MICRO

RADIO REMOTE CONTROL SYSTEM

INSTALLATION AND OPERATION MANUAL

NORTHERN AG
3A4261EJ.doc
September 27, 2021
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DESCRIPTION

The MICRO REMOTE is a state of the art microprocessor based Radio Frequency (RF) control system. It will provide the operator the ability to wirelessly operate equipment. The operator is required to follow all OSHA www.osha.gov and other applicable safety standards when operating the equipment. Do not use high power radio devices in close proximity of this product.

The remote control system consists of: the radio transmitter, receiver module, and associated optional equipment such as wiring harnesses and Gate interface tools.

The transmitter is equipped with pushbuttons for the various functions. This transmitter runs on a 3.7V rechargeable battery.

The system's radio receiver has both PWM and ON/OFF outputs to accommodate the functions available on the transmitter. All outputs are current-sourcing. It also includes RS-232 communication for system diagnostics.

OPERATION

Power must be applied to the receiver module for the system to work.

Pressing the POWER button until the red and green LEDs appear will turn on the transmitter. Pressing and holding the POWER button until the LEDs turn off will turn off the transmitter. Pressing the POWER will turn off all outputs as a safety feature. If

the transmitter goes out of range for more than 2 seconds, all outputs except the BOOM output will turn off as a safety feature.

To save battery life, the transmitter will turn off after 15 minutes if no buttons are pressed. The user must press POWER at this point to restore transmitter operation. To change the sleep time, use the following procedure:

1. With the transmitter off, press and hold POWER and buttons IDLE LOW, IDLE HIGH, and BOOM
2. Keep holding until the green and red LEDs start blinking together slowly. Release buttons
3. Press one of the following buttons for desired sleep time:
   a. ROLL RIGHT - 15 minutes
   b. ROLL LEFT - 30 minutes
   c. IDLE HIGH - 60 minutes
   d. IDLE LOW - 120 minutes
   e. BOOM – sleep time disabled

INDICATOR LEDs

The transmitter has two indicators, the red BATTERY indicator and the green TRANSMIT indicator. The green TRANSMIT indicator blinks rapidly whenever there is communication between the transmitter and the receiver. It will blink slowly when there is no communication (i.e. – no power to the receiver).

The red BATTERY indicator starts blinking once every second when

the battery voltage is low and requires charging. Plug in the transmitter as soon as possible after seeing the low battery indicator. See BATTERY CHARGING below.

The receiver module can identify problems with the system in the form of an error code. Check the red indicator 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 active operation.

TRANSMITTER AND RECEIVER SYNCHRONIZATION

Each radio remote system is designed to operate with a unique radio ID code and RF channel sequence. Each receiver is programmed to respond *only* to the transmitter with the correct ID code/RF channel sequence 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 transmitter. To teach the ID code to the receiver, use the following procedure. ***Please note that if this procedure is interrupted before it has completed, the system may have intermittent operation:**

1. Turn the transmitter and receiver off
2. Press and hold the POWER button for more than 10 seconds. LEDs should blink

at this point. Release the POWER button.

3. Apply power to the receiver
4. Only the green LED should start to blink rapidly on the transmitter
5. Teach complete

CLONING

Warning! This feature can pose a safety hazard for operators if both transmitters are used simultaneously! Use with caution! Occasionally, it is desirable to have more than one transmitter work with a single receiver. This is accomplished by a process called cloning. Cloning allows an additional transmitter (B) to have the same ID code as the original transmitter (A). If this feature is desired, use the following procedure:

1. Make sure transmitters and receivers are off
2. On transmitter A, press and hold POWER button for more than 10 seconds. LEDs should blink at this point. Release POWER button
3. On transmitter B, press and hold buttons ROLL RIGHT, ROLL LEFT, and POWER until the LEDs start to blink. Release buttons
4. Wait for a few seconds until the green LED only starts to blink on transmitter A and transmitter B turns off.
5. Turn off both transmitters
6. Synchronize one of the transmitters to the receivers

If cloning feature has been invoked and is no longer desired, the ID code of one of the transmitters needs to be

changed. This will unclone the transmitters. If this is desired, use the following procedure:

1. Make sure the receiver and transmitters are OFF
2. Press and hold buttons ROLL LEFT, IDLE HIGH, BOOM, and POWER until the LEDs start to toggle. Release buttons
3. Press any button again to select a new ID
4. Uncloning complete
5. Use transmitter and receiver synchronization procedure above to link the uncloned transmitter to new receivers

BATTERY CHARGING

The battery can be charged by plugging the AC wall charger or DC cigarette charger into the USB port. Red and green LED indicators near the top of the transmitter 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.

