



DESIGNERS AND MANUFACTURERS OF ELECTRONIC CONTROLS

KAR-TECH.com

ELITE REMOTE

RADIO/CAN REMOTE CONTROL SYSTEM

-PRELIMINARY-

INSTALLATION AND OPERATION MANUAL

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ELITE REMOTE

INDEX

DESCRIPTION	2
TRANSMITTER AND RECEIVER SYNCHRONIZATION	3
INDICATOR LEDs	3
OUTPUTS	4
INPUTS	4
BATTERY CHARGING	4
INSTALLATION	5
BEFORE APPLYING POWER!	6
USING THE OPTIONAL PALM™ INTERFACE	7
DIAGNOSTIC	7
HISTOGRAM	9
FILE TRANSFER	10
CALIBRATION.....	10
TIME AND DATE SETTING	12
DRIVE RECEIVER WIRING.....	13
CRANE RECEIVER WIRING	14
ENGINE RECEIVER WIRING	15
ROUTINE MAINTENANCE.....	16
MAINTENANCE PRECAUTIONS	16
TROUBLESHOOTING.....	16
TROUBLESHOOTING CHART	18
ERROR CODES – DRIVE	19
ERROR CODES – CRANE	20
ERROR CODES – ENGINE.....	21
TRANSMITTER PICTORIAL	24
DRIVE PICTORIAL.....	25
CRANE PICTORIAL	26
SPECIFICATIONS	27
INSTRUCTION TO THE USER	28

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 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 four modules: the radio transmitter, DRIVE receiver module, CRANE receiver module, ENGINE 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. Releasing the E-STOP will turn on the transmitter.

The system's radio receivers have both current-regulated proportional outputs and ON/OFF outputs to accommodate the functions available on the transmitter. All outputs are current-sourcing. DRIVE and CRANE receivers also include ports for CAN and RS-232 communication. Power must

ELITE REMOTE

be applied to the receiver modules 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 modules 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 section 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 are 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.

INPUTS

Two digital inputs are available for HOP SWITCH and AUGER STOW SWITCH signaling. They will function up to battery voltage levels.

BATTERY CHARGING

The transmitter is designed with a smart battery charger.

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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 into the port. The red and green LED indicators near the charging port indicate the status of the charger: The red LED indicates that the battery is charging and 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.

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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 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 it is low, performance may be erratic.
- Read the rest of this manual.

ELITE REMOTE

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. *Be sure the serial connection is attached to the correct receiver.*

Use the Palm's stylus pen and tap the icon 'GrnCrn 1.0' or 'GrnDrv 1.0' to launch CRANE or DRIVE application. The CRANE application is shown here. The DRIVE application is similar.



Main Page

DIAGNOSTIC

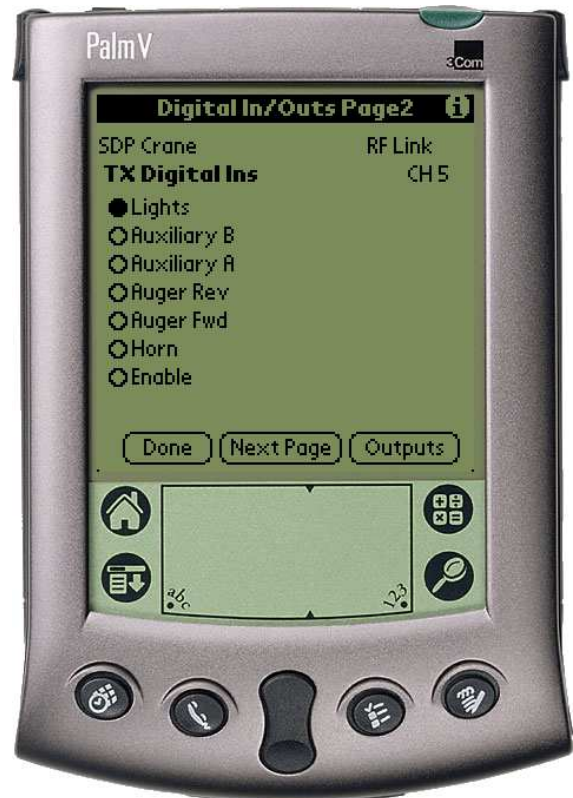
Tap the Diagnostic button to see the diagnostic screens, which shows the present state of remote communications, and system I/O.

