CAN RANGER III

RADIO/CAN REMOTE CONTROL SYSTEM

OPERATION MANUAL

KAR-TECH
3B2591BJ.doc
June 29, 2020
BK

INDEX

DESCRIPTION

The CAN RANGER III 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, actuators, wiring harnesses, charger, and associated optional equipment.

The transmitter is equipped with joysticks, pushbuttons, and toggle switches for the various functions. The Compact and Joystick Mega run on a 3.7V rechargeable battery.

The system's radio receiver is designed with 7 ON/OFF outputs and 1 analog output to drive the Horn, Engine Start, Engine Stop, RPM+, RPM-, Auxiliary 1, and Auxiliary 2. All outputs are protected for over load and short circuit conditions.

The receiver also includes a CAN bus for communicating with the CAN Actuators.

The receiver has an on board Gate for system updating and configuration. The histogram and diagnostic screens on the receiver's display can be used for system diagnostics.

The CAN RANGER III system drives and controls the position of the actuators with respect to the position of the transmitter joysticks. The actuators in turn control the appropriate valves.

OPERATION

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

Main Screen

The <HELP!> Button on the receiver can be pushed at any time. The screen will then describe what is currently being displayed. Press <ESC> to return to the original screen. If there are any errors the screen below will be shown. Then navigate to the histogram screen for diagnostics (see INDICATORS section). Press <ESC> at any time to return to the Main Screen.

Main Screen When Error Present

Pressing the POWER button until the red and green LEDs appear will turn on the Mega transmitter. Turning the key switch to the on position until the green and red LEDs appear will turn on the Compact. Pressing and holding the POWER button until the LEDs stop toggling

will turn off the Mega transmitter. Turning the key switch to the off position until the LEDs stop toggling will turn off the Compact. Pressing the E-STOP on the Compact or tapping the POWER button on the Mega will turn off all outputs except HORN as a safety feature and the STOP ENGINE output will be energized. If the transmitter goes out of range for more than 2 seconds, all the outputs will turn off as a safety feature and the STOP ENGINE output will energize for about 5s.

The E-STOP button on the Compact transmitter must be up or the POWER button on the Mega must be released to start engine and operate any functions. To operate the joysticks, press ENABLE and HORN for at least 1 second. After 1 second, you can release HORN and use ENABLE when you want to operate a function. If the ENABLE is not used for longer than 1 minute, you must start again with both ENABLE and HORN as before.

If the transmitter is on, and one or more of the valve handles/actuators is moved off center beyond the Engine Stop position, by means other than the transmitter (for example if a spring return fails or someone moves a handle) the CAN Ranger will stop the engine. This is a safety feature to protect the person using the transmitter from someone else operating the machine without their knowledge. The Engine STOP position is configurable for

each valve handle, and for each direction. They can be configured by following the ACTUATOR CALIBRATION procedure listed below. NOTE: The Engine Stop values must be between 90% and 10% of the FAST value.

When turning off the transmitter the STOP ENGINE output will activate for about 5s and then turn off to energize the Engine stop relay on the harness. This action will open the NC contact on the relay to stop the engine.

The normal configuration for the actuators is to have the actuators release the manual handles when a function is not active, or when in E-Stop mode. For valves with weak springs, the corresponding actuator can be configured to automatically return back to center.

In order to operate manually with at least one actuator in Auto Center mode enabled, turn off the Receiver. Otherwise the actuator will continue to center the valve/handle.

In order to place the Mega transmitter in fast mode, you must press down on both joysticks while they are centered. The actuators will now move to fast position when the joysticks are operated. To return to slow mode, press down on both joysticks again while they are centered. The actuators will now move to slow position when the joysticks are operated.

To save battery life, the transmitter will turn off after 15 minutes if the receiver is off. The user must press POWER press or turn the key switch at this point to restore transmitter operation. To change the sleep time, use the following procedure:

For Compact

1. With the transmitter off, press and hold AUX 1, RPM MINUS, and LIGHTS ON then turn the key switch to on
2. Keep holding switches until the green and red LEDs start blinking together slowly. Release switches
3. Press one of the following buttons for desired sleep time:
    a. AUX 1 - 15 minutes
    b. LIGHTS ON - 30 minutes
    c. RPM PLUS - 60 minutes
    d. RPM MINUS - 120 minutes
    e. HORN – sleep time disabled

For Mega

1. With the transmitter off, press and hold AUX 1, RPM MINUS, ENGINE START, and POWER button
2. Keep holding buttons until the green and red LEDs start blinking together slowly. Release buttons
3. Press one of the following buttons for desired sleep time:
    a. ENGINE START - 15 minutes
    b. ENGINE STOP - 30 minutes
    c. RPM PLUS - 60

minutes

d. RPM MINUS - 120 minutes
e. HORN – sleep time disabled

The transmitter will NOT go to sleep as long as the receiver has power applied to it.

INDICATORS

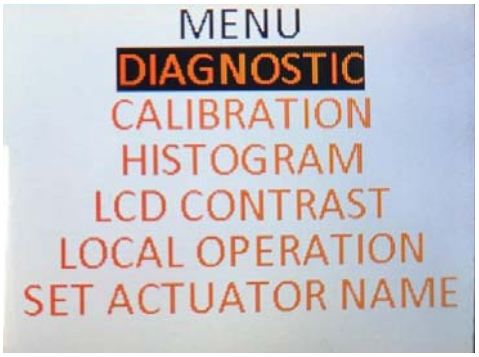
The transmitter has two indicators, the red BATTERY indicator and the green TRANSMIT indicator. The green TRANSMIT indicator blinks rapidly (2x/second) whenever there is communication between the transmitter and the receiver. It will double-blink when no functions are used.

The red BATTERY indicator starts blinking once every second when the battery voltage is low and requires charging. Plug in the Compact transmitter or place the Mega on a charging pad 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. The red LED will turn on solid when there is an error. Check the 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. If Wi-Fi is connected and the user is accessing the pages, the red LED will blink rapidly. The green LED indicator will blink on the receiver during active operation.

The display on the receiver can provide the user with diagnostic information, and can be used to set up the system. The 8 push buttons on the controller are used to navigate through the screens.

The six main options are DIAGNOSTIC, CALIBRATION, HISTOGRAM, LCD CONTRAST, LOCAL OPERATION, and SET ACTUATOR NAME. Press the ↑ and ↓ arrow buttons to scroll through the options. Press the <SET> button to select. Press <MENU> at any time to return to this Main Menu.



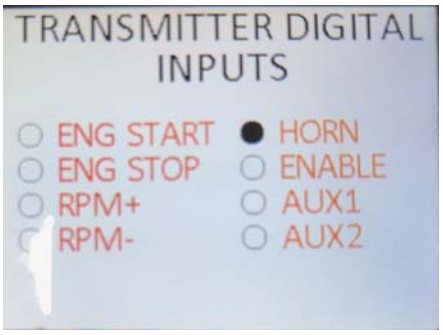
Main Menu Screen

DIAGNOSTIC

The **DIAGNOSTIC** menu lets you see the status of the inputs and the outputs. Press the ← and → arrow buttons to scroll through the screens below. Use the ← arrow or <MENU> button to return to the Main Menu.

