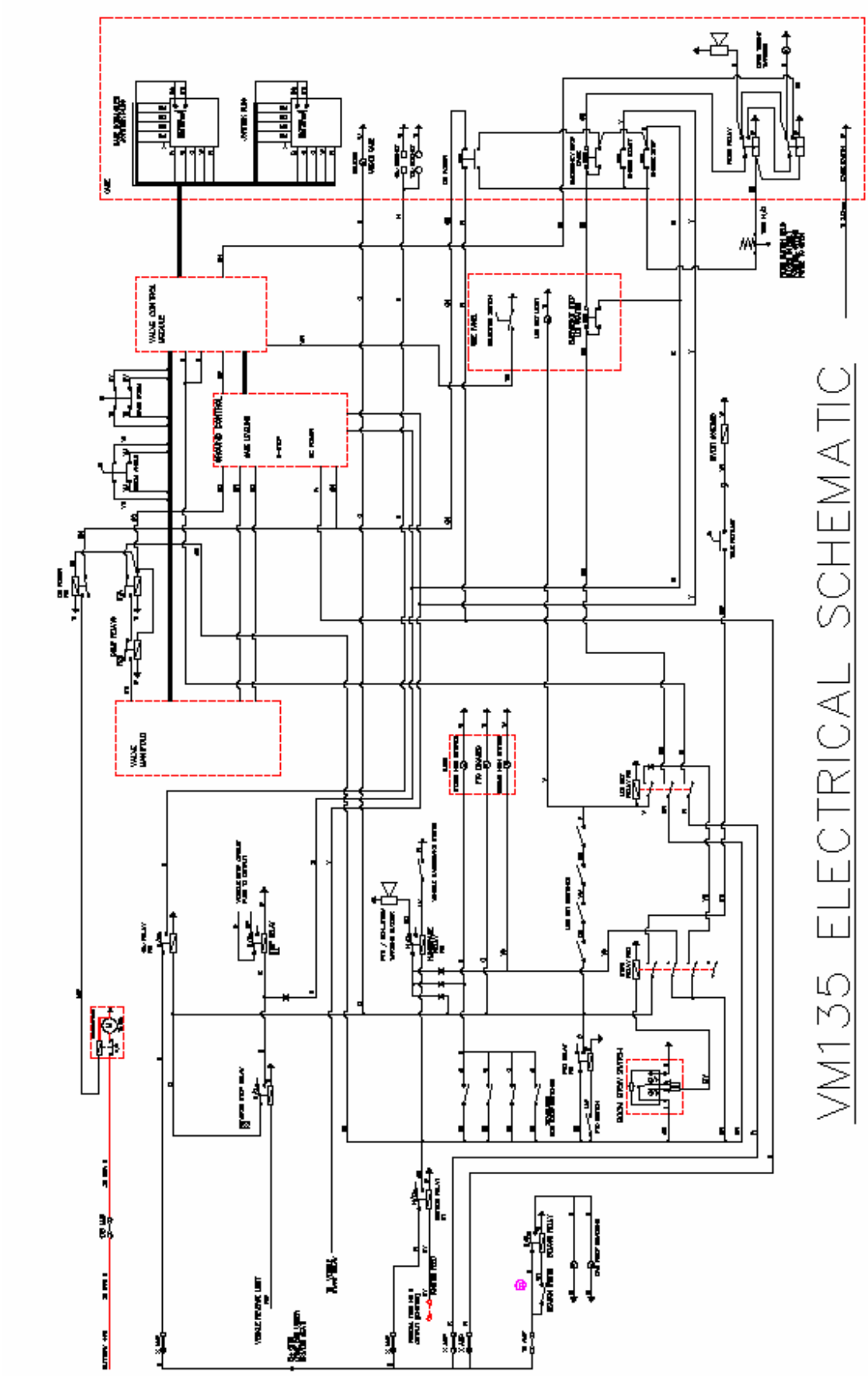


**MAJOR HYDRAULIC ITEMS**

| ITEM | DESCRIPTION | PART NO | QTY |
|---|---|---|---|
| 1 | SUCTION STRAINER | WPA2705000 | 1 |
| 2 | EMERGENCY PUMP UNIT | WPA5746125 | 1 |
| 3 | HYDRAULIC PUMP | HPF20001111B | 1 |
| 4 | CHECK VALVE | WPA5745051 | 2 |
| 5 | RETURN FILTER | WPA2105014 | 1 |
| 6 | LEVEL GAUGE | WPA2705005 | 1 |
| 7 | TEST POINT | WPA5746040 | 1 |
| 8 | HYDRAULIC MANIFOLD-STABS | WPA2114038 | 1 |
| 9 | DUAL PO CHECK VALVE | WPA5746091 | 4 |
| 10 | MOTION CONTROL VALVE | WPA2114020 | 1 |
| 11 | VALVE LEVELLING-SLAVE | WPA2114033S | 1 |
| 12 | SLEW MOTOR/RING INCL CL RELIEF | WPA2026003 | 1 |
| 13 | DUAL O/CENTRE VALVE | WPA5746020 | 2 |
| 14 | REGEN VALVE | WPA2109007 | 1 |
| 15 | DIVERT VALVE | WPA2114037 | 1 |
| 16 | HYDRAULIC MANIFOLD-BOOMS | WPA2109010 | 1 |
| 17 | SHUT OFF VALVE | D400111 | 1 |
| 18 | SLEW STOP VALVE | WPA2114029 | 1 |
| 19 | STABLISER CYLINDER | WPA2113041 | 4 |
| 20 | CAGE LEVEL CYL.-MASTER | WPA2113038 | 1 |
| 21 | CAGE LEVEL CYL.-SLAVE | WPA2113039 | 1 |
| 22 | TELE CYLINDER | WPA2113040 | 1 |
| 23 | MIDDLE CYLINDER | WPA2113037 | 1 |
| 24 | BASE CYLINDER | WPA2113036 | 1 |
| 25 | DRAIN VALVE | H59453000002 | 1 |

# VM135 HYDRAULIC CIRCUIT




VM135 ELECTRICAL SCHEMATIC