IMPORTANT BATTERY INFO

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.

The temperature that the transmitter battery is exposed to affects performance and useful life. It is strongly recommended you keep within the following limits:

A. Charging: -4 to +86°F
B. Operating: -20 to +122°F

C. Storing: -4 to +86°F (lower is better)

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 on the receiver module *or* the HISTOGRAM page on the optional Gate.

The outputs will detect a no-load or short condition WHEN activated.

INSTALLATION

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

To install the receiver module, use the mounting holes provided on the enclosure to attach it in a vertical manner with the wires facing down. Please take extra caution not to damage internal components while installing. It is advised to mount the unit as high as possible, keeping clear of metal obstructions around the antenna which might affect RF performance. Antenna extension cables are available from Kar-Tech to aid in this, if needed.

During operation, the controller will generate heat that must be dissipated. The published amps rating can only be fully achieved if adequate cooling is provided. Mount the controller so that the enclosure makes contact with a metallic surface (chassis, cabinet) to conduct the heat and nothing protrudes through the

potting material to damage internal electronic components.

The main power to the receiver should be connected through a switched, fused line capable of a minimum of 100 amps. For best results, connect power (+) to the motor driver via an auxiliary terminal of the ignition switch, PTO switch, or ignition relay. Connecting the ground (-) directly to the BATTERY – terminal is preferred for optimal performance.

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.
- Read the rest of this manual.

SYSTEM TROUBLESHOOTING USING OPTIONAL GATE:

The Kar-Tech GATE connects to the receiver/controller thru the RS232 diagnostic port.

Note: To prevent electrical shorts and damage turn Receiver power off. Plug gate to the receiver then turn power on to the receiver.

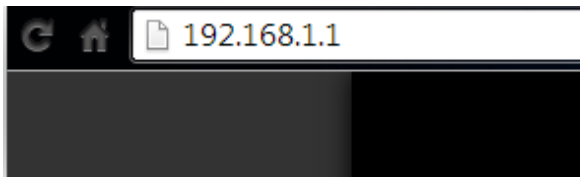
The GATE creates a Wi-Fi access point which allows you to connect to any device with Wi-Fi and web browser such as smart phones, pads or personal computers. It supports Google Chrome, Internet Explorer, Firefox and IOS Safari and allows user to configure, diagnose and troubleshoot the system.

The GATE's POWER LED will start to blink if the battery is low. Charge the GATE as soon as possible after seeing low battery indicator using a Kar-Tech cable. After being plugged in, the GATE will turn off after 1 minute if no receiver or Wi-Fi is connected. If the receiver or Wi-Fi is connected, the GATE will turn off after 5 minutes of no Wi-Fi and receiver connection otherwise it will stay on.

Gate Diagnostic Tool

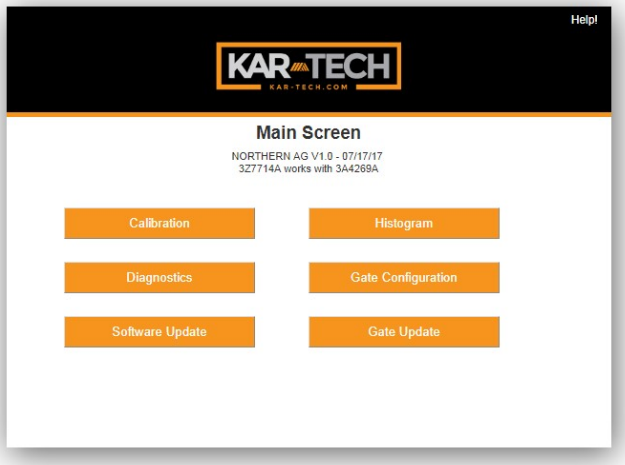
ACCESSING THE CONTROL PANEL

1. Turn off power to the receiver.
2. Plug in the GATE to the receiver.
3. Turn on the power to the receiver. The power LED on the GATE will turn on at this point
4. Use your device and look for the available WiFi networks. A network under the name of "NORTHERN3A426" should be available at this point. Connect to the network, the password is 3A4266A1.
5. Once the connection is established, open a web browser on your device. Kar-Tech recommends using the Firefox browser.
6. Enter the address http://192.168.1.1 in the address bar



