

Fault Finding: Rack & Pinion Hoist

Novocastrian Rentals P/L ABN 27 110 725 623

1. Outline

This procedure is intended for Troubleshooting faults in all Rack & Pinion Materials Hoists and becomes part of the information available to Front Counter Staff to help reduce on-site visits by Service Staff. The information is also intended for Inspection and Service Staff.

2. Glossary

- All Hoists:* A reference to all Rack & Pinion Hoists.
- Geda Hoists:* A reference to Hoists manufactured by Geda Dechintreiter only.
- Maber Hoists:* A reference to Hoists manufactured by Maber Costruzioni only.
- Trolley:* The part of the Hoist holding motor, *Overspeed Governor* and platform.
- Rigger's Deck:* Special Assembly platform connected to Load Platform for Hoist workers
- Control Box:* Electrical box mounted on the cable drum, containing the operating indicator lamps, main isolator key switch and landing gate interlock socket.
- Switch Box:* Electrical box mounted on the Hoist trolley.
- Run Condition:* Hoist condition where operation is possible; only the green indicator lamp on the *Control Box* is lit.
- Hoist Lockout:* Hoist condition where operation is not possible due an *Interlock Switch* or the EMERGENCY OFF control on the *Rigger's Control* being set. This condition on the *Control Box* is shown on *Geda Hoists* when the top red lamp only is lit, and on *Maber Hoists* as no lamps lit.
- Interlock Switch* Electric switch connected to a Hoist part that causes a *Hoist Lockout* condition when set.
- Final-Limit* *Geda Hoists* only. An electrical *Interlock Switch* controlling travel outside the normal range. When tripped, a *Hoist Lockout* condition is set, requiring use of a *Drop Test Control* to move the Hoist platform back into the normal travel range.
- Pendant Control* Hand held control used to operate the Hoist under normal conditions.
- Rigger's Control* Used for erection of the Hoist. The control is platform mounted on *Geda Hoists*, and as a hand-held pendant on *Maber Hoists*.
- Drop Test Control* Hand-held control used for performing Drop Tests on all *Geda Hoists* and later series *Maber Hoists*.
- Drop Test:* Action where the effectiveness of the Overspeed Governor is tested.
- Manual Descent Device:* A device for opening the motor brake to return the platform to ground.

3. Hazard Assessment

| Hazard | Risk | Control |
|-----------------------------------|----------|--|
| Falling from mast or platform | Moderate | Do not climb out of the platform at height; use the Rigger's Deck for tie or maintenance work. Take care when entering or leaving the Rigger's Deck due to the opening between deck and handrail. Do not stand on the Rigger's Deck handrail. Use Height Safety equipment if adding more than two mast sections. |
| Collapse or Tipping of the Hoist | Moderate | Ensure Hoist is placed on a firm stable floor space and the Hoist base under the mast is in firm contact with the floor. Check all stabilisers are firm against the ground and the Hoist is level in all planes. Check mast bolts are tight. Ensure a tie to a firm structure is placed within the first 4m. |
| Crushing from parts of the Hoist | Moderate | Do not stand under a raised platform without bracing under the platform and electrically isolating the Hoist. Exercise care when lowering or performing a <i>Drop Test</i> on a Hoist. Do not allow body parts to come between Hoist parts. Take care when moving test weights. |
| Electrocution | Moderate | Inspect power supply lead and plug before use. Check the Hoist for electrical insulation (Mega test) before use. Do not operate with faulty electrical parts. Only use a protected power supply. Exercise care if testing "live" circuits. |
| Part or whole of the load falling | Low | Ensure that test weights used are structurally sound and any loose parts are secured. Ensure the test weight will not move during Hoist operation. Take care when moving test weights. Ensure loose tools are not left on the Hoist during operation |
| Slipping or tripping | Low | Maintain a neat tidy work space. Hang all leads in the air. |
| Ergonomics | Low | Adopt good lifting techniques when adding/removing mast sections or loading/unloading the platform to reduce the risk of back injury. |