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RF Communications Page

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



Digital Inputs Page

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

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 [REDACTED]. Tapping Next and Back allows access to all the histogram pages. Tap the Done button to return to the main menu.



Histogram Page

This model includes the time and date stamp feature for both DRIVE and CRANE receivers. This will allow memory of the latest error events. See section marked TIME AND DATE SETTING

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later in this section for further information.

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™.



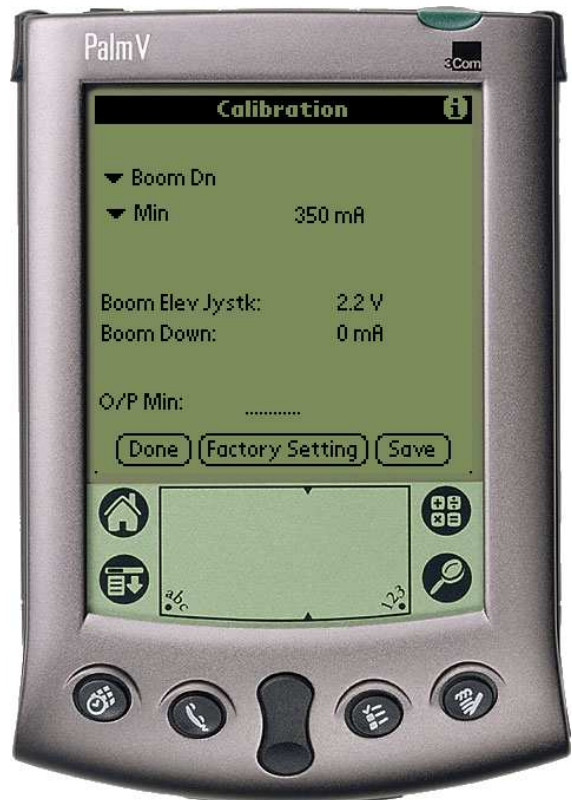
File Transfer Page

This is only used for software updates to the receiver. Tap

the 'i' icon for more information on this procedure.

CALIBRATION

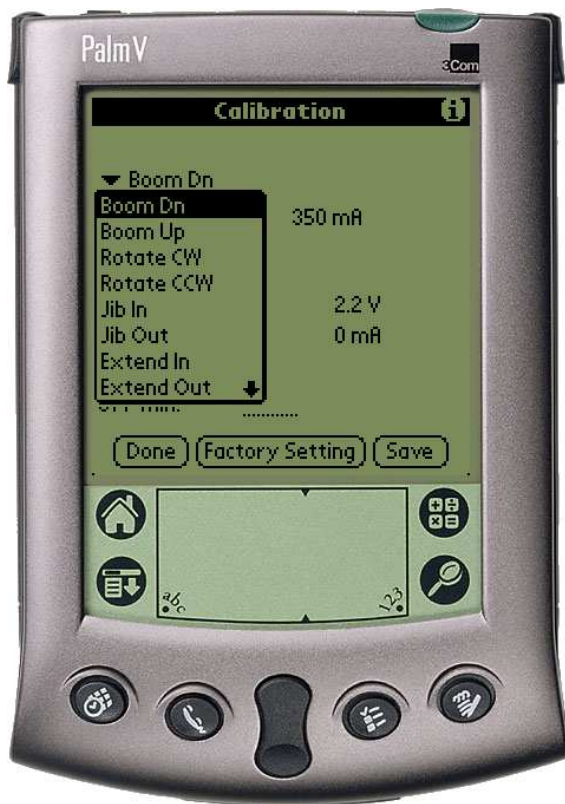
To change the configuration of the outputs, tap the Calibration icon.



Calibration page

The password to gain access to the calibration screens is XXXXXXXXXX. 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

To change the timeout of the transmitter ENABLE button, select Enable Time and adjust as needed.

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

ELITE REMOTE



Calibration parameters menu

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.

TIME AND DATE SETTING

The DRIVE and CRANE receivers each include a real-time clock that logs the time

and date of any error conditions to the histogram. Tapping Time & Date Setting will bring up a splash screen for you to set the current time and date for this function.



