DISCLAIMER

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- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Remote Control Technologies Pty Ltd (RCT) will accept no responsibility for actual use of the product based on these illustrative examples.

- Please contact your nearest Remote Control Technologies Pty Ltd (RCT) branch for more information concerning applications in life critical situations or high reliability.

- Remote Control Technologies Pty Ltd (RCT) reserves the right to make changes to any product herein to improve reliability, function or design. All specifications are subject to change without notice.
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL SAFETY WARNINGS</td>
<td>4</td>
</tr>
<tr>
<td>PRODUCT OVERVIEW</td>
<td>5</td>
</tr>
<tr>
<td>FEATURES AND FUNCTIONS</td>
<td>5</td>
</tr>
<tr>
<td>OPERATION AND USE</td>
<td>6</td>
</tr>
<tr>
<td>CONTROLLER STATUS INDICATOR OPERATION</td>
<td>6</td>
</tr>
<tr>
<td>INSTALLATION GUIDE</td>
<td>7</td>
</tr>
<tr>
<td>WIRING CONNECTIONS</td>
<td>7</td>
</tr>
<tr>
<td>EXTERNAL WIRING DIAGRAM (501d)</td>
<td>8</td>
</tr>
<tr>
<td>CALIBRATION</td>
<td>9</td>
</tr>
<tr>
<td>SERVICE INFORMATION</td>
<td>9</td>
</tr>
<tr>
<td>SERVICE SCHEDULE</td>
<td>9</td>
</tr>
<tr>
<td>SERVICE PROCEDURE</td>
<td>9</td>
</tr>
<tr>
<td>PARTS LIST</td>
<td>9</td>
</tr>
<tr>
<td>TECHNICAL SPECIFICATIONS</td>
<td>10</td>
</tr>
<tr>
<td>COMPLIANCE AND STANDARDS</td>
<td>10</td>
</tr>
<tr>
<td>TROUBLESHOOTING</td>
<td>10</td>
</tr>
<tr>
<td>GLOSSARY</td>
<td>11</td>
</tr>
<tr>
<td>WARRANTY</td>
<td>11</td>
</tr>
</tbody>
</table>
GENERAL SAFETY WARNINGS

PERSONAL SAFETY

■ Everyone is responsible for safety.
■ The installer/service personnel should be trained and authorized to complete the required work.
■ Ensure that the machine is safely isolated during installation and testing to protect all personnel.
■ Complete all required risk assessments and job safety analysis (JSA) before commencing work.
■ Observe all site specific and machine OEM procedures regarding the following:
  – working at heights
  – working in heat
  – working in confined spaces
  – all other site specific occupational health and safety (OH&S) procedures

MACHINE

■ Carry out all prestart operations as per site and machine OEM procedures.
■ Ensure the machine is safely isolated during installation and testing to protect the machine and other equipment in the area.
■ Do not operate any machine with a known fault and report all findings to the supervisor in writing.
■ Test and operate machine as per machine OEM and site procedures.
■ Read and understand machine and site specific operational and testing instructions.

PRODUCT

Before applying power to the equipment, the user/repairer/installer must read all product instructions. If in doubt, seek assistance.

■ Ensure electrical connections are made as per RCT’s recommendations. Test circuits prior to connecting power to any component.
■ The equipment contains no user serviceable parts inside. Return the unit to RCT for repairs.
■ Retain product and installation instructions for future use.
■ Ensure that RCT’s recommended service procedures are included in the machine’s service routine.
■ Observe all machine, site and RCT product warnings.
■ Follow all machine, site and RCT product operating procedures at all time.

The application of safety should not be limited to the above recommendations.
PRODUCT OVERVIEW

The Muirhead® Overcrank Protection controller, part number 11966, is designed to be installed in large mining machines to protect the starter motor from over-cranking.

The overcrank protection controller will stop the engine starter motor being cranked for an excessive amount of time and provides a cooling down period between long cranking.