Address Bar

7. The following options are available from the main screen.



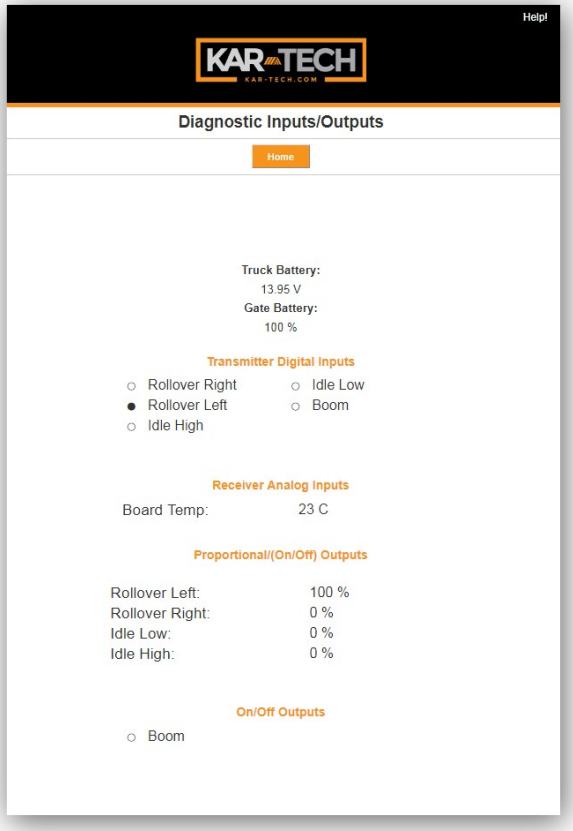
Main Screen

DIAGNOSTICS

Tap the `Diagnostic` button to see the diagnostic screens, which shows the present state

of remote communications, and system I/O.

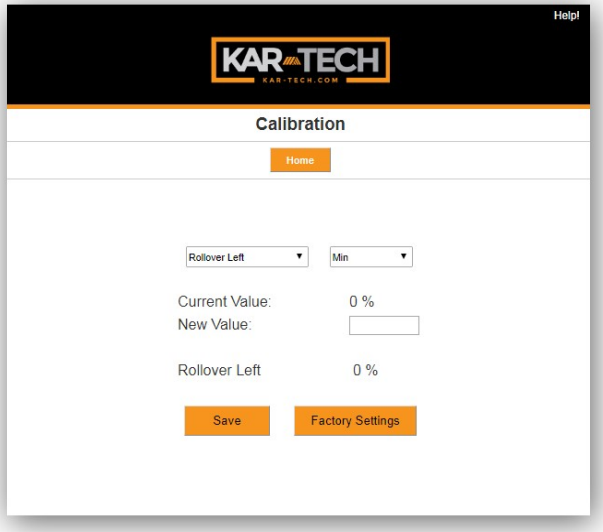
When the round circle next to a label is dark, the corresponding ON/OFF input or output is sensed to be active or ON.



Diagnostics

CALIBRATION

To change the configuration of the unit, tap the `Calibration` icon.



Calibration

The password to gain access to the calibration screens is 1262.

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

1. Select the output to change from the first drop-down menu
   a. `ROLLOVER LEFT` – Select to adjust

this PWM output

b. ROLLOVER RIGHT – Select to adjust this PWM output

c. IDLE LOW – Select to adjust this PWM output

d. IDLE HIGH – Select to adjust this PWM output

2. Select the parameter of the output to change from the second drop-down menu
   a. Min – Minimum percent (%) of PWM
   b. Max – Maximum percent (%) of PWM
   c. Ramp Up – Time in seconds to go from Min to Max PWM
   d. Ramp Down – Time in seconds to go from Max PWM to zero
   e. Frequency – Dither frequency to valves in Hz (Change affects all outputs)
3. Enter the new value in the new value box
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).

Tap the Factory Settings button to return all outputs to standard values. Tap HOME to quit calibration and return to the main menu.

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 1262. Tap the `Home` button to return to the main menu.