Time and date setting screen

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DRIVE RECEIVER WIRING

P1:12 PIN DEUTSCH DTM13-12PA

PIN#	OPTIONAL HARNESS WIRE COLOR	DESCRIPTION
1	BLACK	GROUND
2		CAN HIGH
3		CAN LOW
4		RS-232 TXD
5		RS-232 RXD
6		N/C
7		N/C
8		N/C
9		N/C
10		N/C
11		N/C
12	WHITE	POWER (9 TO 35 VDC)

P2:12 PIN DEUTSCH DTM13-12PB

PIN#	OPTIONAL HARNESS WIRE COLOR	DESCRIPTION
1	1 BLACK	L-DRIVE FWD CR PROP
2	2 BROWN	L-DRIVE REV CR PROP
3	3 RED	LEFT TRACK IN CR PROP
4	4 ORANGE	LEFT TRACK OUT CR PROP
5	5 YELLOW	R-DRIVE FWD CR PROP
6	6 GREEN	R-DRIVE REV CR PROP
7	7 BLUE	R-TRACK IN CR PROP
8	8 VIOLET	R-TRACK OUT CR PROP
9	9 GRAY	HORN
10		N/C
11		N/C
12		N/C

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CRANE RECEIVER WIRING

P1 CONNECTOR: CINCH 18-PIN

PIN	COLOR	DESCRIPTION
1A	11 BROWN/BLACK	BOOM DOWN CR PROP
1B	10 YELLOW/BLACK	BOOM UP CR PROP
1C	9 ORANGE/BLACK	ROTATE CW CR PROP
1D	8 BLUE/BLACK	ROTATE CCW CR PROP
1E	19 ORANGE/BLUE	JIB IN CR PROP
1F	18 RED/BLUE	JIB OUT CR PROP
2A	1 BLACK	EXTEND IN CR PROP
2B	16 BROWN/RED	EXTEND OUT CR PROP
2C	15 YELLOW/RED	WINCH IN CR PROP
2D	14 ORANGE/RED	WINCH OUT CR PROP
2E	13 BLUE/RED	AUGER FWD CR PROP
2F	12 BLACK/RED	AUGER REV CR PROP
3A	2 RED	AUX A PWM PROP
3B	7 RED/BLACK	AUX B PWM PROP
3C	6 BROWN	HORN
3D	5 YELLOW	LIGHTS
3E	4 ORANGE	DUMP
3F		N/C

P2 CONNECTOR: CINCH 30-PIN

PIN	COLOR	DESCRIPTION
1A	RED	POWER (9 TO 35VDC)
1B		N/C
1C		CANH
1D		CANL
1E		RS232 TX
1F		RS232 RX
1G		N/C
1H		N/C
1J		N/C
1K		N/C
2A		N/C
2B		N/C
2C		N/C
2D		N/C
2E		N/C
2F		N/C
2G		N/C
2H		N/C
2J		N/C
2K		N/C
3A		N/C
3B		N/C
3C		N/C
3D		N/C
3E		N/C
3F		N/C
3G		N/C
3H	WHITE	HOP SW INPUT
3J	GREEN	AUGER STOW SW INPUT
3K	BLACK	GROUND