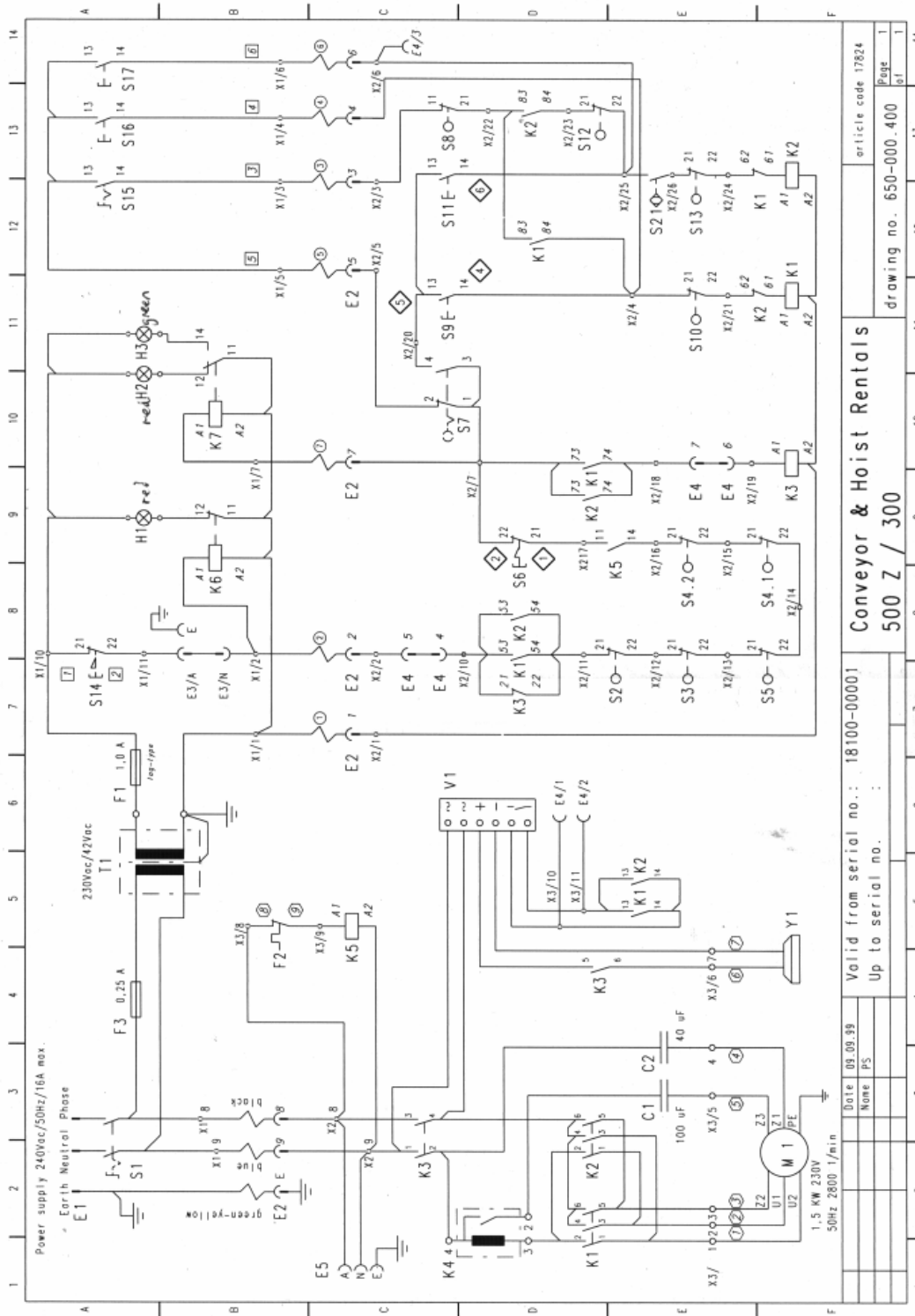
4. Fault Chart

| Fault | Geda 500Z/300 Remedy | Maber 800/150 Remedy |
|--|---|---|
| Hoist will not operate - no indicator lamps lit on <i>Control Box</i> | <ol style="list-style-type: none"> 1) Power Lead not plugged in 2) Power not turned on 3) Key switch not turned on 4) Fuses in <i>Control Box</i> blown | <ol style="list-style-type: none"> 1) Power lead not plugged in. 2) Power not turned on 3) Key switch not turned on 4) Phase rotation switch on the <i>Switch Box</i> turned to centre off or incorrect phase direction. 5) Fuse in the <i>Switch Box</i> has blown. 6) EMERGENCY OFF button pushed on <i>Pendant Control</i>. 7) <i>Rigger's Control</i> still plugged in. 8) <i>Pendant Control</i> not plugged in 9) Hoist trailing cable not plugged in. 10) <i>Drop-Test Pendant</i> plugged in 11) Close all gates, covers and <i>Rigger's Deck</i>. 12) Check trailing cable is not dragging or catching, setting <i>Interlock Switch</i> 13) Check nothing is fouling the Obstruction bar under the platform, setting the <i>Interlock Switch</i>. |
| Hoist will not operate - two red lamps lit on <i>Control Box</i> | <ol style="list-style-type: none"> 1) EMERGENCY OFF button pressed on <i>Pendant Control</i>. 2) Landing Gate(s) open 3) Dummy plug not in circuit 4) Landing Gates not plugged in 5) Trailing cable not connected to Hoist at <i>Trolley</i> | <ol style="list-style-type: none"> 1) Landing Gates not plugged in 2) Landing Gate is open. 3) Landing Gate dummy plug not plugged in. |
| Hoist will not operate - One red lamp lit on <i>Control Box</i> . | <ol style="list-style-type: none"> 1) Close both loading ramps 2) Close <i>Rigger's Deck</i> 3) Open EMERGENCY OFF button on <i>Rigger's Control</i>. 4) Thermo switch on motor has cut-out due to voltage drop. 5) <i>Final-Limit</i> switch activated. Use the <i>Drop-Test Control</i> to move Hoist away from this limit. Adjust motor brake if lower <i>Final-Limit</i> was engaged. 