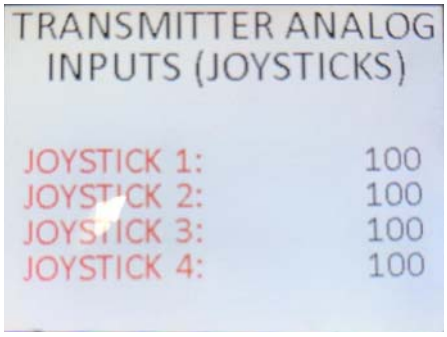
RF Diagnostic Screen

This screen shows the present communication status between the transmitter and receiver. It also shows the RF ID being used and battery voltage at the receiver.



Transmitter Digital Inputs Diagnostic Screen

This screen shows the present state of the transmitter's digital inputs. When the round circle next to a label is dark, the corresponding ON/OFF input is sensed to be active or ON.



Transmitter Analog Inputs Diagnostic Screen

This screen shows the present state of the transmitter's analog inputs. When the corresponding joystick is centered the value will be 100, when the joystick is all the way to the left or down the value will be 0, and when the joystick is all the way to the right or up the value will be 200.

ON/OFF Outputs Diagnostic Screen

This screen shows the present state of the receiver's ON/OFF outputs. When the round circle next to a label is dark, the corresponding ON/OFF output is sensed to be active or ON.

CALIBRATION

The **CALIBRATION** Menu lets you set up the actuators, the engine RPM, and the other options.

Calibration Password Screen

The password is 1262. To enter the password, use the → button to change which digit you are changing. Use ↑ to increase the selected digit or ↓ to decrease it. Use <MENU> button to back out of this screen and return to the Main Menu. Once you have changed all 4 digits, push <SET>. If you entered the correct password you get this screen:

Calibration Menu Screen

The following options are available in the calibration menu: ASSIGN ACTUATORS, ACTUATOR SETUP, RPM SETUP, OPTION SETUP, and FACTORY SETTING. Press the ↑ and ↓ arrow buttons to scroll through the options. Press the <SET> button to select.

CAN ACTUATOR ID ASSIGNMENT

Kar-Tech CAN Actuators are pre-assigned at the factory and labeled for each function.

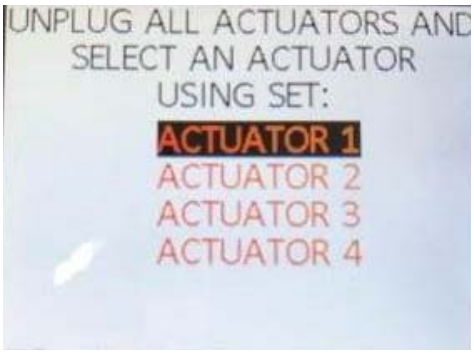
The following procedure is only if reassignment is required in case of actuator replacement or if two identical actuators are detected.

Note: If the receiver ever detects two or more actuators with the same ID, it will stop operation and indicate errors. The receiver tests for this every time it is powered up and continually as it runs.

Since all actuators are identical, they need to be assigned identification numbers by the receiver in order to distinguish which actuator does what function.

Using the buttons on the CAN Ranger Receiver, navigate through the screens to CALIBRATION. Press <SET>. Use the arrow buttons to enter the password 1262. Enter the password by pressing <SET>. Then select ASSIGN ACTUATORS from menu by pressing <SET>. Use the ← arrow button to return to Calibration Menu or <MENU> button to return to the Main Menu.

NOTE: ACTUATOR 2-8 functions are deactivated by default. If you want to use these functions, you must enable them first before assigning the actuators see OPTION SETUP.

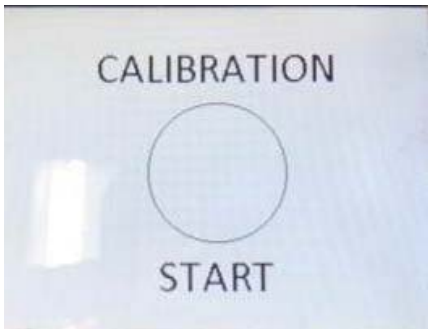


Assign Actuators Main Screen

After selecting this by pushing SET, the receiver's LCD will walk the operator through the procedure. The basic idea is that all actuators need to be disconnected from the system. **This means both disconnecting the wire cable and disconnecting the mechanical linkage from the shaft of the actuators.** Next, one by one the actuators are connected to the system. Each time the operator tells the receiver which actuator was added, the receiver will assign that actuator the appropriate function. When an actuator 1 is selected, the following screens will be displayed:

Assign Actuator 1 Screen

After <SET> is pressed:



Calibration Start Screen

Calibration Completed Screen

Things to keep in mind while concerning Actuator IDs:

- The receiver will not let you add more than one at a time.
- The receiver cannot know if you are assigning the wrong ID to an actuator. That is, if you attach the BOOM actuator and tell the receiver it is the WINCH, the receiver will treat that actuator as the WINCH and the crane will not operate correctly.
- If you skip an actuator during the assignment process, the Receiver will not know, and will not assign that actuator.
- After assigning IDs, you need to re-calibrate the actuators, or at least any new or swapped actuators.
- Leave the actuators plugged in after you add each one. No need to remove them after each step. If you do remove an actuator that has been assigned and you still need to assign other actuators. Do not plug the taught actuator back in until you have completed the ID Assign procedure and exited.
- If you leave the actuators mechanically linked to the valves during the ID step, the actuator's ZERO position may not be correct. If you get strange/incorrect position readings, this may be the reason.

ACTUATOR CALIBRATION

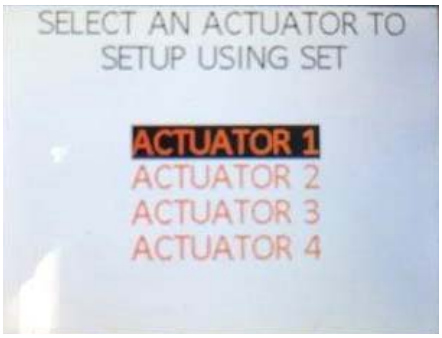
The receiver is programmed for default values for each actuator at the factory. Please refer to Appendix B for factory setting values.

PLEASE NOTE: IF THE FOLLOWING PROCEDURE IS NOT PERFORMED PRIOR TO OPERATION, THE ENGINE STOP MAY BE ON CONTINUOUSLY!

ACTUATOR CALIBRATION USING THE MANUAL HANDLES

Using the buttons on the CAN Ranger Receiver, navigate through the screens to CALIBRATION. Press <SET>. Use the arrow buttons to enter the password 1262. Enter the password by pressing <SET>. Then select the ACTATOR SETUP option by pressing ↓ arrow button then <SET>:

ACTUATOR SETUP



Setup Actuators Main Screen

Select the actuator you would like to calibrate from the list using the ↑ arrow, ↓ arrow, and <SET> buttons. The screens will then walk you through the setup.

During the calibration you will be asked to calibrate center, fast, slow, and engine stop positions. These positions are defined as follow:

CENTER POSITION

This is the position the actuator moves to when the transmitter is ON and the

joystick is in neutral (center position). This position is normally the valve handle in its neutral position (Valve center).

FAST POSITION

This is the position the actuator moves to when the transmitter's in fast mode and a joystick is pushed all the way in one direction. This position is normally the maximum travel of the valve handle.

SLOW POSITION

This is the position the actuator will move to when the transmitter's in slow mode and a joystick is pushed all the way in one direction. This position is normally slightly below the maximum travel of the valve handle.