P1

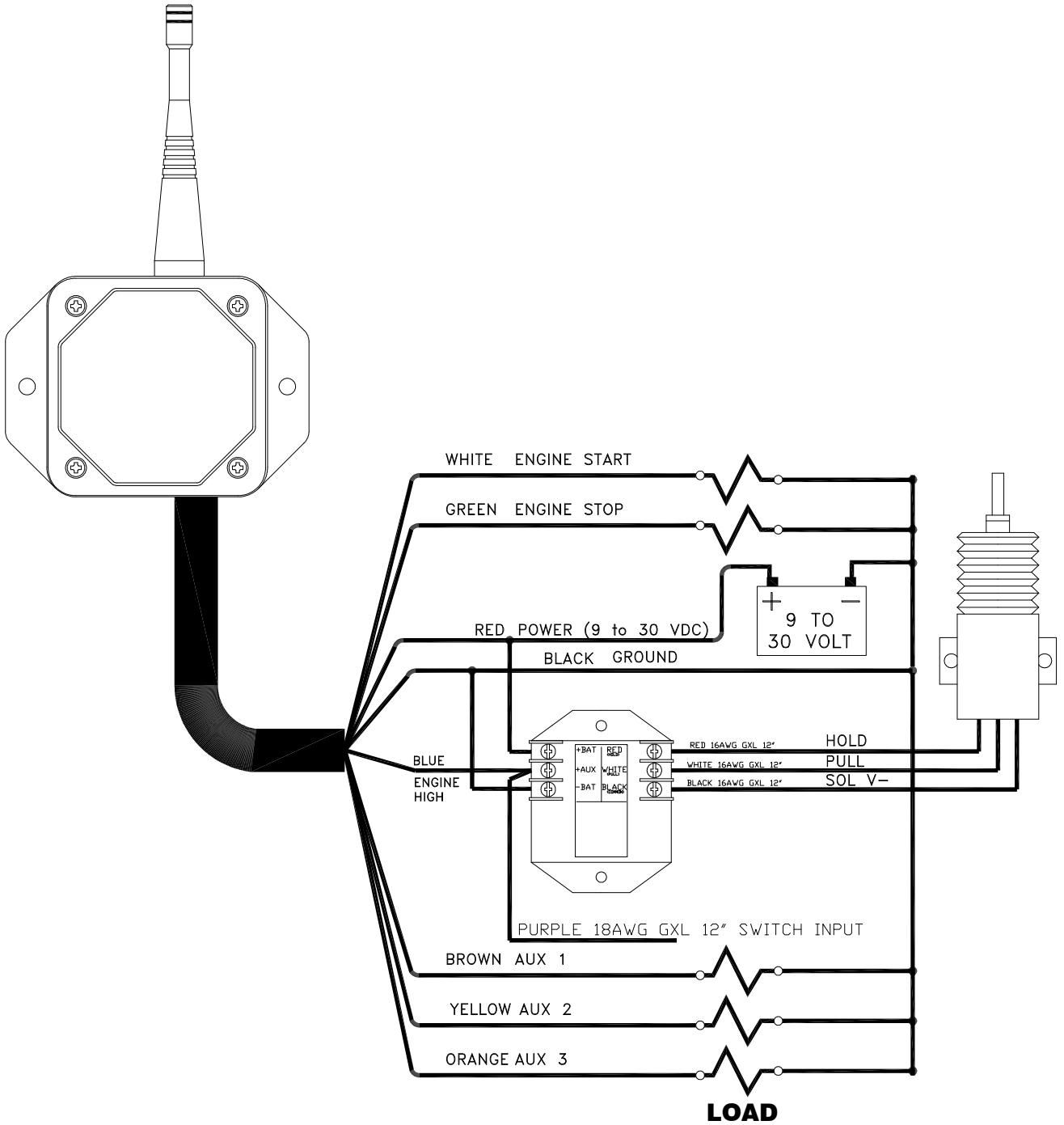
1A 1B 1C	1D 1E 1F
2A 2B 2C	2D 2E 2F
3A 3B 3C	3D 3E 3F

P2

1A 1B 1C 1D 1E	1F 1G 1H 1J 1K
2A 2B 2C 2D 2E	2F 2G 2H 2J 2K
3A 3B 3C 3D 3E	3F 3G 3H 3J 3K

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ENGINE RECEIVER WIRING



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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

PROBLEM	SOLUTION
1. No functions work	<ol style="list-style-type: none">1. Check that transmitter power is on2. Check that receiver power is on3. Check system wiring for power into the system4. Check LED status display for system status5. Check for proper grounding of system's electrical circuit6. Check system's hydraulic system
2. Certain functions do not work	<ol style="list-style-type: none">1. Check the wiring connection from the system to the valve coil for the output function that does not work2. Check LED status display for possible fault or error indication3. Check system's hydraulic system4. Check system's electrical system
3. Functions operate intermittently	<ol style="list-style-type: none">1. Loose connector at the valve coil2. Check LED status display for system status3. Check receiver antenna for any damage and proper connection4. Check system's hydraulic system

