



**MANUFACTURING, INC.**

**VERSA REMOTE™**  
**FULL FEATURED REMOTE CONTROL SYSTEM**

**OPERATIONS AND INSTALLATION MANUAL**

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## VERSA REMOTE™

### DESCRIPTION:

The VERSA REMOTE is a state of the art microprocessor based Radio Frequency (RF) and Controller Area Network (CAN) remote control system designed to provide the machine operator with the ability to remotely operate equipment. The machine operator is still required to follow OSHA and other applicable standards when operating the equipment.

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

The remote control system consists of two major modules, the transmitter (pendant), and the CRANE radio/CAN receiver.

The transmitter is designed with two hall-effect dual-axis proportional joysticks for Crane or Drive control. The drive control functions are not active on the EZ-Hauler 2. These joysticks provide reliable control without the worry and hassle of the contacting parts in a potentiometer driven joystick. These joysticks control the white

labeled crane functions when the operation switch is in the CRANE position, or the red labeled drive functions when the OPERATION switch is in the DRIVE position. The drive control functions are not active on the EZ-Hauler 2. The transmitter is also designed with 4 toggle switches for AUGER A/B, AUXILIARY A/B, LIGHTS and Crane/Drive OPERATION. When operating the EZ-Hauler 2 system, only the Crane side of the OPERATION switch will operate the machine. There are two variable potentiometers for controlling Auger and Auxiliary speeds and an E-STOP for transmitter power and emergency stop functions. Pulling the E-STOP to the up position activates the transmitter. Moving a switch or operating the proportional joysticks can then activate the transmitter functions.

The CRANE radio/CAN receiver is designed with 2 solid-state on/off outputs and 10 current-regulated proportional outputs. Turning on the power for the receiver and operating the transmitter operates the crane functions.

Each transmitter is preprogrammed with a special radio ID code. The receivers are programmed to respond only to

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the transmitter with the ID code for which it is set. This feature allows the equipment to work in wireless mode in close vicinity of one another without interference. In the event that a transmitter becomes damaged and a new one is needed, the receivers can be reprogrammed to respond to the new transmitter. Simply turn the new transmitter and receiver power on, then connect the CAN connection/charger cable and operate the remote control for 5 to 10 seconds or until the green transmitter light starts blinking.

The transmitter has two LED indicators, the **BATTERY** and the **TRANSMIT** indicators. The red BATTERY indicator starts blinking every 30 seconds when the battery voltage reaches 9 volts and blinking speed increases while the voltage is decreasing from 9 to 7.5 volts.

**Note: To check for low battery turn receiver off and leave transmitter on. If red light blinks only when the receiver is on, count the number of the blinks or check error code display on the receiver and refer to page 14 for additional information.**

The transmitter is powered, and the rechargeable battery can be recharged, by the +12 volt electrical system of the truck when connected to the crane by the CAN/charger cable or the cigarette lighter charger cable.

A 9.6 Volt, 2.0 Ah Nickel-Metal Hydride battery powers the transmitter. Both frequency and duration of use determine the operation time of the battery. Power is being used any time the transmitter power is on. To turn transmitter power off, press the E-STOP switch to the down position. To prolong the battery life and efficiency, the pendant should not be left on charge for a long period of time and should be discharged periodically. A complete charge can be achieved in 8 hours.

To save battery life, the transmitter is designed with an auto shut down feature. This feature turns the transmitter off when none of the switches or buttons is used for period of one hour. The user must then cycle the E-STOP switch to turn transmitter power back on.

The transmitter is also able to communicate with the main receiver via CAN (Controller Area Network) protocol. This is done by connecting the CAN cable to the transmitter. This feature is designed to allow the user to operate the machine in case radio communication is not allowed or severe radio interference or discharged transmitter battery.