ENGINE STOP POSITION

This is the position of the valve handle right before hydraulics flow or function movement. The receiver commands the engine to stop if the transmitter is ON with joystick in the center and valve is moved manually or the actuator did not return to center due to mechanical failure or binding of the valve components or actuator. Move valve handle until there is a slight motion of the boom or winch function to store value.

At the end of the calibration of each actuator, the Auto Center feature can be Enabled or Disabled for that actuator. This feature is generally

enabled if the valve spring is weak.

ACTUATOR 1 CALIBRATION

If this is the first time calibrating the actuators, start with ACTUATOR 1 SETUP and the controller will walk you through all Enabled actuators in turn (normally 4). Once you have selected the actuator you want to calibrate push <SET> and follow the instructions on the screen.

There are several settings for each actuator. See the Option Setup section. If you are setting up a new actuator, make sure to configure each setting to match your machine.

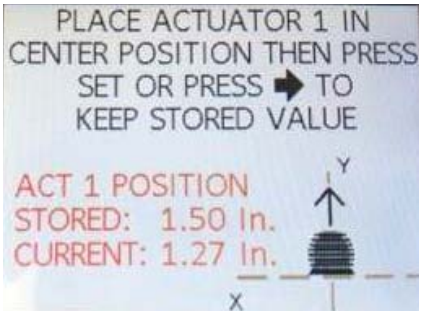
In each setting screen both the stored value and the current actuator position are shown on the display.

Push <SET> to store the current position into this parameter or press → arrow button to keep stored value. The receiver will automatically move to the next setting.

For example, if you selected ACTUATOR 1, the first screen will be for the center position. Before pressing <SET>, move the ACTUATOR 1 Handle back and forth. The displayed position, shown in inch, should change. If not, the wrong actuator is connected to this connection, or the actuator is not functioning correctly. Try the other handles to see if the one of the other handles control the displayed position. If so, swap the actuator locations or re-ID

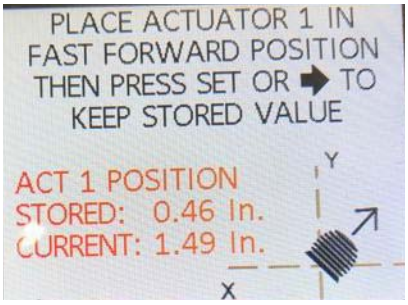
the actuators. If no handle controls the position, make sure the actuators are linked to the valves.

If the ACTUATOR 1 handle can change the position on the display, center the handle. It should be about 1.5 inch. Note that the actuator total travel is 3 inch; therefore 1.5 is the center position. If it is not close, adjust the linkage to the valve handles and push <SET>.



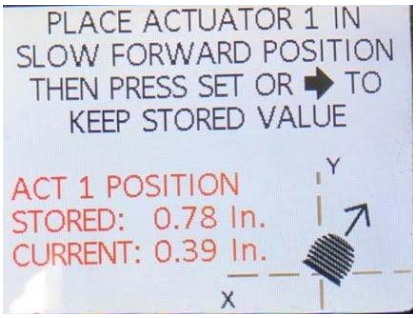
Center Calibration Screen

The next screen will be to set the Fast Forward. Push the ACTUATOR 1 Handle all the way in the direction for Forward. Hold it there and push <SET>.



Fast Forward Calibration Screen

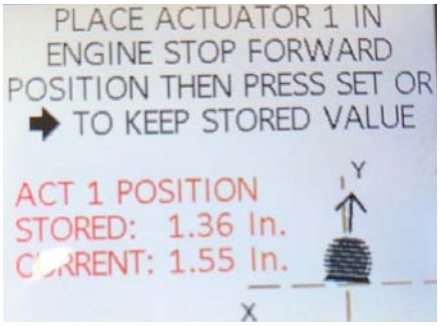
Next the Slow Forward needs to be set. Hold the ACTUATOR 1 Handle in the position for slow Forward, and press <SET>.



Slow Forward Calibration Screen

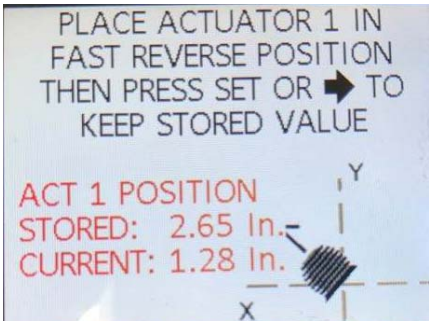
The next screen will be to set the Engine Stop Position for Forward. Hold the ACTUATOR

1 Handle in the position that you want the Engine to be stopped and push <SET>.



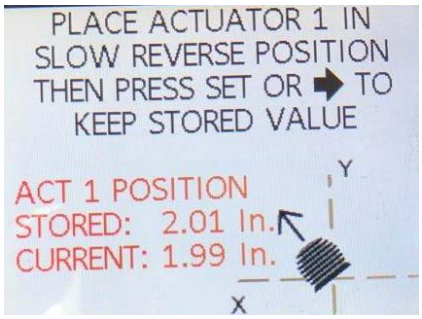
Engine Stop Forward Calibration Screen

The next screen will be to set the Fast Reverse. Push the ACTUATOR 1 Handle all the way in the direction for Reverse. Hold it there and push <SET>.



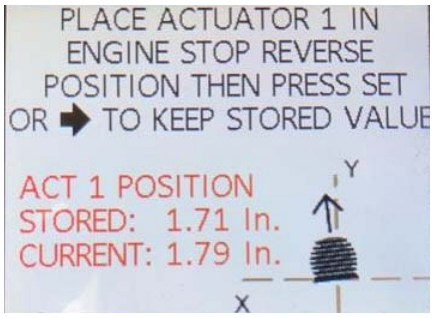
Fast Reverse Calibration Screen

Next the Slow Reverse needs to be set. Hold the ACTUATOR 1 Handle in the position for slow Reverse, and push <SET>.



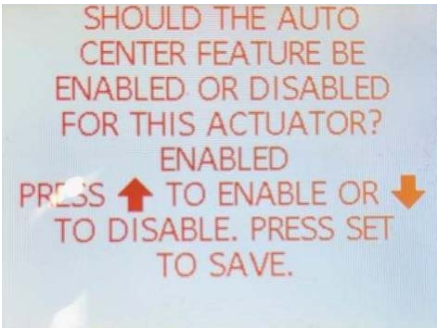
Slow Reverse Calibration Screen

The next screen will be to set the Engine Stop Position as described above for Reverse. Hold the ACTUATOR 1 Handle in this position, and push <SET>.



Engine Stop Reverse Calibration Screen

The next screen lets you Enable or Disable the Auto Center feature for ACTUATOR 1. Push ↑ and ↓ arrow buttons to toggle between ENABLE and DISABLE.



Auto Center Calibration Screen

The final step in calibrating the ACTUATOR 1 function is to save the settings or if you don't want to save them, just escape. Push <SET> to save settings or press <ESC> to quit and the settings will revert back to the previous settings.

If you push <SET> the controller will automatically return to the Actuator Setup Main Screen so you can select the next actuator.

Repeat this procedure for all the enabled actuators. If this is the only actuator that requires calibration or to exit calibration keep pressing the ← arrow button. The Actuator calibration is now complete. Make sure crane works properly with remote before delivery.