6) <i>Overspeed Governor</i> Device has triggered. Find reason for triggering. Check motor-brake, motor and drive pinion. See Form 0507 "Annual Procedure – Rack & Pinion Hoist" chapter 7. <i>Overspeed Governor</i> Test for details to release the <i>Governor</i>. 7) Fault is as two red lamp lit, but one lamp is blown. | <ol style="list-style-type: none"> 1) One red lamp blown |
| Hoist will not operate - Green lamp lit on <i>Control Box</i> . | <ol style="list-style-type: none"> 1) Hoist is on a <i>Working-Limit</i> switch. Operate Hoist in other direction 2) Hoist is switched to <i>Rigger's Control</i>. | <ol style="list-style-type: none"> 1) Hoist is on a <i>Working-Limit</i> switch. Operate Hoist in other direction |
| Hoist will not lift full load | <ol style="list-style-type: none"> 1) Hoist is overloaded 2) Power supply more than 40m away 3) Leads not 3 x 2.5² mm 4) Supply voltage is less than 210v under load. | <ol style="list-style-type: none"> 1) Hoist is overloaded 2) Power supply is more than 40m away 3) Leads not 3 x 2.5² mm 4) Supply voltage less than 375v under load. |
| Hoist will not stop | <ol style="list-style-type: none"> 1) Hoist is in automatic mode 2) Operating buttons stuck with concrete/mortar 3) Damaged <i>Pendant Control</i> 4) Landing Level actuator not present/not | <ol style="list-style-type: none"> 1) Hoist is in automatic mode 2) Operating buttons stuck with concrete/mortar 3) Damaged <i>Pendant Control</i> 4) Landing Level actuator not present/not |

| | | |
|--|--|---|
| | correctly set 5) Working/Final-Limit actuator absent and Proximity switch disabled. | correctly set 5) Working/Final-Limit actuator absent and Proximity switch disabled. |
| Hoist will not operate in automatic mode | 1) Hoist not switched to automatic mode 2) Landing Level actuator not set | 1) Motion switch not 'single clicked' for automatic mode. 2) Landing Level actuator not set. |