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### OUTPUTS:

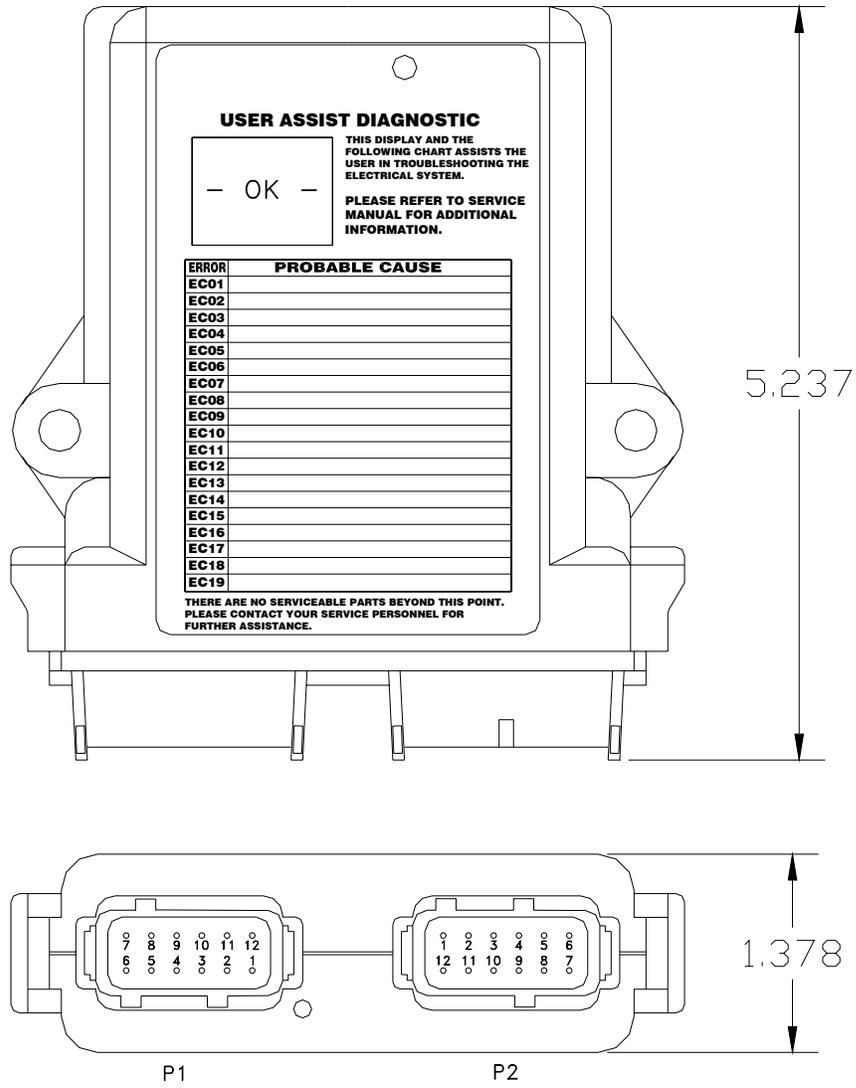
There are 2 sourcing on/off outputs and 10 current-regulated proportional outputs on the crane radio/CAN receiver. Each output is designed with built-in short circuit and overload protection. The on/off outputs are also designed with no load or broken wire status. The status of the on/off outputs, as well as the current-regulated proportional outputs, is reported to the machine operator via the 4 character LED display on the control board or the histogram page on the optional Palm Pilot™.

Refer to the error code chart on the front of the receiver module, or in this manual, for a list of error codes. The output status in conjunction with individual output LED determines the condition of fault. If an individual output LED is dimly on while function is not activated, there is a “no load” condition. If an individual output LED is off while function is activated, there is an overload condition or the output is shorted to ground.

### DISPLAY:

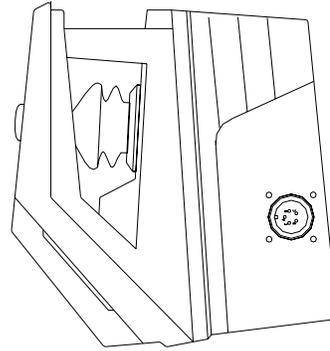
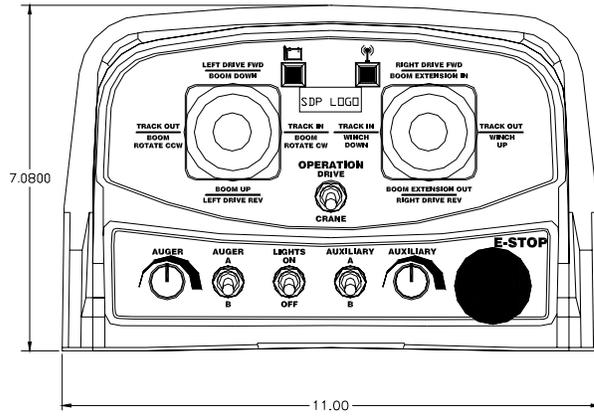
Each receiver module is designed with a 4 character LED display indicating the status of the remote. It is visible from the front cover of the control enclosure.