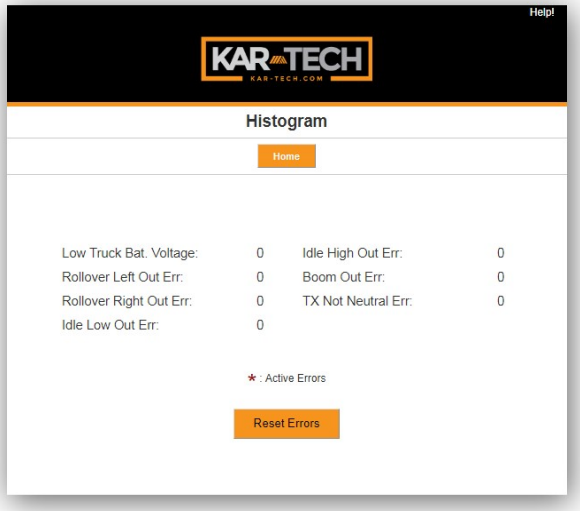
Note: the GATE is not a precision measurement instrument. There may be delays.

SOFTWARE UPDATE

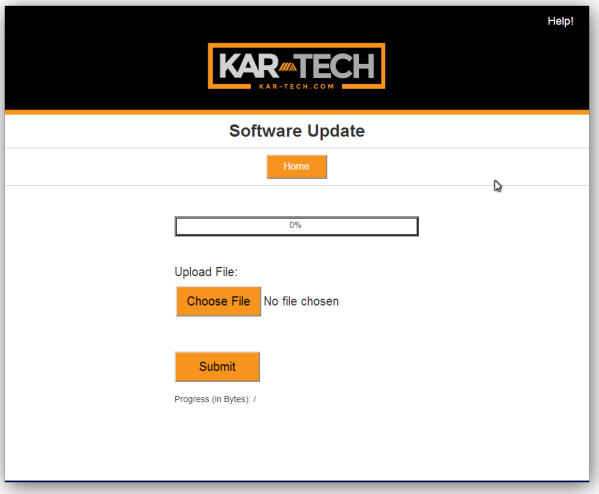
Use the `Choose File` button to select new software on your device with which to program the receiver. Kar-Tech will have provided software in the .kar format. Once the file is selected, press the SUBMIT button to upload the file.

Note: This feature does not work on Apple mobile or tablet products.

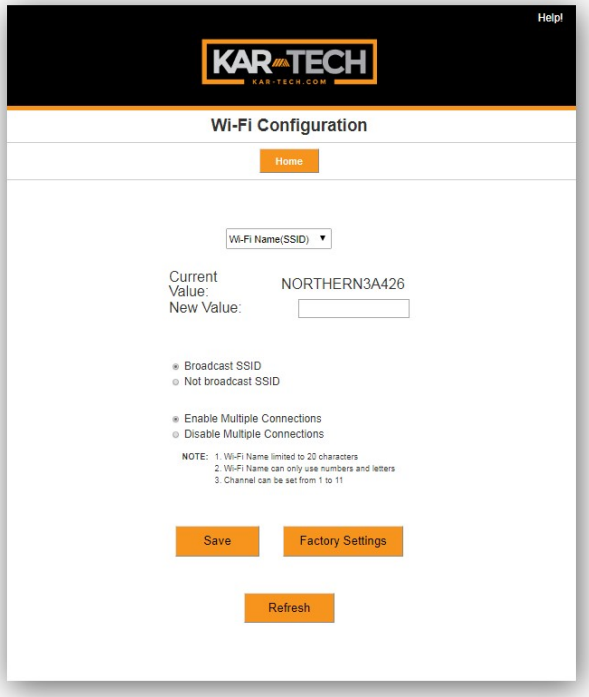
Note: Do not turn the receiver or the GATE off during the upload process.



Histogram Page



Software Update Page



Gate Configuration Page

GATE CONFIGURATION

This page allows you to change the name (SSID) of the WiFi network you are connecting to. Factory settings will rename the Wi-Fi to its original name.

If Broadcast SSID option is selected, the Wi-Fi name (SSID) is public and it will be visible to any other Wi-Fi devices. Otherwise, the Wi-Fi name (SSID) is hidden and it would require manual connection to the network.

If Enable Multiple Connections is selected, multiple connections up to 4 devices could be connected to the GATE. However, only one of the connected devices can use the GATE. If Single connection is enabled, only one device can be connected to the GATE.