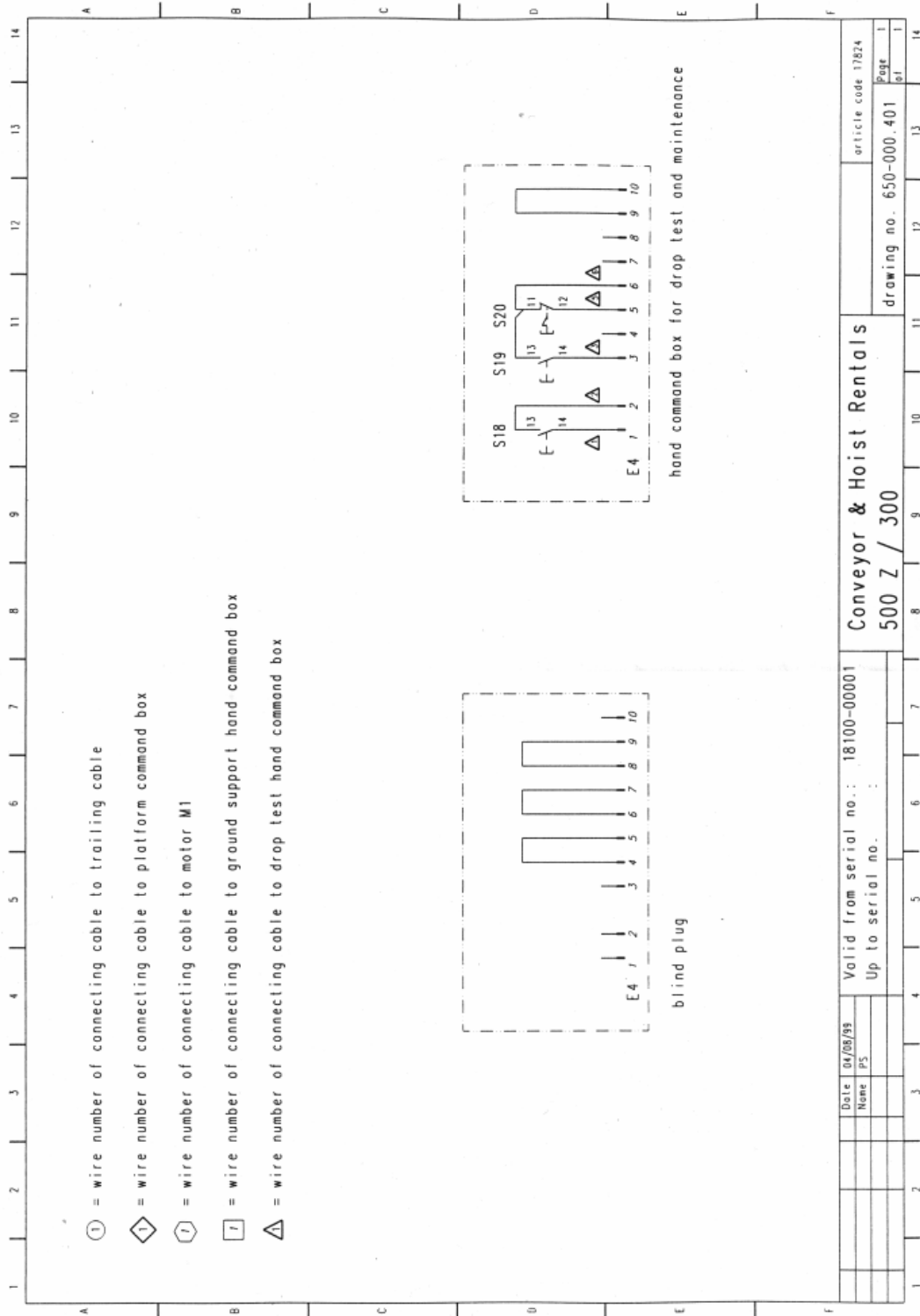
5. Electrical Diagrams

5.1 Geda 500Z/300 Schematic



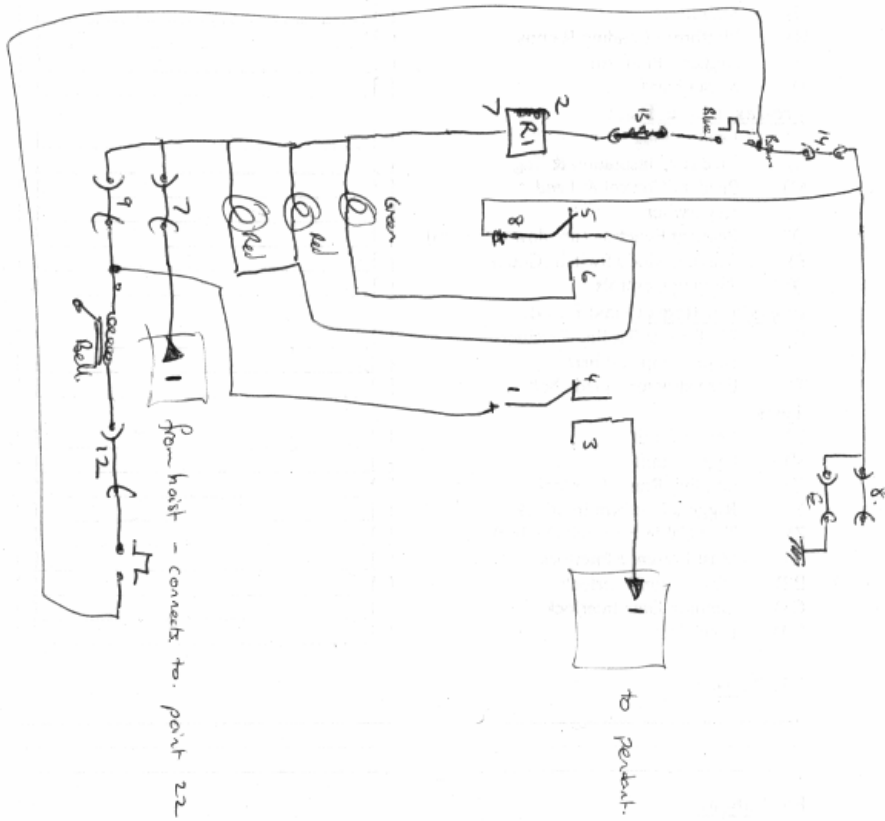
| Conveyor & Hoist Rentals 500 Z / 300 | | Explanation to wiring diagram 650-000.400 / 650-000.401 | | |
|--------------------------------------|----------|---|---|--|
| valid from serial No 18100-00001 | | Please indicate serial number on order | | |
| Amount | Part no. | Short name | Description | Additional information |
| | | C1 | Starting capacitor | |
| | | C2 | Operating mode capacitor | 100 µF |
| | | E1 | Power supply connector | 40 µF |
| | | E2 | Trailing cable connector at trolley | 3-pole |
| | | E3 | Landing level gate connector | 10-pole |
| | | E4 | Connector for hand control box | 3-pole mounted at ground control junction box |
| | | E5 | Auxiliary power supply socket | 10-pole / used for drop test and maintenance |
| | | F1 | Fuse 1.0 amps | 3-pole / 240V / 10 Amp maximum current / 50 Hz |
| | | F2 | Thermal protection switch for M1 | Control power supply fuse / lag-type / size 5*20mm |
| | | F3 | Fuse 0.25 amps | Opens at 130°C motor coil temperature |
| | | H1 | Fault signal lamp (red) | Transformer fuse / size 5*20mm |
| | | H2 | Fault signal lamp (red) | Indicates fault at ground support or landing level gate switch |
| | | H3 | Ready signal (green) | Indicates fault at platform control switches |
| | | K1 | Down mode contactor | Indicates readiness for operation |
| | | K2 | Up mode contactor | Inside trolley junction box |
| | | K3 | Emergency stop contactor | Inside trolley junction box |
| | | K4 | Starting relay | Inside trolley junction box |
| | | K5 | Auxiliary relay for thermal protection switch | K6(>18.9Amps=on/<15.6Amps=off) |
| | | K6 | Relay for ground or level fault signal | 230V coil |