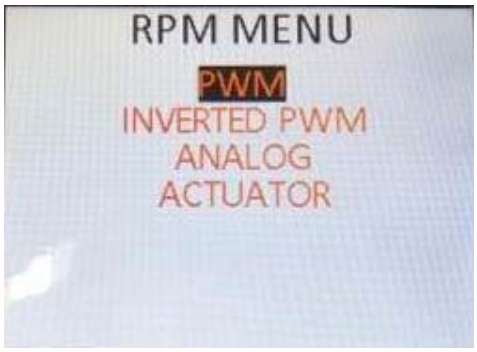
RPM CALIBRATION

PLEASE NOTE: THE KAR-TECH CAN RANGER CAN BE CONFIGURED TO PROVIDE MANY DIFFERENT TYPES OF RPM SIGNALS. MAKE SURE THE SYSTEM IS CONFIGURED FOR THE CORRECT TYPE OF OUTPUT FOR YOUR ENGINE.

The CAN Ranger is calibrated at the factory for Cummins engine. Refer to appendix B for factory setting parameters.

Using the buttons on the CAN Ranger Receiver, navigate through the LCD screens to CALIBRATION. Push <SET>. Use the arrow buttons to enter the password 1262. Then press the ↓ arrow button twice and press <SET>.

RPM Menu Screen 1



RPM Menu Screen 2

Scroll until you get the type of RPM you want. The options are:

Caterpillar

Cummins

International

Mercedes

Bump Throttle

Cruise Control

On Off Throttle

PWM

Inverted PWM

Analog

Actuator

Press the ← arrow button if you don't want to change the RPM setting and return to Calibration Menu or press

<SET> to select and save.

Caterpillar, Cummins, International, and Mercedes all have pre-set configurations and settings. If you have one of these engines, pick the appropriate one. Then you can fine tune the settings to match what your vehicle needs. The parameters are MINIMUM RPM (Idle), MAXIMUM RPM (Full throttle) and for Caterpillar, FREQUENCY.

Bump Throttle sends a pulse to ECM through RPM+ output which increments the engine RPM to the next sequential setting. These are set in the engine, not in the Ranger III unit.

Cruise Control and **On Off Throttle** use 2 On/Off outputs (Floating or BATTERY+) for increasing or decreasing the RPM. These outputs will connect BATTERY+ to outputs RPM- and RPM+ when the corresponding buttons are pressed on the transmitter.

Note: If you need sinking signals to your engine, use 2 relays to invert these outputs.

PWM generates a pulse width modulated output with amplitude of BATTERY + on RPM+ output. The percentage of time that it is connected to BATTERY+ is the Duty Cycle. The engine should have a pull-down resistor in its input. The parameters are MAXIMUM PWM (Full throttle), MINIMUM PWM (Idle) and FREQUENCY.

INVERTED PWM generates a sinking pulse width modulated output that is either

connected to ground or is open on RPM+ output. The percentage of time that it is connected to ground is the Duty Cycle. The engine should have a pull-up resistor in its input. The parameters are MAXIMUM PWM (Full throttle), MINIMUM PWM (Idle) and FREQUENCY.

Analog generates a DC voltage that varies to change the engine's RPM on Analog output. The parameters are MAXIMUM RPM (Full throttle), and MINIMUM RPM (Idle).

To change parameters, use the ← and → buttons to change digits. Use the ↑ and ↓ buttons to change the selected digit's value. Press <SET> to save.

Actuator uses a CAN Actuator to control the throttle. For example it may pull a cable connected to the accelerator pedal. Follow the steps on the Display to set the Idle and Max RPM positions. When using the transmitter to set up the RPM actuator, the RPM+ and RPM- buttons move the RPM actuator out and in, by a certain step. The step size is small when the SPEED switch is in the SLOW position. The step size is larger when the SPEED switch is in the FAST position. If not using the transmitter to calibrate the RPM Actuator, just physically move the actuator into the Idle and Max RPM positions when instructed.

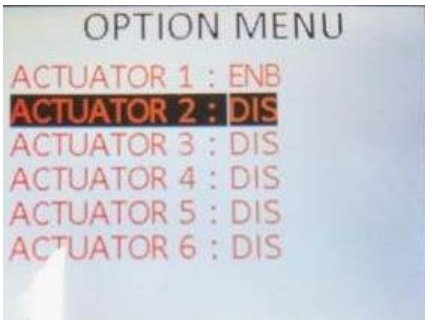
Use the ← arrow button to return to Calibration Menu or <MENU> button to return to

the Main Menu.

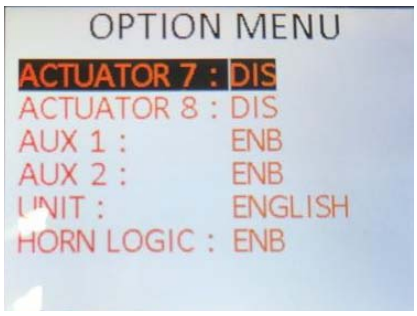
Note: If you return to the same RPM type that is currently saved, the parameters will be as they are currently set. If you change from one type of RPM to another, the parameters will revert to the default settings.

OPTION SETUP

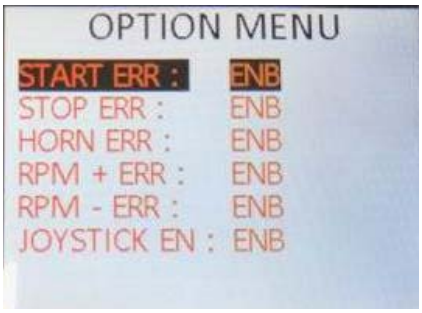
Using the buttons on the CAN Ranger Receiver, navigate through the LCD screens to CALIBRATION. Press <SET>. Use the arrow buttons to enter the password 1262. Then press the ↓ arrow button three times and press <SET> to get to the OPTION SETUP screen:



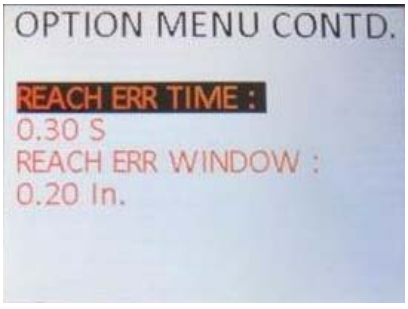
Option Menu First Screen



Option Menu Second Screen



Option Menu Third Screen



Option Menu Fourth Screen

Use ↑ or ↓ arrow buttons to scroll through the options. Press <SET> when on desired option then use ↑ or ↓ arrow buttons to change setting. Press <SET> again to save.

The ACTUATORS 1-8 can either be disabled or enabled.

For Aux 1 you can select between ENABLE, DISABLE, and JYSTK SET 2. If your machine has more than four actuators you want to select JYSTK SET 2. This will disable the AUX 1 output. Then when AUX 1 is pressed on the transmitter the joysticks will operate actuators 5-8. Release the AUX 1 button to operate actuators 1-4 again. Otherwise enable or disable it. When you have made your selection, press <SET>.

For AUX 2 (LIGHTS) you can select between DISABLE, ACT3, and ENABLE functions. These functions are for the Auxiliary 2 toggle switch on the transmitter and the Auxiliary 2 output on the receiver. When ACT3 is selected, you must be operating this actuator in order to turn on the AUX 2 (LIGHTS) output. Otherwise enable or disable it. If you leave it enabled but do not have the feature, you will get an error indicating that there is an output error. No damage will occur. When you have made your selection, press <SET>.