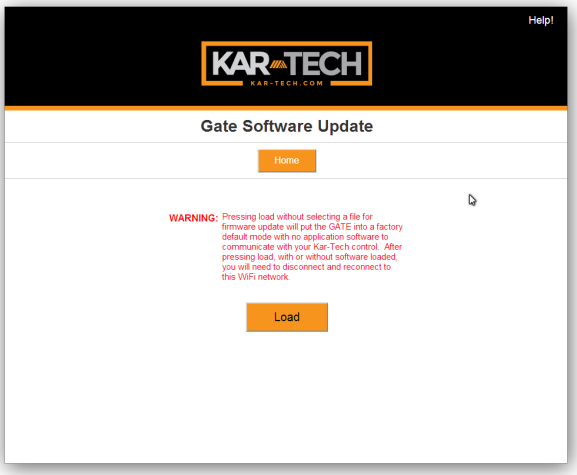
NOTE: A reconnect to the new Wi-Fi connection is needed after each change. It is advised to keep a note of the WiFi name in case if Not Broadcast SSID option is selected. Forgetting the WiFi name after selecting this option will require the GATE

to be sent to KAR-TECH for RESET.

GATE UPDATE

This page was designed to upload software that changes the product that the GATE interface works with.

Once the LOAD button is pressed the application on the GATE will be **deleted**.



Gate Update Page

1. Select LOAD
2. Disconnect then reconnect to "NORTHERN3A426" network
3. Press HOME button
4. Screen below should be shown:

5. Press Gate Software Update
6. Using Browse select proper .gat file
7. Press Submit
8. File will upload and say Success! When complete
9. Disconnect then reconnect to "NORTHERN3A426" network
10. Press HOME button
11. Update complete

Note: the GATE is not a

precision measurement instrument. There may be some delays.

WIRING

COLOR	DESCRIPTION
RED 14GA GXL	POWER (9-30V)
BLACK 14GA GXL	GROUND
WHITE 14GA GXL	ROLLOVER LEFT PWM OUTPUT
WHITE 14GA GXL	ROLLOVER RIGHT PWM OUTPUT
BLUE 18GA GXL	IDLE LOW PWM OUTPUT
BROWN 18GA GXL	IDLE HIGH PWM OUTPUT
WHITE 14GA GXL	BOOM OUTPUT

DB9 CONNECTOR

PIN	DESCRIPTION
1	POWER (9-30V)
2	RS-232 RX
3	RS-232 TX
5	GROUND

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 MICRO REMOTE system. If, after following these instructions, the system still does not function, contact your KAR-TECH representative for further instructions or servicing.

TROUBLESHOOTING CHART

PROBLEM	***SOLUTION***
No functions work	1. Verify transmitter power source – battery, CAN cable, external supply, etc 2. Verify that receiver control module power source is present at its input connector 3. Check for proper system ground 4. Check the receiver or control module LED status display for functionality or errors 5. Check the hydraulic system 6. Check to see if the module has sufficient cooling.
Certain functions do not work	1. Check the wiring and connections from the receiver control module to the control module to the valve coil for the particular function that does not work 2. Check the receiver control module LED status display for possible fault or error indication 3. Check the hydraulic system 4. Check the electrical system 5. Check to see if the module has sufficient cooling.
Functions operate intermittently	1. Check for loose connections at the valve coil 2. Check the receiver control module LED status display for functionality or errors 3. Check the receiver antenna for damage

	and possible obstructions 4. Check the hydraulic system

ERROR CODES

EC	POSSIBLE CAUSE
1	RF COMMUNICATION ERROR
2	LOW SYSTEM VOLTAGE
3	ROLL LEFT OUTPUT ERROR
4	ROLL RIGHT OUTPUT ERROR
5	IDLE LOW OUTPUT ERROR
6	IDLE HIGH OUTPUT ERROR
7	BOOM OUTPUT ERROR
8	TX NOT IN NEUTRAL MODE

Error code explanations:

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

2 System voltage is below 11V (12V system)

4-7 Short or open load/coil on output

8 Switch or joystick on transmitter is not in its rest or off position when turning the transmitter on

PARTS LIST

PART NUMBER	*DESCRIPTION*
3A4262A	RADIO TRANSMITTER
3A4269E	RADIO RECEIVER
B20173A	FAST CHARGER SUPPLY, 12 VDC CAR
B20172A	FAST CHARGER SUPPLY, 110VAC WALL
3A4266A	OPTIONAL GATE DIAGNOSTIC TOOL