| | | K7 | Relay for platform switches fault signal | 48V coil |
| | | M1 | Motor single phase 230V/50Hz/1.5kW | 48V coil |
| | | S1 | Main power supply switch | At ground support junction box |
| | | S2 | Limit switch for overspeed safety brake | |
| | | S3 | Emergency bottom limit switch | |
| | | S4.1 | Limit switch ramp | Left side |
| | | S4.2 | Limit switch ramp | Right side (motor) |
| | | S5 | Limit switch erection platform | |
| | | S6 | Emergency push button | At platform command box |
| | | S7 | Mode switch for operation or erection | At trolley junction box |
| | | S8 | Limit switch for 2 mtr. security stop | Interrupts automatic mode below 2 mtr. |
| | | S9 | Down push button | At platform command box |
| | | S10 | Bottom limit switch | Interrupts down motion |
| | | S11 | Up push button | At platform command box |
| | | S12 | Landing level switch | Activated by mast-mounted metal plate (triangular type) |
| | | S13 | Up limit switch | Activated by mast mounted metal plate (straight type) |
| | | S14 | Emergency push button | At ground hand control command box |
| | | S15 | Mode switch for manual or automatic operation | At ground hand control command box |
| | | S16 | Down push button | At ground hand control command box |

5.4 Geda 500Z/300 Connection Sockets



| | | | | | | |
|------|----------|------------------------|-------------|--------------------------|-------------------------|--------------------|
| Date | 04/08/99 | Valid from serial no.: | 18100-00001 | Conveyor & Hoist Rentals | drawing no. 650-000.401 | article code 17824 |
| Name | PS | Up to serial no.: | | | | |
| | | | | 500 Z / 300 | Page | 1 |
| | | | | | of | 1 |

5.6 Maber 800/150 Landing gate Interlock



END OF FAULT FINDING