



DESIGNERS AND MANUFACTURERS OF ELECTRONIC CONTROLS

**KAR-TECH**.com

# **ELITE REMOTE**

## **RADIO/CAN REMOTE CONTROL SYSTEM**

**-PRELIMINARY-**

### **INSTALLATION AND OPERATION MANUAL**

SDP TRACK/DRIVE  
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**ELITE REMOTE**

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## **ELITE REMOTE**

### **DESCRIPTION**

The ELITE REMOTE is a state of the art microprocessor based Radio Frequency (RF) control system. It will provide the operator the ability to remotely operate equipment. The operator is required to follow all OSHA [www.osha.gov](http://www.osha.gov) safety standards when operating the equipment.

This system is designed with Frequency Hopping Spread Spectrum (FHSS) and Phase Lock Loop (PLL) technology for the optimum performance in radio remote products.

The remote control system consists of two modules: the radio transmitter, receiver module, and associated optional equipment such as

wiring harnesses and Palm™ interface tools.

The transmitter is equipped with joystick(s) and toggle switches for various functions. It includes a port for charging the internal battery and for wired control via the built-in Controller Area Network (CAN) system. Pressing the POWER pushbutton will turn on the transmitter.

The system's radio receiver has both current-regulated proportional outputs and ON/OFF outputs to accommodate the functions available on the transmitter. All outputs are current-sourcing. It also includes ports for CAN and RS-232 communication. Power must be applied to the receiver

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module for the system to work.

### **TRANSMITTER AND RECEIVER SYNCHRONIZATION**

Each radio transmitter is preprogrammed with a unique radio ID code. Each receiver is programmed to respond only to the radio transmitter with the ID code for which it is set. This feature allows multiple systems to work in close proximity to one another without interference. In the event that a transmitter becomes damaged and a new one is needed, the receiver can be reprogrammed to respond to the new radio transmitter. To teach the ID code to the receiver, use the following procedure:

1. Plug the CAN cable into the CAN port on both the

receiver and transmitter and operate a function on the transmitter until the LEDs on the front panel go from steady to flashing. The units are synchronized at this point.

### **INDICATOR LEDs**

The transmitter has two indicators, the red BATTERY indicator and the green TRANSMIT indicator. The green TRANSMIT indicator flashes rapidly whenever there is communication between the transmitter and the receiver. The red BATTERY indicator starts blinking once every second when the battery voltage is low and requires charging.

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The receiver module can identify problems with the system in the form of an error code. Check the red indicator or display window on the receiver to diagnose system problems. Then, refer to the ERROR CODE CHART in this manual for explanation of the error codes. The green LED indicator will blink on the receiver during normal operation.

### **OUTPUTS**

Each of the outputs from the receiver module is designed with built-in short circuit and overload protection. The outputs can also detect a no-load or broken wire condition.

These error conditions are evident by the red LED indicator or alphanumeric

display on the receiver module *or* the HISTOGRAM page on the optional Palm Pilot™.

The ON/OFF outputs will indicate an error under no load or broken wire status if NOT activated, and will detect a short IF activated. The proportional outputs will detect a no-load or short condition WHEN activated.

### **BATTERY CHARGING**

The transmitter is designed with a smart battery charger. The battery can be charged by connecting the CAN cable from the receiver module (powered on) to the port on the transmitter, or by plugging the AC wall charger or DC cigarette charger into the port. Red and green LED indicators near the charging

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port or on the underside of the pendant indicate the status of the charger: A red LED indicates that the battery is charging and a green LED indicates that the battery is fully charged. A complete charge can be achieved in about 1 hour.

To save battery life, the transmitter will turn off when none of the switches or joysticks (if equipped) is used for period of 10 minutes. The user must press the POWER button at this point to restore transmitter operation. However, the transmitter will stay on as long as the receiver has power applied to it.

When the battery is new, the run-time of the transmitter will be shorter until it has

gone through the drain/charge cycle several times. After this point, the unit's current drain should allow at least 20 hours of run-time before a recharge is needed.