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ERROR CODES – DRIVE

ERROR	PROBABLE CAUSE
EC01	RF COMMUNICATION PROBLEM
EC02	HORN FAULT
EC03	LEFT DRIVE FWD FAULT
EC04	LEFT DRIVE REV FAULT
EC05	LEFT TRACK IN FAULT
EC06	LEFT TRACK OUT FAULT
EC07	RIGHT DRIVE FWD FAULT
EC08	RIGHT DRIVE REV FAULT
EC09	RIGHT TRACK IN FAULT
EC10	RIGHT TRACK OUT FAULT
EC11	LEFT DRIVE JOYSTICK PROBLEM
EC12	LEFT TRACK JOYSTICK PROBLEM
EC13	RIGHT DRIVE JOYSTICK PROBLEM
EC14	RIGHT TRACK JOYSTICK PROBLEM
EC15	WRONG RFID
EC16	JOYSTICK OFF CENTER ON POWER UP
EC17	LOW BATTERY

Error code explanations:

- 1** Transmitter is off
Transmitter went to sleep mode
Interference in RF communication link
- 2-10** Short or open load/coil on output
- 11-14** No voltage present on joystick in transmitter
- 15** Transmitter and receiver are not synchronized
- 16** Joystick not at center position when transmitter power is turned on
- 17** Battery voltage is below 10.5V

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ERROR CODES – CRANE

ERR	POSSIBLE CAUSE	ERR	POSSIBLE CAUSE
EC01	RF COMMUNICATION PROBLEM	EC15	AUGER FWD FAULT
EC02	HORN FAULT	EC16	AUGER REV FAULT
EC03	LIGHTS FAULT	EC17	AUX A FAULT
EC04	DUMP FAULT	EC18	AUX B FAULT
EC05	BOOM DOWN FAULT	EC19	BOOM ELEVATION JOYSTICK PROBLEM
EC06	BOOM UP FAULT	EC20	BOOM ROTATE JOYSTICK PROBLEM
EC07	ROTATE CW FAULT	EC21	BOOM EXTEND JOYSTICK PROBLEM
EC08	ROTATE CCW FAULT	EC22	WINCH JOYSTICK PROBLEM
EC09	JIB IN FAULT	EC23	JIB JOYSTICK PROBLEM
EC10	JIB OUT FAULT	EC24	AUGER POT PROBLEM
EC11	EXTEND IN FAULT	EC25	AUX POT PROBLEM
EC12	EXTEND OUT FAULT	EC26	WRONG RFID
EC13	WINCH IN FAULT	EC27	JOYSTICK OFF CENTER ON POWER UP
EC14	WINCH OUT FAULT	EC28	AUGER STOW SWITCH MISSING
		EC29	LOW BATTERY

Error code explanations:

- 1** Transmitter is off
Transmitter went to sleep mode
Interference in RF communication link
- 2-18** Short or open load/coil on output
- 19-23** No voltage present on joystick in transmitter
- 24-25** No voltage present on potentiometer in transmitter
- 26** Transmitter and receiver are not synchronized
- 27** Joystick not at center position when transmitter power is turned on
- 28** Voltage to input is very low or missing
- 29** Battery voltage is below 10.5V

ELITE REMOTE

ERROR CODES – ENGINE

ERROR	PROBABLE CAUSE
EC01	RF COMM PROBLEM
EC02	ENGINE START ERROR
EC03	ENGINE STOP ERROR
EC05	ENGINE HIGH (PULL) ERROR

Error code explanations:

- 1** Transmitter is off
Transmitter went to sleep mode
Interference in RF communication link

- 2-3, 5** Short or open load/coil on output

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PARTS LIST

PART NUMBER	DESCRIPTION
3B1152A	RADIO TRANSMITTER
3B1153A	DRIVE RECEIVER
3B1158A	CRANE RECEIVER
3B115BA	ENGINE RECEIVER
3B1154A	DRIVE WIRING HARNESS
3B1159A	CRANE WIRING HARNESS
3B115AA	SOLAR TRICKLE CHARGER
020-506-0250	25' CAN ADAPTOR CABLE
020-506-0120	RS-232 ADAPTOR CABLE
010-001-2200	RECHARGABLE TRANSMITTER BATTERY
B20032B	CHARGER, 12 VDC CIGARETTE LIGHTER PLUG
B20072A	FAST CHARGER SUPPLY, 110V AC WALL
B40022C	OPTIONAL PALM PILOT WITH SOFTWARE

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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.