Whenever the system detects a problem, an error code appears on the display. If no problem is detected, the display will read “OK“. Refer to the error code chart on decal of the driver module or in this manual for additional information.

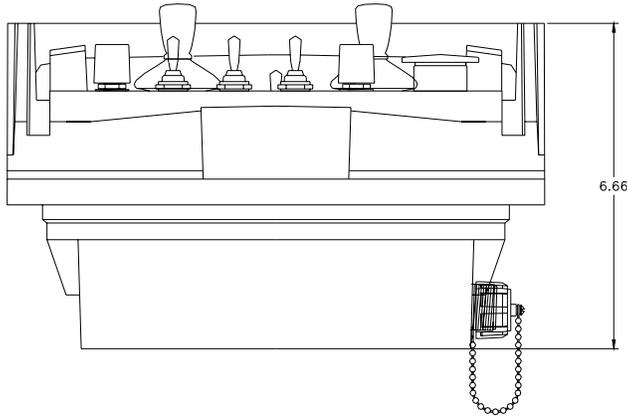


**Figure 1:** Crane Radio/CAN Receiver Unit

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- A POWER / BATTERY CHARGE
- B GROUND
- C CAN HIGH
- D CAN LOW



SHOULDER HARNESS NOT SHOWN

**Figure 2: Radio/CAN Transmitter Unit**

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### **INSTALLATION:**

1. Refer to the wiring chart in this manual for wiring connections.
2. The receiver should be mounted on shock absorbing mounts. The receiver is best mounted in a protected location.
3. When installing the unit, the main power should run from the battery, through a 20 amp fast blow fuse, to a power switch or relay; then into the receiver unit. For best results connect receiver main power connections to the auxiliary terminal of the ignition switch, PTO switch, or ignition relay. Use 18 gauge or heavier wire.
4. All connections must be properly insulated to protect against shorts.
5. Seal all connections with a non-conductive silicone grease to prevent against corrosion.

### **BEFORE APPLYING POWER:**

1. Check power and ground polarity.
2. Check wiring harness for possible shorts before connecting remote control to output devices (i.e., valves, and relays) by checking each mating pin terminal.
3. Check transmitter battery for proper operation or any leakage from the battery. Always remove

battery if the transmitter is to be stored for a long period of time.

4. Read the rest of this manual.

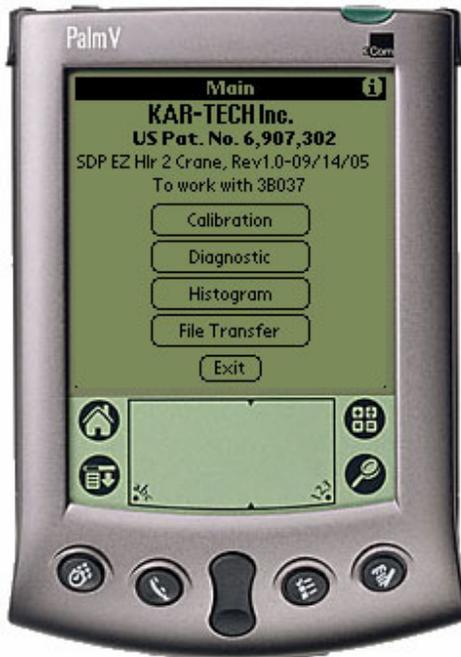
### **SYSTEM TROUBLESHOOTING USING OPTIONAL PALM PILOT™:**

The Patented Palm Pilot™, US patent No. 6,907,302, software is a very useful tool for troubleshooting the control system. The EZ-Hauler 2 receiver module application includes a proportional output CALIBRATION section. This allows the user to adjust and calibrate the proportional outputs of the CRANE radio/CAN receiver using the Palm Pilot™.