Next is the Units setup. Use ↑ or ↓ to toggle between ENGLISH and METRIC for the actuator diagnostic screens. When you have selected the

units of measurement you want, press <SET> again.

Next is the HORN LOGIC setup.

WARNING: Per ANSI standards, it is the responsibility of the operator to press horn to operate the crane. This feature is factory enabled to make sure the operator pushes horn before operating the crane. Disabling this function will leave the responsibility solely on trained crane operator.

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the HORN LOGIC. When Enabled, the HORN button needs to be pushed, along with an ENABLE button for 1 second before any joystick functions can be activated. This needs to be repeated if no joystick functions are operated for more than 1 minute. If Disabled, only the ENABLE button needs pressing to activate joystick functions. The default is Enabled.

Next is the enabling or disabling of the following outputs error codes: START, STOP, HORN, RPM+, and RPM-. Use ↑ or ↓ to toggle between ENABLE or DISABLE for the output's error code. When Enabled, the receiver's red LED will blink an error if it detects a problem with that output. When it is Disabled, the receiver's red LED will not blink an error if it detects a problem with the output.

Next is Joystick Enable setup. Use ↑ or ↓ to toggle between ENABLE or DISABLE for the JOYSTICK ENABLE LOGIC. When Enabled, the ENABLE button needs to be pushed for

1 second before any joystick functions can be activated and then continually pressed. If Disabled, the ENABLE button needs to be pushed for 1 second before any joystick functions can be activated. This needs to be repeated if no joystick functions are operated for more than 15 seconds. The default is Enabled.

Lastly the two Reach Error parameters need to be set. The CAN Actuators will detect when they either cannot move to their commanded position, or if something moves them away from their commanded position. The CAN Actuators will fight against this external force for REACH ERR TIME. If the CAN Actuator is more than REACH ERR WINDOW distance from the commanded position for more than REACH ERR TIME, the CAN Actuator will turn off its clutch and motor. The corresponding joystick needs to be centered and then activated again for the CAN Actuator to try to move again.

Use <SET> to select TIME or WINDOW. Use ← and → to select the digit and ↑ or ↓ to increase and decrease the selected digit. Push <SET> when you are done to save. Use the ← arrow button to return to Calibration Menu or <MENU> button to return to the Main Menu.

FACTORY SETTING

The **FACTORY SETTING** Menu lets you reset all the settings back to the factory default values. These include

RPM setup, options, and actuator calibration. Press <SET> to return the system back to the factory settings. Use the ← arrow button to return to Calibration Menu or <MENU> button to return to the Main Menu.

Factory Settings Screen

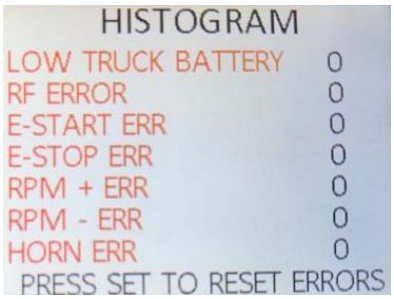
HISTOGRAM

The **HISTOGRAM** Menu lets you check the errors. You can check on just the active errors, all the errors, or clear the error counts. Press <SET> to reset the error code count.

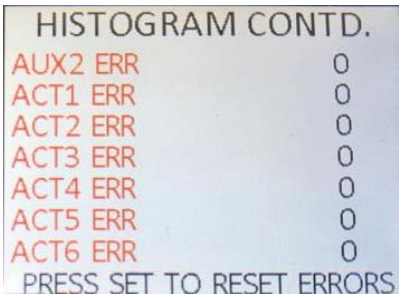
Histogram Password Screen

The password is 1262. To enter the password, use the → button to change which digit you are changing. Use ↑ to increase the selected digit or ↓ to decrease it. Use <MENU> button to back out of this screen and return to the Main Menu. Once you have changed all 4 digits, push <SET>.

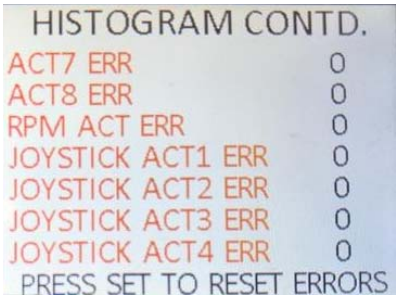
The histogram screens are below. Use the ← and → arrow buttons to scroll through the screens. Use the ← arrow or <MENU> button to return to the Main Menu.



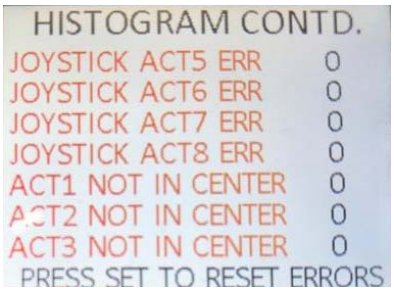
Histogram Screen 1



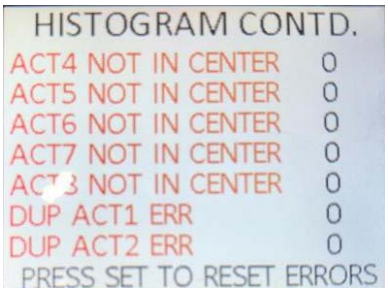
Histogram Screen 2



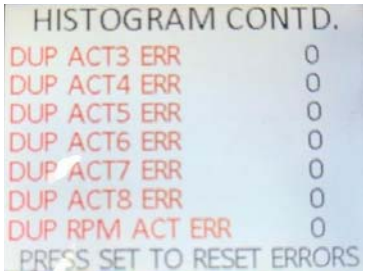
Histogram Screen 3



Histogram Screen 4



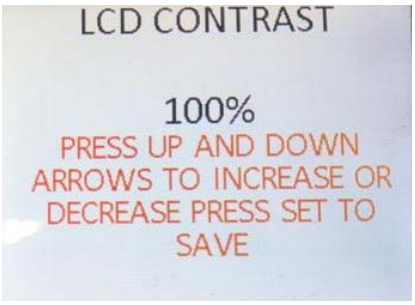
Histogram Screen 5



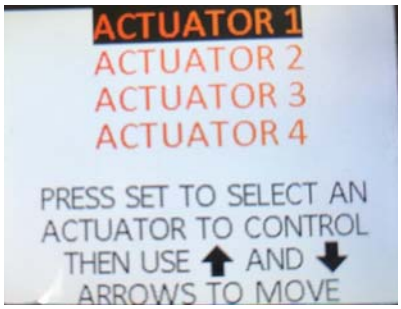
Histogram Screen 6

LCD CONTRAST

The **LCD CONTRAST** Menu lets you adjust the LCD Contrast. Press ↑ and ↓ arrow buttons to increase or decrease the contrast and press <SET> to save. Use the ← arrow or <MENU> button to return to the Main Menu without saving.



LCD Contrast Screen



Local Operation Screen

LOCAL OPERATION

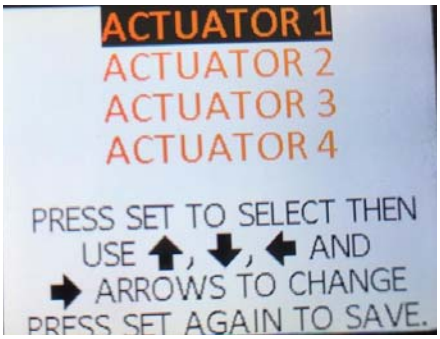
The **LOCAL OPERATION** Menu lets you use the Receiver's buttons to manually control the actuators. This option is used for equipment without manual override valve handles.