## **INSTALLATION**

Refer to the WIRING CHART in this manual for hookup of the harness.

To install the receiver module, use the two mounting holes provided on the enclosure. Please take extra caution not to damage internal components while installing. For high vibration applications, use shock absorbing mounts. It is advised to mount the receiver as high as possible with no metal obstructions in the vicinity of the antenna which

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might affect RF performance. Antenna extension cables are available from Kar-Tech to aid in this, if needed.

The main power to the receiver should be connected through a switched, fused line capable of 20A. For best results, connect the receiver main power connections to the auxiliary terminal of the ignition switch, PTO switch, or ignition relay.

All connections must be properly insulated to protect against shorts.

Seal all connections with a non-conductive silicone grease to prevent corrosion.

### **BEFORE APPLYING POWER!**

- Check power and ground

for proper polarity.

- Check the wiring harness for possible shorts before connecting to output devices (i.e. valves and relays) by checking each mating pin terminal.
- Verify that the transmitter battery is fully charged. If the unit runs on disposable batteries, make sure they are fresh.
- Read the rest of this manual.

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### USING THE OPTIONAL PALM™ INTERFACE

The Patented Palm Pilot™ interface, US patent No. 6,907,302, software is a very useful tool for troubleshooting the control system.

To use this tool, connect the Palm™ serial cable to the serial connector on the receiver control harness or adaptor, and apply power to the system.



*Main Page*

Use the Palm's stylus pen and tap the icon 'SDPElite 1.0' to launch the application.

### DIAGNOSTIC

Tap the Diagnostic button to see the diagnostic screens, which shows the present state of remote communications, and system I/O.

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*RF Communications Page*

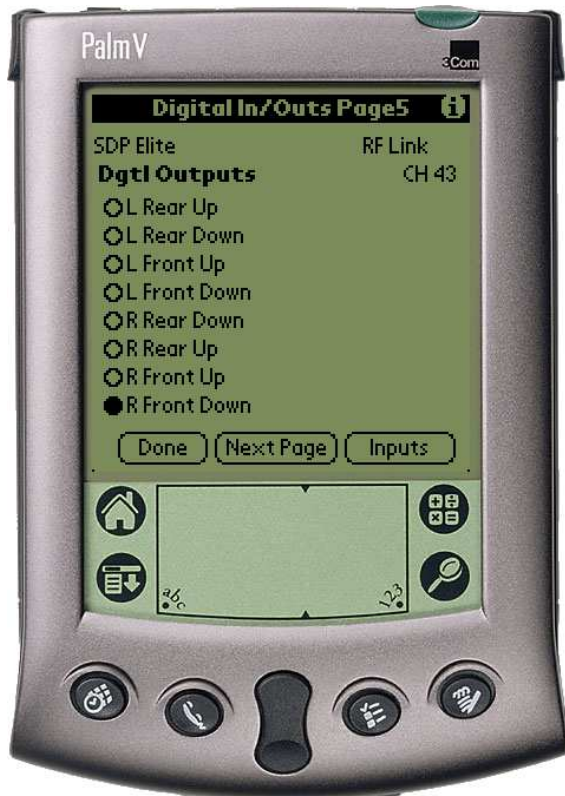


*Digital Inputs Page*

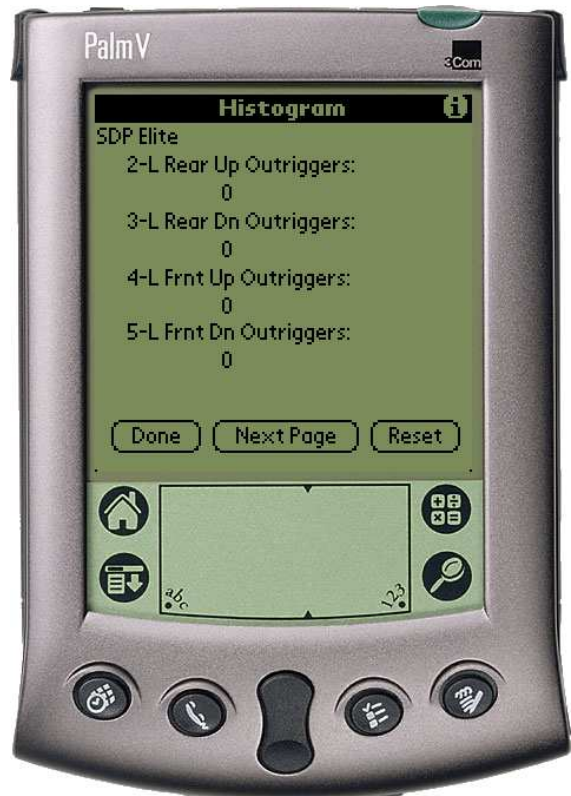
When the round circle next to a label is dark, the corresponding ON/OFF input or output is sensed to be active or ON.