To use this tool, connect the Palm Pilot™ serial cable to the 9-pin DB9 serial connector on the radio/CAN receiver harness, and turn Palm Pilot™ and system powers on. Make sure the REMOTE SYSTEM power is on.

Use the Palm's stylus pen and tap on the SDP EzH 2 CRANE icon for the CRANE module application. The main window will appear with five buttons: CALIBRATION, DIAGNOSTIC, HISTOGRAM, FILE TRANSFER, and EXIT.

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Press the EXIT button to exit to the Palm home window.

### **PALM DIAGNOSTICS:**

The DIAGNOSTICS button takes the user to a diagnostic screen, which shows the current state of remote communications, system inputs and system outputs. This can be a useful tool when trying to setup or troubleshoot the equipment. When the round button next to a label is dark, the corresponding input or output is sensed to be active. Press the NEXT PAGE button to switch between pages of inputs or outputs or RF. Press the button labeled INPUT or OUTPUT to switch between input or output

screens. Press the DONE button to return to the main menu. Press the 'i' icon in the upper right-hand corner on Palm Pilot for more information.

### **HISTOGRAM:**

The HISTOGRAM button on the main menu will take the user to 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 problem areas. Press the RESET button to reset the error code counts next to each error code display line. The password to reset the error codes is [REDACTED]

### **FILE TRANSFER:**

The FILE TRANSFER button in the main menu is used to receive new program files from a PC and transfer the file to the receiver. This is only used for software updates to the receiver. Press the 'i' icon on Palm Pilot for more information.

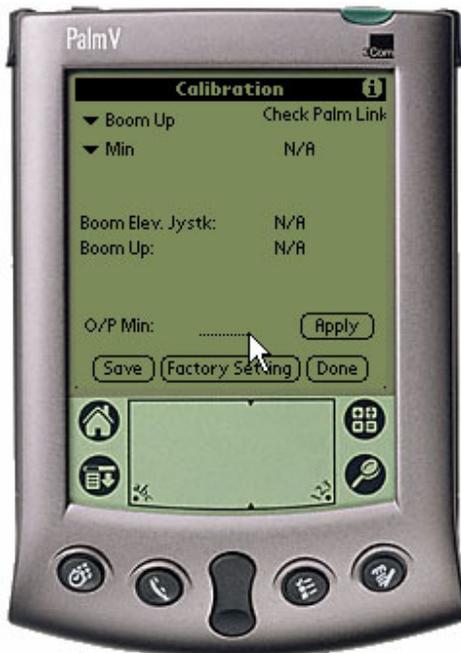
### **CRANE PROPORTIONAL OUTPUT CALIBRATION:**

The EZ-Hauler 2 radio/CAN receiver Palm Pilot™ application includes a CALIBRATION button which allows the user to set the

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limits and frequency for the proportional outputs of the radio/CAN receiver. To set minimum and maximum settings, along with ramp values and frequency for proportional outputs of the receiver, follow this procedure:

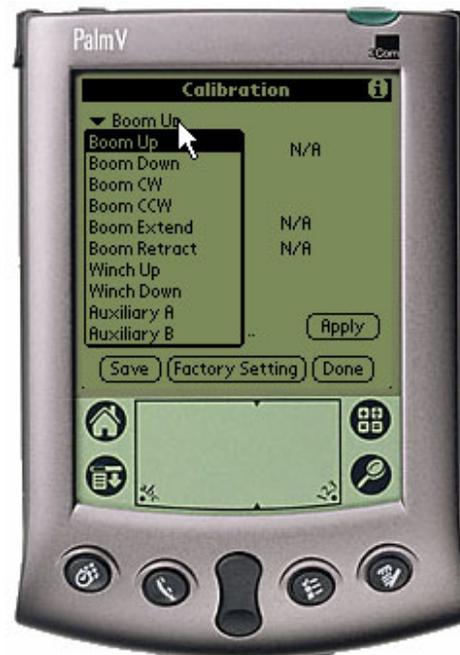
1. Press the CALIBRATION button on the Main application screen to enter into the calibration routine.
2. When the CALIBRATION button has been pressed, the user will be prompted to enter a password. The password can be entered using the scratch pad at the bottom of the display, or by using the keyboard panel. The password is XXXXXXXXXX.