FEATURES AND FUNCTIONS

- Multi-voltage 12-24 V
- Environmentally sealed – IP65
- Overcrank visual warning
- Protects starter circuit from unnecessary damage caused by overcranking
- Overcrank timeout function
- Compact and robust design
OPERATION AND USE

The overcrank protection controller will allow the operator to crank the vehicle for a maximum of 30 seconds after which the output is turned off. If the crank time exceeds 10 seconds, there is a lockout period of 60 seconds before it can be cranked again. An LED (usually mounted in the instrument panel) will illuminate during this time to indicate that the start circuit is in lockout.

The bypass switch functionality has been designed so that maintenance staff can perform tasks without being inhibited by the overcrank protection controller. When the bypass switch is on, the controller will allow the operator to crank the vehicle for as long as necessary.

The timings mentioned above are the default time settings. Contact RCT if your specific application requires values different to the defaults.

CONTROLLER STATUS INDICATOR OPERATION

<table>
<thead>
<tr>
<th>STATE</th>
<th>INDICATOR SEQUENCE</th>
</tr>
</thead>
</table>
| Battery Power-up               | ■ All indicators will turn on.  
■ All indicators will turn off.  
■ After power-up, the controller will revert to normal operation.                                                                                       |
| Status Indicator in Operation  | **RED** – Fault.  
■ If outputs have problems, this will turn on.  
■ Outputs 1 & 2 – high current outputs: checked for over current.  
■ Output 3 – not checked as it is a low side driver.  
■ Output 4 – checked for correct output voltage.  
■ Temperature – checked for board temperature exceeding 80 °C.                                                                                         |
| **Yellow** – Pulses during normal operation, indicates system OK.  
■ Flashes on and off at one-second intervals (on for one second, off for one second).                                                                 |
| **Green** – On for normal operation.  
■ Flashes when valid input goes active (number of flashes = input number).  
■ Allows checking that inputs are correctly wired and that the hardware is seeing the input toggle.                                                                 |
INSTALLATION GUIDE

1. Install the control unit in a suitable location preferable in the cabin.

2. Refer to the wiring table below and the wiring diagram in this manual to connect the controller. It is recommended that the wiring is installed alongside the OEM wiring ensuring that it is secured at regular intervals; this will provide protection from heat and abrasion, and any other excess damage that may occur with extended vehicle operation. When securing the wiring to the OEM wiring, ensure that the loom is away from moving vehicle parts which could lead to loom damage.

WIRING CONNECTIONS

<table>
<thead>
<tr>
<th>NO.</th>
<th>COLOUR</th>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Battery +VE</td>
<td>Connect to the permanent battery supply at the key switch (supply 12-24 V DC).</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>Ground</td>
<td>Earth (ground).</td>
</tr>
<tr>
<td>3</td>
<td>Yellow/Blue</td>
<td>Output 1 (ignition output)</td>
<td>Connect to the (OEM) ignition wires previously disconnected from the ignition terminal at the key switch (10 A continuous output).</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>Output 3</td>
<td>Not used.</td>
</tr>
<tr>
<td>5</td>
<td>Orange</td>
<td>Input 1</td>
<td>Not used.</td>
</tr>
<tr>
<td>6</td>
<td>White</td>
<td>Input 3</td>
<td>Bypass key.</td>
</tr>
<tr>
<td>7</td>
<td>Brown</td>
<td>Input 4</td>
<td>Not used.</td>
</tr>
<tr>
<td>8</td>
<td>Pink</td>
<td>Input 2</td>
<td>Ignition key start signal and terminal 30 of start relay.</td>
</tr>
<tr>
<td>9</td>
<td>Purple</td>
<td>Output 4</td>
<td>Not used.</td>
</tr>
<tr>
<td>10</td>
<td>Blue</td>
<td>Output 2</td>
<td>Lockout LED + VE.</td>
</tr>
<tr>
<td>11</td>
<td>Pink</td>
<td>- VE</td>
<td>Not used.</td>
</tr>
<tr>
<td>12</td>
<td>Yellow</td>
<td>Battery +VE</td>
<td>Not used.</td>
</tr>
</tbody>
</table>
CALIBRATION

Not applicable.

SERVICE INFORMATION

SERVICE SCHEDULE

The manufacturer recommends that the following service procedure should be performed at each machine’s scheduled service interval.