Tap the `Next Page` button to switch between pages of inputs. Tap the button labeled `Outputs` to view output screens.

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*ON/OFF Outputs Page*



*Histogram Page*

### HISTOGRAM

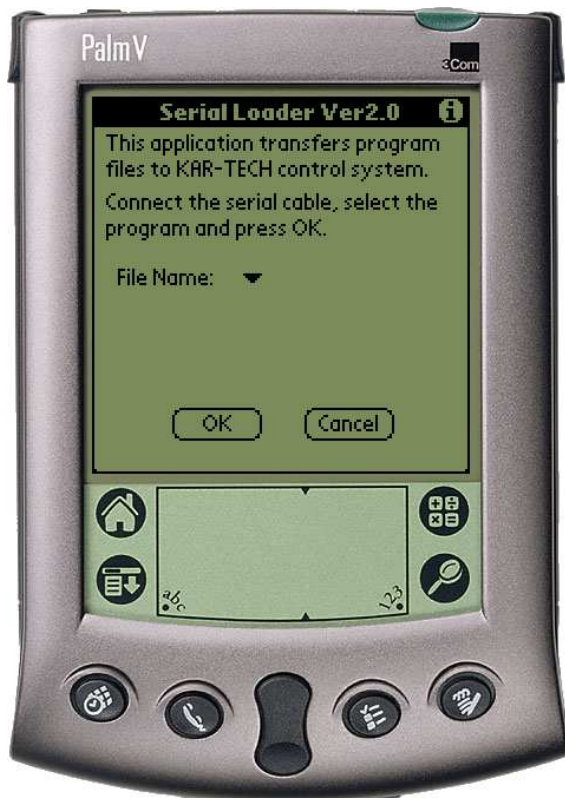
Tap the Histogram icon to see a set of screens that show which error codes are active and how many times the specific error code has been active.

This feature can be used to troubleshoot machine wiring and other problems. Tapping the Reset button resets the error code counts. The password to reset error codes is XXXXXXXXXX. Tapping Next and Back allows access to all the histogram pages. Tap the Done button to return to the main menu.

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### FILE TRANSFER

Tap the File Transfer button to send new program files from the Palm to the receiver. New programs are uploaded to the Palm via the Palm™ desktop as a \*.pdb file using HotSync™.