If the password is entered incorrectly, the main window will reappear and a main button can again be selected.

When the password has been entered correctly, the calibration screen will appear.

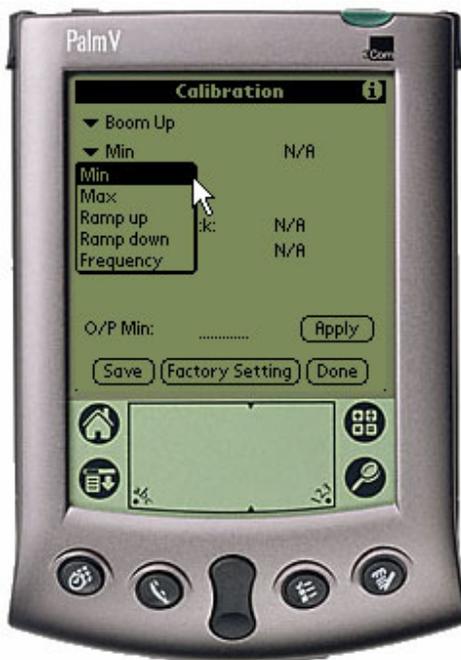
3. The first line of this screen will show the currently selected proportional output. There are 10 to choose from: BOOM UP, BOOM DOWN, BOOM CW, BOOM CCW, BOOM EXTEND, BOOM RETRACT, WINCH UP, WINCH DOWN, AUXILIARY A, and AUXILIARY B.



To choose between these 10 settings, select the arrow in front of the selection. A pull-down menu will appear with the

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available selections listed. Select the output to be changed from the pull-down menu in this line. The next line allows the user to select the proportional characteristic, of the selected above proportional output, which the user wants to change. In this pull-down menu are 5 to choose from: MIN, MAX, RAMP UP, RAMP DOWN, and FREQUENCY.



To choose between these five

settings, select the arrow in front of the selection. A pull-down menu will appear with the available selections listed. Select the setting to be changed from the pull-down menu in this line. Then enter a new value by selecting the dotted field on the lower part of the display labeled “O/P \_\_\_\_: .....” and typing on the scratch pad. Press the APPLY button to activate the entered value. Press the SAVE button at the bottom of the screen to save the active value. The lines in the middle of the screen show the current values for the currently operating joystick and proportional output.

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### WIRING CHART

CRANE CAN/RADIO RECEIVER OPTIONAL HARNESS WIRING

CONNECTOR P1: DEUTSCH DTM13-12PA 12 PIN

<u>PIN#</u>	<u>WIRE COLOR#</u>	<u>FUNCTION</u>
1	BLACK	GROUND
2	WHITE	CAN DATA HIGH (To Pendant)
3	GREEN	CAN DATA LOW (To Pendant)
4	WHITE	RS-232 TX (PALM PILOT™)
5	GREEN	RS-232 RX (PALM PILOT™)
6	WHITE	PRESSURE SWITCH (HOP) INPUT (N.C. CONTACT)
7		NO CONNECTION
8		NO CONNECTION
9		NO CONNECTION
10	GREEN	LIGHTS OUTPUT
11		NO CONNECTION
12	RED	+12V BATTERY POWER

CONNECTOR P2: DEUTSCH DTM13-12PB 12 PIN

<u>PIN#</u>	<u>WIRE COLOR</u>	<u>FUNCTION</u>
1	RED	BOOM UP/DOWN PROPORTIONAL VOLTAGE OUTPUT
2	BLUE	BOOM CW/CCW PROPORTIONAL VOLTAGE OUTPUT
3	ORANGE	BOOM EXTENSION IN/OUT PROPORTIONAL VOLTAGE OUTPUT
4	YELLOW	WINCH UP/DOWN PROPORTIONAL VOLTAGE OUTPUT
5	BROWN	AUGER PROPORTIONAL VOLTAGE OUTPUT
6	RED/BLACK	AUXILIARY PROPORTIONAL VOLTAGE OUTPUT
7	BLUE/BLACK	BOOM UP/DOWN VALVE POWER
8	ORANGE/BLACK	BOOM CW/CCW VALVE POWER
9	YELLOW/BLACK	BOOM EXTENSION VALVE POWER
10	BROWN/BLACK	WINCH VALVE POWER
11	BLACK/RED	AUGER/AUXILIARY VALVE POWER
12	BLUE/RED	DUMP VALVE OUTPUT