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

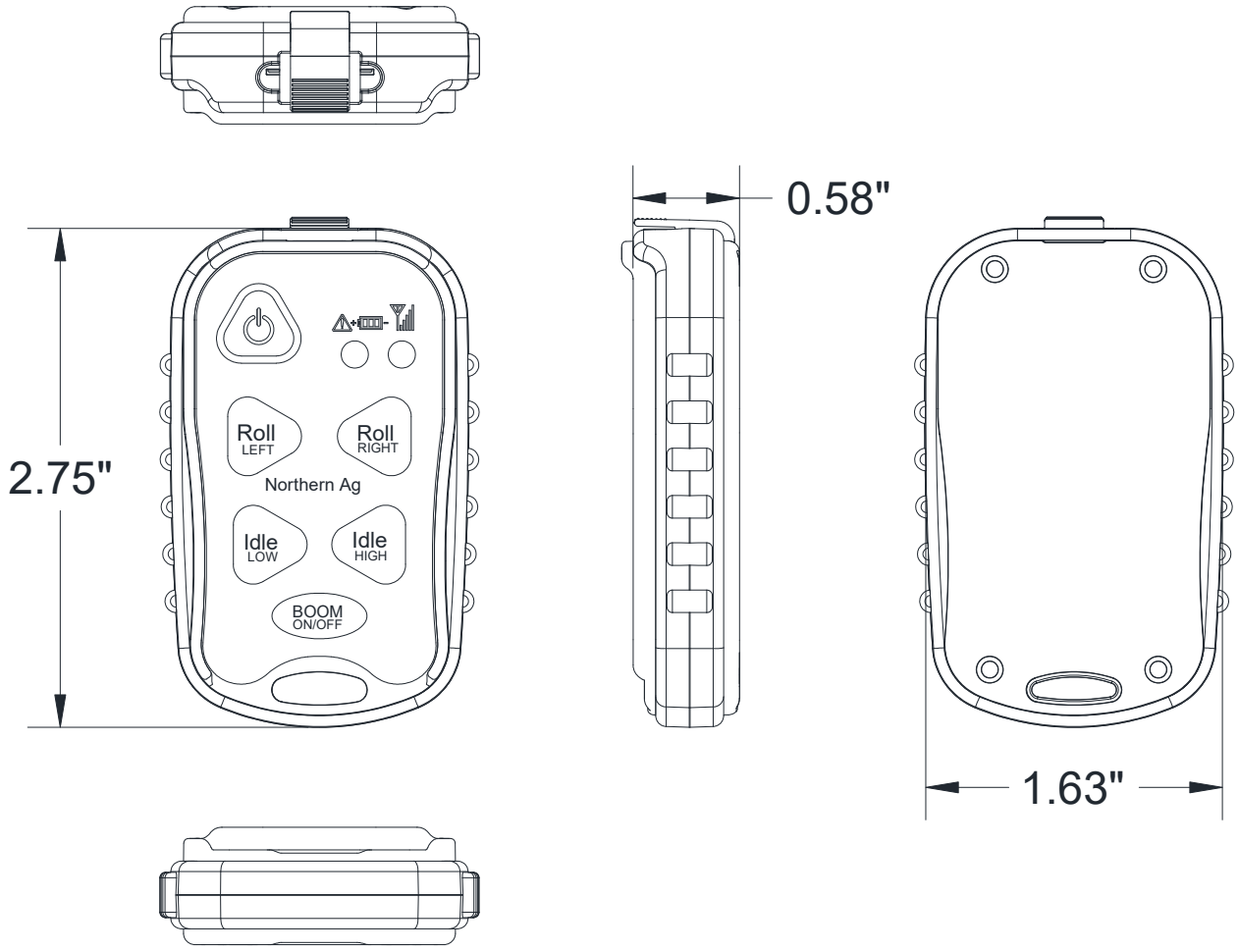
Note: For operation with negative ground systems only.