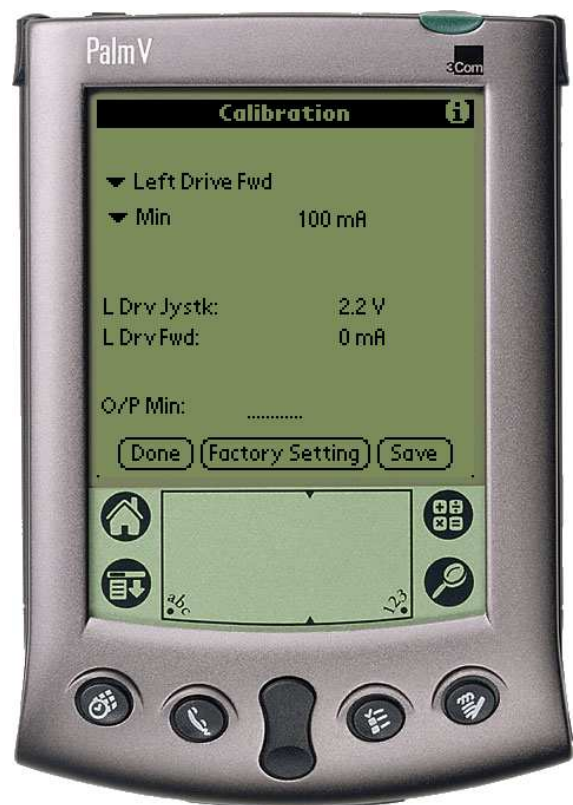


*File Transfer Page*

This is only used for software updates to the receiver. Tap the 'i' icon for more information on this procedure.

### CALIBRATION

To change the configuration of the outputs, tap the Calibration icon.



*Calibration page*

The password to gain access to the calibration screens is **██████**. In these screens, configuration for proportional outputs is available.

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*Output selection menu*

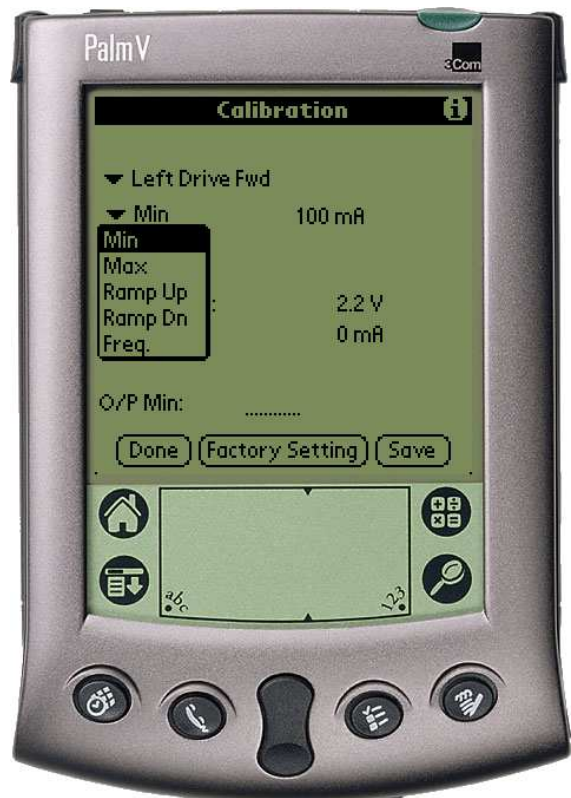
To adjust a proportional output's configuration, use the following procedure:

1. Select the output to change from the first drop-down menu
2. Select the parameter of the output to change from the second drop-down menu
3. Enter the new value on the line above the Factory Setting button

- by tapping on the line and using the scratch pad to enter a new value
4. Tap the Save button to send the setting to memory

The lines to the right of the parameter indicate the present value of the output (if active), and joystick voltage on the transmitter

Select Done when finished



*Calibration parameters menu*

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Tap the `Factory Setting` button to return all outputs to standard values. Tap `Save` to send these settings to memory. Tap `Done` and `Exit` to quit configuration and return to the main menu.

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### WIRING

P1:12 PIN DEUTSCH DTM13-12PA

PIN#	OPTIONAL HARNESS WIRE COLOR	DESCRIPTION
1	1 BLACK	GROUND
2		CAN HIGH
3		CAN LOW
4		RS-232 TXD
5		RS-232 RXD
6		N/C
7	3 BLUE	R-REAR UP OUTRIGGER
8		N/C
9	4 ORANGE	R-REAR DOWN OUTRIGGER
10	5 BROWN	R-FRONT UP OUTRIGGER
11	6 YELLOW	R-FRONT DOWN OUTRIGGER
12	2 RED	POWER (9 TO 35 VDC)