SERVICE PROCEDURE

1. Perform a visual inspection; include the following:
   a) Controller
   b) Wiring connections and looms
   c) Switches

2. Perform a system test as per the Operation and Use section of this manual for the operation of the controller.

PARTS LIST

The following parts are included with the product:

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>11966</td>
<td>Overcrank Controller</td>
<td>1</td>
</tr>
<tr>
<td>1523/2401</td>
<td>Either a 12 or 24 V relay is included depending on the voltage system of the installation:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 12 V Relay (part number 1523)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- 24 V Relay (part number 2401)</td>
<td>1</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATIONS

| Dimensions, controller only | Length: 119 mm | Width: 80 mm | Height/Depth: 65 mm |
| Dimensions, boxed for freight | Length: 220 mm | Width: 120 mm | Height/Depth: 120 mm |
| Weight, controller only | 255 g |
| Input nominal voltage | 12 to 24 V DC |
| Min and max input voltage | 9 to 35 V DC |
| Ignition output rated continuous current | 10 A |
| Connection types | 12-pin receptacle |
| Inputs | Ignition supply, bypass input, battery supply, chassis ground |
| Circuit protection | External control |
| Enclosure type | ABS |
| Environmental protection IP rating | IP65 |
| Programming/adjustment | Available – contact RCT |

COMPLIANCE AND STANDARDS

Remote Control Technologies Pty Ltd has an obligation as a manufacturer to comply with the regulations as required by the relevant regulatory bodies, depending on the market and location.

This product currently complies with the following:

ACMA

EU
- RoHS 2 Directive 2011/65/EU

FCC
This device is exempt from FCC regulations under 47 CFR 15.103 Exempted devices.

IC
This device is exempt from IC regulations under ICES-003 — Information Technology Equipment (ITE) — Limits and Methods of Measurement.

TROUBLESHOOTING

<table>
<thead>
<tr>
<th>FAULT</th>
<th>POSSIBLE CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit not working.</td>
<td>Check wiring and connections.</td>
</tr>
<tr>
<td>Intermittent fault.</td>
<td>Check wiring and connections.</td>
</tr>
</tbody>
</table>
GLOSSARY

A Amp (Ampere)
AC Alternating Current
AMS Advanced Management System
Aux Auxiliary Output
CAN Controller Area Network
CMIO Control Master Input Output PCB
CMR Control Master Receiver
CMT Control Master Transmitter
CM2200 Control Master 2200 Remote Set
COMMS Communications
CPU Central Processor Unit
DC Direct Current
E.G. For example
ETR Energised To Run
ETS Energised To Stop
ESD Engine Shutdown
FET Field Effect Transistor
GND Ground
H Hours
HEX Hexidecimal Numbering System
ID Identity
i.e. That is
In Input
IP Ingress Protection
kg Kilogram
Km/h Kilometres Per Hour
LCD Liquid Crystal Display
LED Light Emitting Diode
LK Link
M Minutes
mA Milli Amps
MAX Maximum
MCU Multi Control Unit
MFU Multi Function Unit
MHz Mega Hertz (million(s) cycles per second)
MIN Minimum
mm millimetres
mW Milli Watts
N/A Not Applicable
N/C Normally Closed
N/O Normally Open
OEM Original Equipment Manufacturer
O/P Outputs
Out Output
PB Push Button
PC Personal Computer
PCB Printed Circuit Board
PIN Personal Identification Number
PLC Programmable Logic Controller
POT Potentiometer
PPM Pulses Per Metre
PWM Pulse Width Modulation
PWR Power
RCT Remote Control Technologies Pty Ltd
Rev Revision
RF Radio Frequency
RH Relative Humidity
RPM Revolutions per minute
RX Receiver
RS232 Recommended Standard (number 232) for serial data transfer
Source The output can supply/drive current out
SYS System
TOV Text On Video
TX Transmitter
V Volts
°C Degrees Centigrade
# Number
< Less Than
> Greater Than
% Percentage

WARRANTY

Please see the RCT standard warranty, available on our website - www.rct.net.au
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