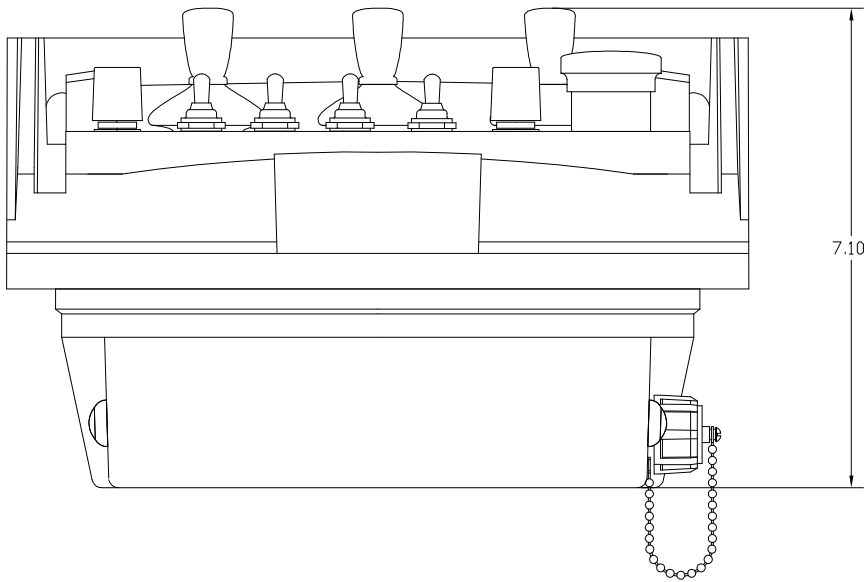
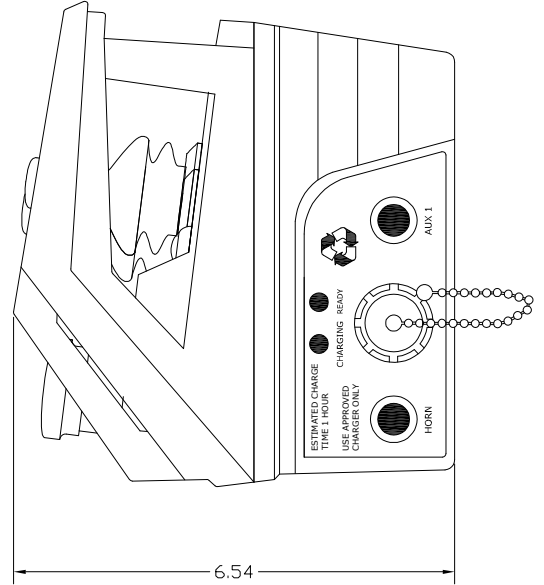
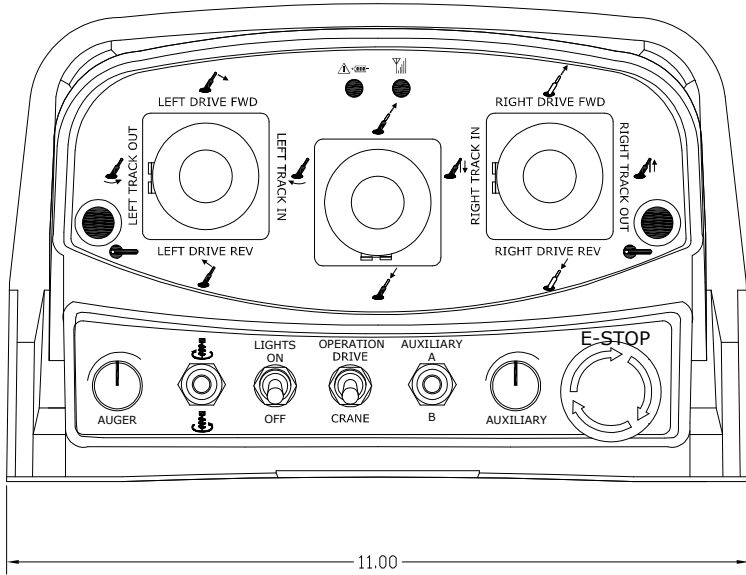
WARNING:

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.

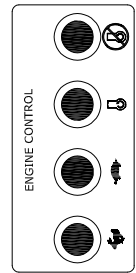
The information, specifications, and illustrations in this manual are those in effect at the time of printing. We reserve the right to change specifications or design at any time without notice.

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TRANSMITTER PICTORIAL



OPPOSITE SIDE PANEL



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

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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.