P2:12 PIN DEUTSCH DTM13-12PB

PIN#	OPTIONAL HARNESS WIRE COLOR	DESCRIPTION
1	3 BLUE	L-DRIVE FWD CR PROP
2	4 ORANGE	L-DRIVE REV CR PROP
3	5 YELLOW	L-TRACK IN CR PROP
4	6 BROWN	L-TRACK OUT CR PROP
5	7 RED/BLACK	R-DRIVE FWD CR PROP
6	8 BLUE/BLACK	R-DRIVE REV CR PROP
7	9 ORANGE/BLACK	R-TRACK IN CR PROP
8	10 YELLOW/BLACK	R-TRACK OUT CR PROP
9	11 BROWN/BLACK	L-REAR UP OUTRIGGER
10	12 BLACK/RED	L-REAR DOWN OUTRIGGER
11	13 BLUE/RED	L-FRONT UP OUTRIGGER
12	14 ORANGE/RED	L-FRONT DOWN OUTRIGGER

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### **ROUTINE MAINTENANCE**

Clean transmitter regularly with a damp cloth and mild detergent.

Inspect electrical wiring for wear points or other damage. Repair as required.

Inspect all connections for looseness or corrosion. Tighten and/or "seal" as necessary.

### **MAINTENANCE PRECAUTIONS**

When performing any inspection or maintenance work on the remote system, always exercise care to prevent injury to yourself and others or damage to the equipment. The following are general precautions, which should be closely followed in

carrying out any maintenance work.

Do not have hydraulic power available to the valves when performing electrical tests.

Never operate or test any function if any person is in an area where they could be hurt by being hit or squeezed by the hydraulic equipment.

Turn power off before connecting or disconnecting valve coils or other electrical loads.

### **TROUBLESHOOTING**

This next section provides basic operator level troubleshooting for the ELITE REMOTE system. If, after following these instructions, the system still does not function, contact your KAR-

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TECH representative for  
further instructions or  
servicing.

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### TROUBLESHOOTING CHART

<b>PROBLEM</b>	<b>SOLUTION</b>
1. No functions work	<ol style="list-style-type: none"><li>1. Check that transmitter power is on</li><li>2. Check that receiver power is on</li><li>3. Check system wiring for power into the system</li><li>4. Check LED status display for system status</li><li>5. Check for proper grounding of system's electrical circuit</li><li>6. Check system's hydraulic system</li></ol>
2. Certain functions do not work	<ol style="list-style-type: none"><li>1. Check the wiring connection from the system to the valve coil for the output function that does not work</li><li>2. Check LED status display for possible fault or error indication</li><li>3. Check system's hydraulic system</li><li>4. Check system's electrical system</li></ol>
3. Functions operate intermittently	<ol style="list-style-type: none"><li>1. Loose connector at the valve coil</li><li>2. Check LED status display for system status</li><li>3. Check receiver antenna for any damage and proper connection</li><li>4. Check system's hydraulic system</li></ol>

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### ERROR CODES

<b>ERROR</b>	<b>PROBABLE CAUSE</b>
<b>EC01</b>	<b>RF COMMUNICATION PROBLEM</b>
<b>EC02</b>	<b>LEFT REAR UP FAULT</b>
<b>EC03</b>	<b>LEFT REAR DOWN FAULT</b>
<b>EC04</b>	<b>LEFT FRONT UP FAULT</b>
<b>EC05</b>	<b>LEFT FRONT DOWN FAULT</b>
<b>EC06</b>	<b>RIGHT REAR UP FAULT</b>
<b>EC07</b>	<b>RIGHT REAR DOWN FAULT</b>
<b>EC08</b>	<b>RIGHT FRONT UP FAULT</b>
<b>EC09</b>	<b>RIGHT FRONT DOWN FAULT</b>
<b>EC10</b>	<b>LEFT DRIVE FWD FAULT</b>
<b>EC11</b>	<b>LEFT DRIVE REV FAULT</b>
<b>EC12</b>	<b>LEFT TRACK IN FAULT</b>
<b>EC13</b>	<b>LEFT TRACK OUT FAULT</b>
<b>EC14</b>	<b>RIGHT DRIVE FWD FAULT</b>
<b>EC15</b>	<b>RIGHT DRIVE REV FAULT</b>
<b>EC16</b>	<b>RIGHT TRACK IN FAULT</b>
<b>EC17</b>	<b>RIGHT TRACK OUT FAULT</b>
<b>EC18</b>	<b>LEFT DRIVE JOYSTICK PROBLEM</b>
<b>EC19</b>	<b>LEFT TRACK JOYSTICK PROBLEM</b>
<b>EC20</b>	<b>RIGHT DRIVE JOYSTICK PROBLEM</b>
<b>EC21</b>	<b>RIGHT TRACK JOYSTICK PROBLEM</b>
<b>EC22</b>	<b>WRONG RF ID</b>
<b>EC23</b>	<b>JOYSTICK OFF-CENTER</b>
<b>EC24</b>	<b>LOW BATTERY</b>