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## DRIVE CAN/RADIO RECEIVER OPTIONAL HARNESS WIRING

CONNECTOR P1: DEUTSCH DTM13-12PA 12 PIN

<u>PIN#</u>	<u>WIRE COLOR#</u>	<u>FUNCTION</u>
1	BLACK	GROUND
2		CAN DATA HIGH (To Pendant)
3		CAN DATA LOW (To Pendant)
4		RS-232 TX (PALM PILOT™)
5		RS-232 RX (PALM PILOT™)
6		NO CONNECTION
7		NO CONNECTION
8		NO CONNECTION
9		NO CONNECTION
10		NO CONNECTION
11		NO CONNECTION
12	RED	+12V BATTERY POWER

CONNECTOR P2: DEUTSCH DTM13-12PB 12 PIN

<u>PIN#</u>	<u>WIRE COLOR</u>	<u>FUNCTION</u>
1		SPARE ON/OFF OUTPUT
2		SPARE ON/OFF OUTPUT
3	BROWN	LEFT DRIVE FORWARD PROPORTIONAL OUTPUT
4	WHITE	LEFT DRIVE REVERSE PROPORTIONAL OUTPUT
5	ORANGE	LEFT TRACK OUT PROPORTIONAL OUTPUT
6	BLUE	LEFT TRACK IN PROPORTIONAL OUTPUT
7	YELLOW	RIGHT DRIVE FORWARD PROPORTIONAL OUTPUT
8	GREY	RIGHT DRIVE REVERSE PROPORTIONAL OUTPUT
9	GREEN	RIGHT TRACK IN PROPORTIONAL OUTPUT
10	PURPLE	RIGHT TRACK OUT PROPORTIONAL OUTPUT
11		SPARE PROPORTIONAL OUTPUT
12		SPARE PROPORTIONAL OUTPUT

**VERSA REMOTE™****ROUTINE MAINTENANCE:**

1. Clean transmitter and receiver regularly with a damp cloth and mild detergent.
2. Periodically check receiver antenna for tightness.
3. Inspect electrical wiring for wear points or other damage. Repair as required.
4. Inspect all connections for looseness or corrosion. Tighten and/or "seal" as necessary.

**MAINTENANCE PRECAUTIONS:**

When performing any inspection or maintenance work on the VERSA 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.

1. Do not have hydraulic power available to the valves when performing electrical tests.
2. 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.

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

**TROUBLESHOOTING:**

This section provides basic operator level troubleshooting for the VERSA REMOTE system. If, after following these instructions, the system still does not function, check the hydraulic system then contact your representative for further instructions or servicing.

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## TROUBLE SHOOTING CHART

PROBLEM	SOLUTION
1. No operation of all functions when a function switch is activated.	<ol style="list-style-type: none"> <li>1. Check that transmitter power is on.</li> <li>2. Check that both receivers' powers are on.</li> <li>3. Check vehicle wiring for power into the system.</li> <li>4. Check status displays for system status.</li> <li>5. Check for proper grounding of vehicle's electrical circuit.</li> <li>6. Check vehicle's hydraulic system</li> </ol>
2. Boom down, Extend out and Winch down functions do not work	<ol style="list-style-type: none"> <li>1. Check the wiring connection from Pressure switch normally close contact to receiver</li> <li>2. Check LED status display for system status.</li> <li>3. Check vehicle's hydraulic system</li> <li>4. Check vehicle's electrical system</li> </ol>
3. Certain functions do not work	<ol style="list-style-type: none"> <li>1. Check the wiring connection from the system to the valve coil or the output function that does not work.</li> <li>2. Check LED status display for system status.</li> <li>3. Check vehicle's hydraulic system</li> <li>4. Check vehicle's electrical system</li> </ol>
4. Function operates intermittently.	<ol style="list-style-type: none"> <li>1. Loose connector at the valve coil.</li> <li>2. Check LED status displays for system status.</li> <li>3. Check receiver antenna for any damage and proper connection.</li> <li>4. Check vehicle's hydraulic system</li> </ol>