Use the <SET> button to select the actuator you would like to control. Use the ↑ and ↓ arrows to extend and retract the actuator. Use the ← arrow or <MENU> button to return to the Main Menu.

SET ACTUATOR NAME

The **SET ACTUATOR NAME** Menu lets you change the actuator names from the default names to a unique name. This name can be up to 10 characters long. To enter the name, use the → button to change which letter you are changing. Use ↑ and ↓ to change the selected letter. Make the unused characters _ this will delete the rest of the characters and center the name. Once you have the name you desire, push <SET>. Use the ← arrow or <MENU> button to return to the Main Menu when

complete.



Set Actuator Name Screen

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:**

For Compact

1. Turn the transmitter and receiver off
2. Push the E-stop button and press & hold HORN button then turn the key switch to on
3. Keep holding button for >10 seconds then release the button and E-stop
4. LEDs should blink at this point
5. Apply power to the receiver. Only the green

LED should start to blink on transmitter

6. Teach complete

For Mega

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
3. Release POWER button
4. Apply power to the receiver and press any switch. Only the green LED should start to blink on 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:

For Compact

1. Make sure transmitters and receivers are off
2. On transmitter A, press and hold LIGHTS, HORN and RPM PLUS buttons. Press the E-stop button then turn on the transmitter. Hold buttons for 3 seconds then release LEDs should blink at this point.
3. On transmitter B, press and hold AUX 1, HORN

and RPM PLUS buttons. Press the E-stop button then turn on the transmitter. Hold buttons for 3 seconds then release LEDs should blink at this point.

4. Wait for a few seconds until the green LED only starts to blink on transmitter A and transmitter B.
5. Turn off both transmitters
6. Synchronize one of the transmitters

For Mega

7. Make sure transmitters and receivers are off
8. On transmitter A, press and hold AUX 2, HORN and RPM PLUS buttons then power on transmitter. Hold buttons for 3 seconds then release LEDs should blink at this point.
9. On transmitter B, press and hold AUX 1, HORN and RPM PLUS buttons then power on transmitter. Hold buttons for 3 seconds then release LEDs should blink at this point.
10. Wait for a few seconds until the green LED only starts to blink on transmitter A and transmitter B.
11. Turn off both transmitters
12. 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:

For Compact and Mega

1. Make sure the receiver and transmitters are OFF
2. Press and hold AUX 2/LIGHTS, HORN, AND RPM MINUS buttons then turn on the transmitter. Hold buttons 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 transmitter is designed with a smart battery charger. The Compact's battery can be charged by plugging the AC wall charger or DC cigarette charger into the port. Red and green LED indicators near the charging port on 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. The Mega's battery can be charged by placing it on the charger pad. The green and red LED indicators will then 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 or alphanumeric display on the receiver module *or* the HISTOGRAM page on the receiver.

The RPM outputs can be used as either ON/OFF (RPM +/-), or variable RPM for connection to ECM. Analog RPMs provided are: PWM, inverted PWM or DC voltage output. There are preset parameters for different type of engines (i.e. Cummins engine) under RPM calibration.

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.

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 to attach it in a vertical manner with the connectors facing down. 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 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.

The main power to the receiver should be connected through a switched, fused line capable of a minimum of 20 amps. For best results, connect power (+) to the receiver via an auxiliary terminal of the ignition switch, PTO switch, or ignition relay. Be sure that the ground (-) is connected securely to the chassis or battery with a star washer which digs into the base metal to insure good contact.

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 UPDATING USING ON BOARD GATE:

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 update the system.

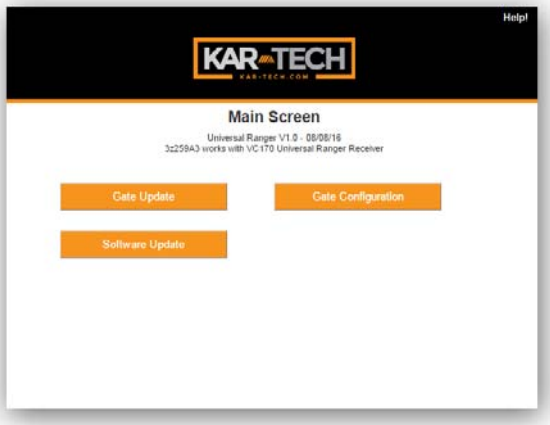
ACCESSING THE CONTROL PANEL

1. Turn on the power to the receiver.
2. Use your device and look for the available Wi-Fi networks. A network under the name of “KTUNIVRANGER” should be available at this point. Connect to the network, the password is 3B2599A1.
3. Once the connection is established, open a web browser on your device. Kar-Tech recommends using the Firefox browser.

4. Enter the address http://192.168.1.1 in the address bar. The receiver's red LED will blink rapidly when pages are operated for Wi-Fi connected indication.

Address Bar

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



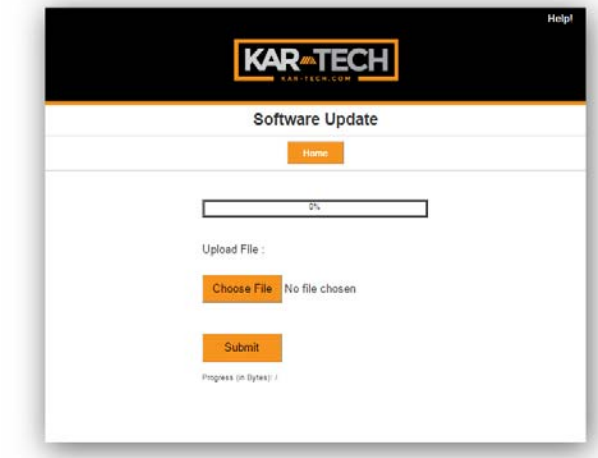
Main Screen

SOFTWARE UPDATE

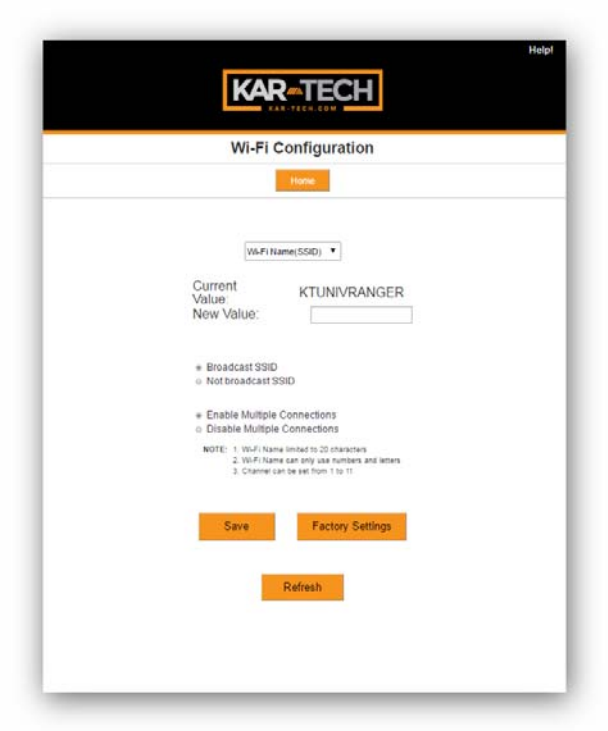
Use the Choose File button to select new software on your device with which to program the receiver. Kar-Tech will have provided software in the .kar format. Once the file is selected, press the SUBMIT button to upload the file.