#### **Error code explanations:**

- 1** Transmitter is off  
Transmitter went to sleep mode  
Interference in RF communication link
  
- 2-17** Short or open load/coil on output
  
- 18-21** No voltage present on joystick in transmitter
  
- 22** Transmitter and receiver are not synchronized
  
- 23** Joystick not in center position when powering up
  
- 24** Battery is below 10.5 volts

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### PARTS LIST

<b>PART NUMBER</b>	<b>DESCRIPTION</b>
<b>3B1222A</b>	RADIO TRANSMITTER
<b>3B1223A</b>	RADIO RECEIVER
<b>3B1224A</b>	RECEIVER WIRING HARNESS
<b>020-506-0250</b>	25' CAN ADAPTOR CABLE
<b>020-506-0120</b>	RS-232 ADAPTOR CABLE
<b>010-001-2201</b>	RECHARGABLE TRANSMITTER BATTERY
<b>B20032B</b>	CHARGER, 12 VDC CIGARETTE LIGHTER PLUG
<b>B20072A</b>	FAST CHARGER SUPPLY, 110V AC WALL
<b>B40022C</b>	OPTIONAL PALM PILOT WITH SOFTWARE

There are no user-serviceable parts inside the transmitter or the receiver. Return the units for service.

Note: For operation with negative ground systems only.