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**ERROR CODE CHART**

## CRANE CAN/RADIO RECEIVER ERROR CODE LIST

EC01-	Radio or CAN signal problem.
EC02-	Short or open connection at BOOM UP/DOWN POWER output.
EC03-	Short or open connection at BOOM CCW/CW POWER output.
EC04-	Short or open connection at BOOM EXTENSION POWER output.
EC05-	Short or open connection at WINCH IN UP/DOWN POWER output.
EC06-	Short or open connection at AUGER/AUXILIARY POWER output.
EC07-	Short or open connection at DUMP VALVE output.
EC08-	Short or open connection at LIGHTS output.
EC09-	BOOM UP/DOWN joystick problem
EC10-	BOOM CCW/CW joystick problem
EC11-	BOOM EXTENSION joystick problem
EC12-	WINCH UP/DOWN joystick problem
EC13-	AUGER speed control problem
EC14-	AUXILIARY speed control problem
EC15-	Wrong transmitter RF ID received

## DRIVE CAN/RADIO RECEIVER ERROR CODE LIST

EC01-	Radio or CAN signal problem.
EC02-	Short or open connection at SPARE ON/OFF 1 output.
EC03-	Short or open connection at SPARE ON/OFF 2 output.
EC04-	Short or open connection at LEFT DRIVE FORWARD output.
EC05-	Short or open connection at LEFT DRIVE REVERSE output.
EC06-	Short or open connection at LEFT TRACK OUT output.
EC07-	Short or open connection at LEFT TRACK IN output.
EC08-	Short or open connection at RIGHT DRIVE FORWARD output.
EC09-	Short or open connection at RIGHT DRIVE REVERSE output.
EC10-	Short or open connection at RIGHT TRACK IN output.
EC11-	Short or open connection at RIGHT TRACK OUT output.
EC14-	LEFT DRIVE joystick problem
EC15-	LEFT TRACK joystick problem
EC16-	RIGHT DRIVE joystick problem
EC17-	RIGHT TRACK joystick problem
EC19-	Wrong transmitter RF ID received

**PARTS LIST**

PART NUMBER	DESCRIPTION
3B0372B	PROPORTIONAL TRANSMITTER WITH DRIVE CONTROL OPTION
3B0373A	CRANE CONTROL RECEIVER
3B0374A	DRIVE CONTROL RECEIVER
020-506-0250	25FT CAN/CHARGER CABLE
010-001-1600	RECHARGABLE TRANSMITTER BATTERY
3B0376A	CRANE CONTROL RECEIVER HARNESS
3B037BA	DRIVE CONTROL RECEIVER HARNESS
B20032	CHARGER, 12 VDC CIGARETTE LIGHTER PLUG
B20052	CHARGER, 110 VAC
B40022C	OPTIONAL PALM PILOT WITH APPLICATION SOFTWARES

There are no user-serviceable parts inside the Transmitter or the Receiver. Return the units for service.

Note: For operation with negative ground vehicles only.

**WARNING:**

The VERSA 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 reserves the right to change specifications or design at any time without notice.

## VERSA REMOTE™

### SPECIFICATIONS

FCC ID: P4U-VRTS

Industry Canada Certification Number: 4534A-VRTS

EQUIPMENT CLASS: PART 15 SPREAD SPECTRUM TRANSMITTER

#### TRANSMITTER

Power supply .....	9.6 Volt Rechargeable, NICAD battery.
Operating temperature - Radio.....	-40° C to +85° C
Storage temperature .....	-40° C to +100° C
RF Frequency.....	903-926.5 MHz
RF Transmit power (EIRP) .....	33 mW
Vibration .....	3G to 200Hz
Shock .....	50G
NEMA.....	12

#### RECEIVER

Power supply voltage .....	12V nominal, 9V to 35V transient
Operating temperature .....	-40° C to +85° C
Storage temperature .....	-40° C to +100° C
Outputs.....	5.0 Amp. (Protected)
RF Frequency.....	903-926.5 MHz
Vibration .....	3G to 200Hz
Shock .....	100G
NEMA.....	4X

## VERSA 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, uses and can radiate 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.