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.



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.

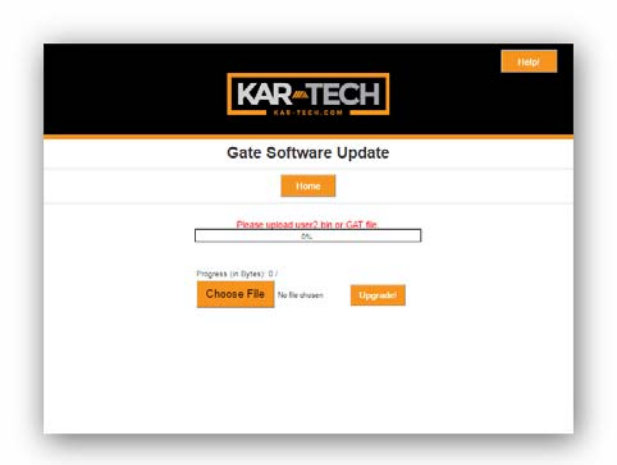
If Enable Multiple Connections is selected, multiple connections up to 4 devices could be connected to the GATE. However, only one of the connected devices can use the GATE. If Single connection is enabled, only one device can be connected to the GATE.

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



Gate Update Page

1. Choose File then press Update
2. Percent will go from 0-100% then the gate will reboot

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

WIRING

CONNECTOR, DT06-4S-E

PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
3	WHITE	CAN HIGH
4	GREEN	CAN LOW

CONNECTOR, DT06-4S-E

PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
3	WHITE	CAN HIGH
4	GREEN	CAN LOW

CONNECTOR, DT06-4S-E

PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
3	WHITE	CAN HIGH
4	GREEN	CAN LOW

CONNECTOR, DT06-4S-E

PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
3	WHITE	CAN HIGH
4	GREEN	CAN LOW

COLOR	DESCRIPTION
RED	POWER (9-30V)
BLACK	GROUND
BLUE	START OUTPUT
ORANGE	STOP OUTPUT
WHITE	RPM + OUTPUT/PWM FOR ECM
GREEN	RPM - OUTPUT
RED/BLACK	ANALOG OUTPUT FOR ECM
BLUE/BLACK	HORN OUTPUT
ORANGE/BLACK	AUX 1 SINKING OUTPUT
GREEN/BLACK	AUX 2/LIGHTS OUTPUT

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 CAN RANGER III 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
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
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

ERROR CODE	PROBABLE CAUSE
1	RF COMMUNICATION ERROR
2	LOW VOLTAGE
3	ENGINE START OUTPUT ERROR
4	ENGINE STOP OUTPUT ERROR
5	RPM PLUS OUTPUT ERROR
6	RPM MINUS OUTPUT ERROR
7	HORN OUTPUT ERROR
8	AUX 2/LIGHTS OUTPUT ERROR
9	ACTATOR 1 ERROR
10	ACTUATOR 2 ERROR
11	ACTUATOR 3 ERROR
12	ACTUATOR 4 ERROR
13	ACTUATOR 5 ERROR
14	ACTUATOR 6 ERROR
15	ACTUATOR 7 ERROR
16	ACTUATOR 8 ERROR
17	RPM ACTUATOR ERROR
18	JOYSTICK ACTUATOR 1 ERROR
19	JOYSTICK ACTUATOR 2 ERROR
20	JOYSTICK ACTUATOR 3 ERROR
21	JOYSTICK ACUTATOR 4 ERROR
22	JOYSTICK ACTUATOR 5 ERROR
23	JOYSTICK ACTUATOR 6 ERROR
24	JOYSTICK ACTUATOR 7 ERROR
25	JOYSTICK ACTUATOR 8 ERROR
26	ACTUATOR 1 NOT IN CENTER ERROR
27	ACTUATOR 2 NOT IN CENTER ERROR
28	ACTUATOR 3 NOT IN CENTER ERROR
29	ACTUATOR 4 NOT IN CENTER ERROR
30	ACTUATOR 5 NOT IN CENTER ERROR
31	ACTUATOR 6 NOT IN CENTER ERROR
32	ACTUATOR 7 NOT IN CENTER ERROR
33	ACTUATOR 8 NOT IN CENTER ERROR
34	DUPLICATE ACTUATOR 1 ERROR
35	DUPLICATE ACTUATOR 2 ERROR

36	DUPLICATE ACTUATOR 3 ERROR
37	DUPLICATE ACTUATOR 4 ERROR
38	DUPLICATE ACTUATOR 5 ERROR
39	DUPLICATE ACTUATOR 6 ERROR
40	DUPLICATE ACTUATOR 7 ERROR
41	DUPLICATE ACTUATOR 8 ERROR
42	DUPLICATE RPM ACTUATOR ERROR

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) or 21V (24V system)

3-8 Short or open load/coil on output

9-17 Problem occurred with this actuator

18-25 No voltage present on joystick in transmitter

26-33 Actuator is not in center position

34-42 Duplicate ID found for that actuator

PARTS LIST

PART NUMBER	*DESCRIPTION*
3B2592B	MEGA RADIO TRANSMITTER
3B259CA	COMPACT RADIO TRANSMITTER
3B2593A	RADIO RECEIVER
1A0014C	CAN ACTUATOR, 3” 90lb
3B1908A	ACTUATOR EXPANSION CABLE
3B087MA	LINKAGE KIT, UNIVERSAL – 4 ACTUATORS
1A0018A	LINKAGE KIT, UNIVERSAL – 1 ACTUATORS
B20032B	FAST CHARGER SUPPLY, 12 VDC CAR
B20072A	FAST CHARGER SUPPLY, 110VAC WALL
B20223A	WALL MEGA CHARGER PAD/110-240VAC
B20222A	CAR MEGA CHARGER PAD/12-24VDC

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

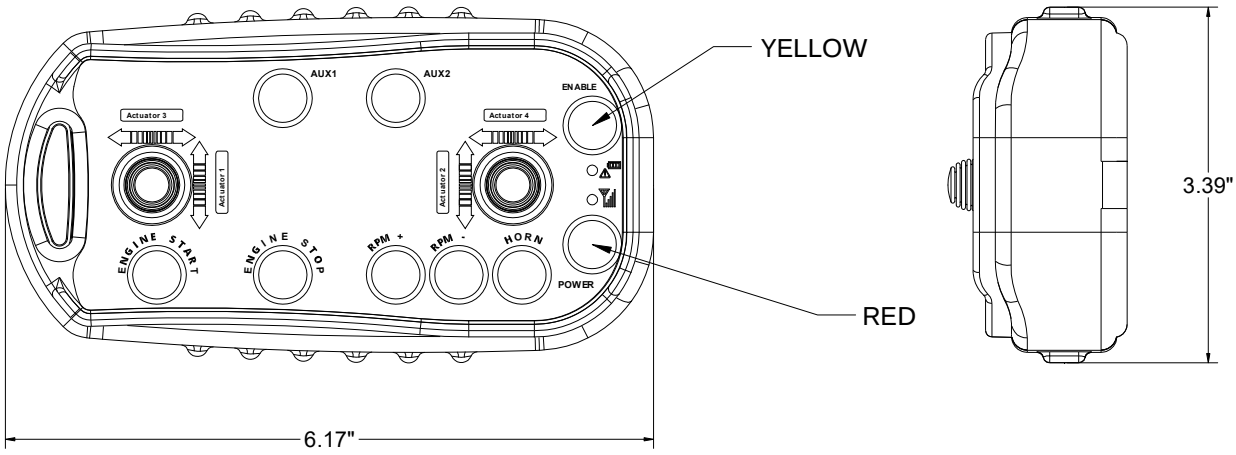
Note: For operation with negative ground systems only.