WARNING:

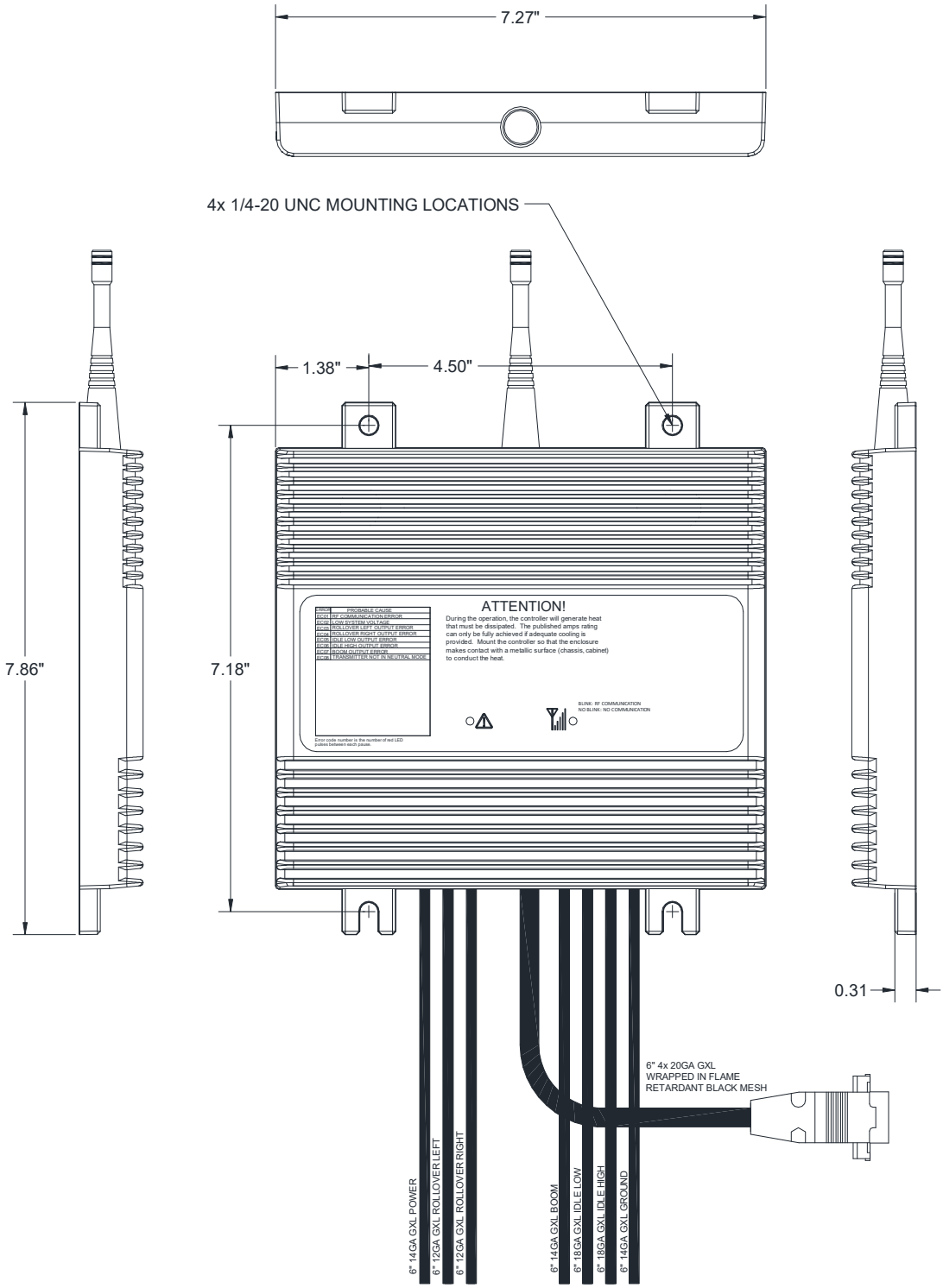
The MICRO REMOTE must be operated in compliance with all applicable safety regulations, rules, and practices. Failure to follow required safety practices may result in death or serious injury.

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.

TRANSMITTER PICTORIAL



RECEIVER PICTORIAL



SPECIFICATIONS

TRANSMITTER

Equipment Class..... Part 15 Spread Spectrum Transmitter
FCC ID P4U-MCTA1
ICC (Industry Canada Certification) ID 4534A-MCTA1
Power supply ..... 3.7V LiPo Rechargeable 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) ..... 10 mW
LCD display operating range (if equipped) ..... -20˚C to +70˚C
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
Idle and Boom Outputs ..... 30A max
Roll Outputs..... 60A max
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

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.