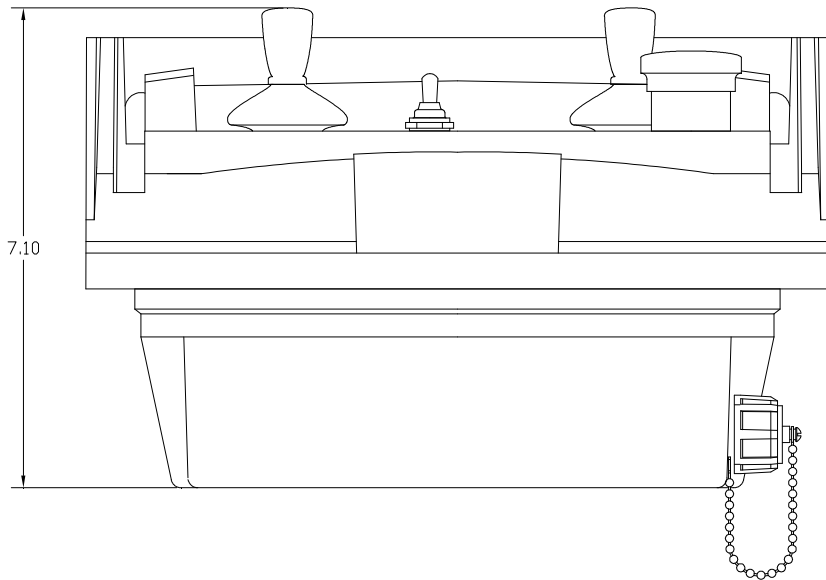
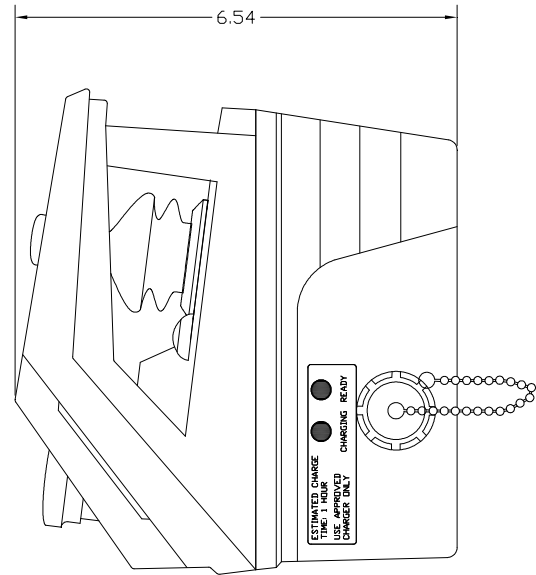
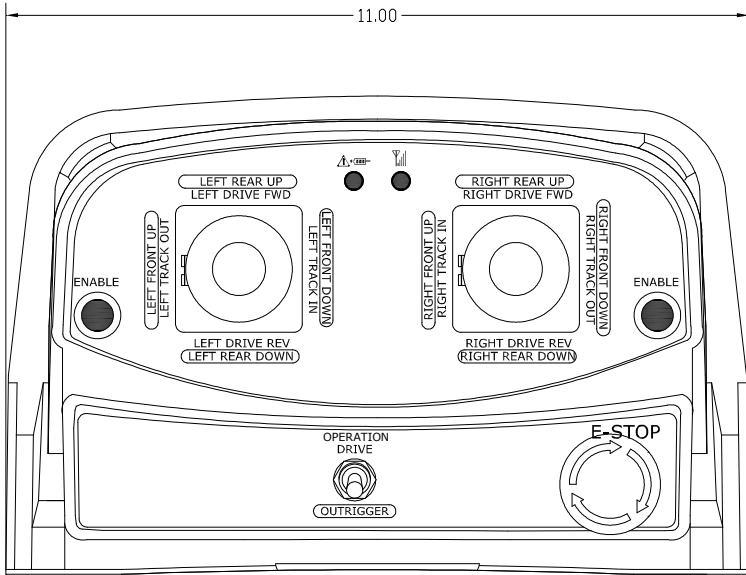
#### **WARNING:**

The ELITE REMOTE must be operated in compliance with all applicable safety regulations, rules, and practices. Failure to follow required safety practices may result in death or serious injury.

The information, specifications, and illustrations in this manual are those in effect at the time of printing. We reserve the right to change specifications or design at any time without notice.

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## TRANSMITTER PICTORIAL



CONNECTOR: MS-3102E14S-5P  
 A POWER / BATTERY CHARGE  
 B GROUND  
 C CAN HIGH  
 D CAN LOW



## ELITE REMOTE

### SPECIFICATIONS

#### **FCC ID:** P4U-VRTS

Industry Canada Certification Number: 4534A-VRTS

EQUIPMENT CLASS: PART 15 SPREAD SPECTRUM TRANSMITTER

#### **TRANSMITTER**

Power supply .....	7.2 Volt Rechargeable, NiMH battery
Fast charger temperature range.....	+5°C to +60°C
Operating temperature - Radio .....	-40°C to +85°C
Storage temperature .....	-40°C to +100°C
RF Frequency .....	902-928 MHz
RF Transmit power (EIRP) .....	33 mW
Vibration.....	3G to 200Hz
Shock.....	50G
NEMA .....	12

#### **RECEIVER**

Power supply voltage.....	9-30VDC
Operating temperature .....	-40°C to +85°C
Storage temperature .....	-40°C to +100°C
Outputs .....	5.0A max each, sourcing
Digital Inputs (when equipped).....	supply voltage
Analog Inputs (when equipped) .....	0-5VDC/4-20mA
RF Frequency .....	902-928 MHz
Vibration.....	3G to 200Hz
Shock.....	100G
NEMA .....	4X

## **ELITE REMOTE**

### **INSTRUCTION TO THE USER**

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- \* Reorient or relocate the receiving antenna.
- \* Increase the separation between the equipment and receiver.
- \* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- \* Consult the dealer or an experienced radio/TV technician for help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.