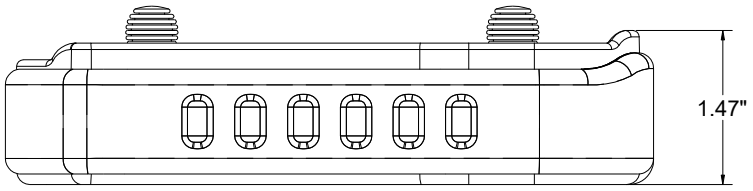
WARNING:

The CAN RANGER III 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.

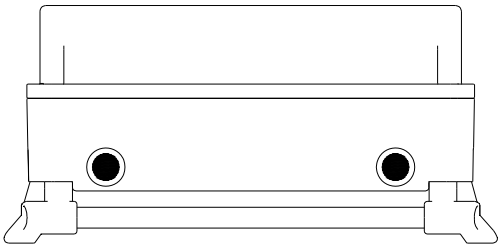
TRANSMITTER PICTORIAL
3B2592B

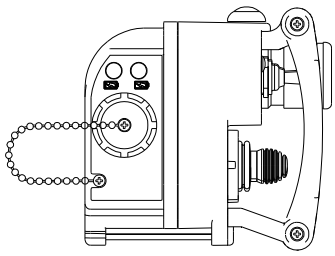


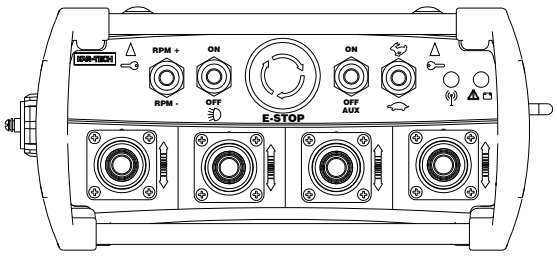


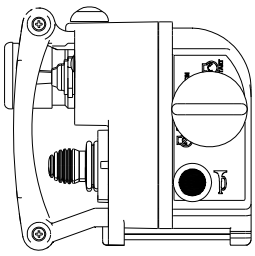
CAN RANGER III

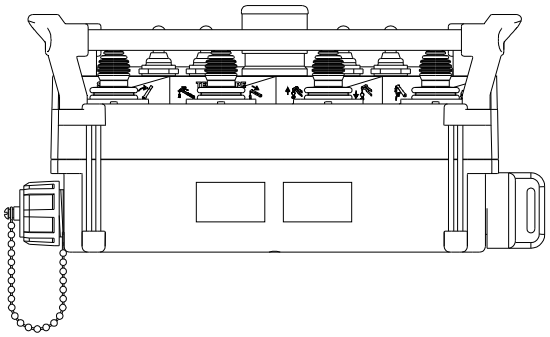
3B259CA



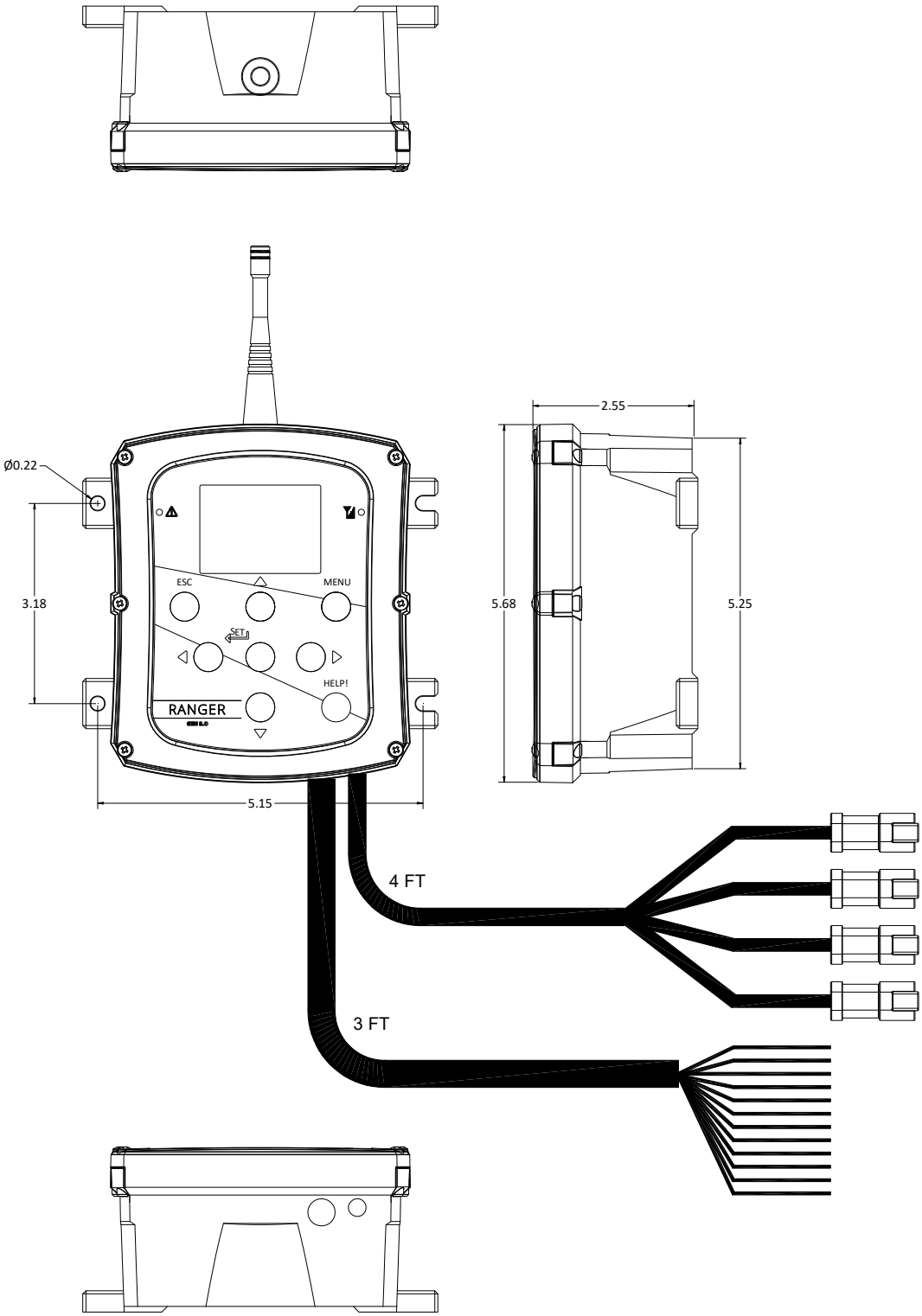




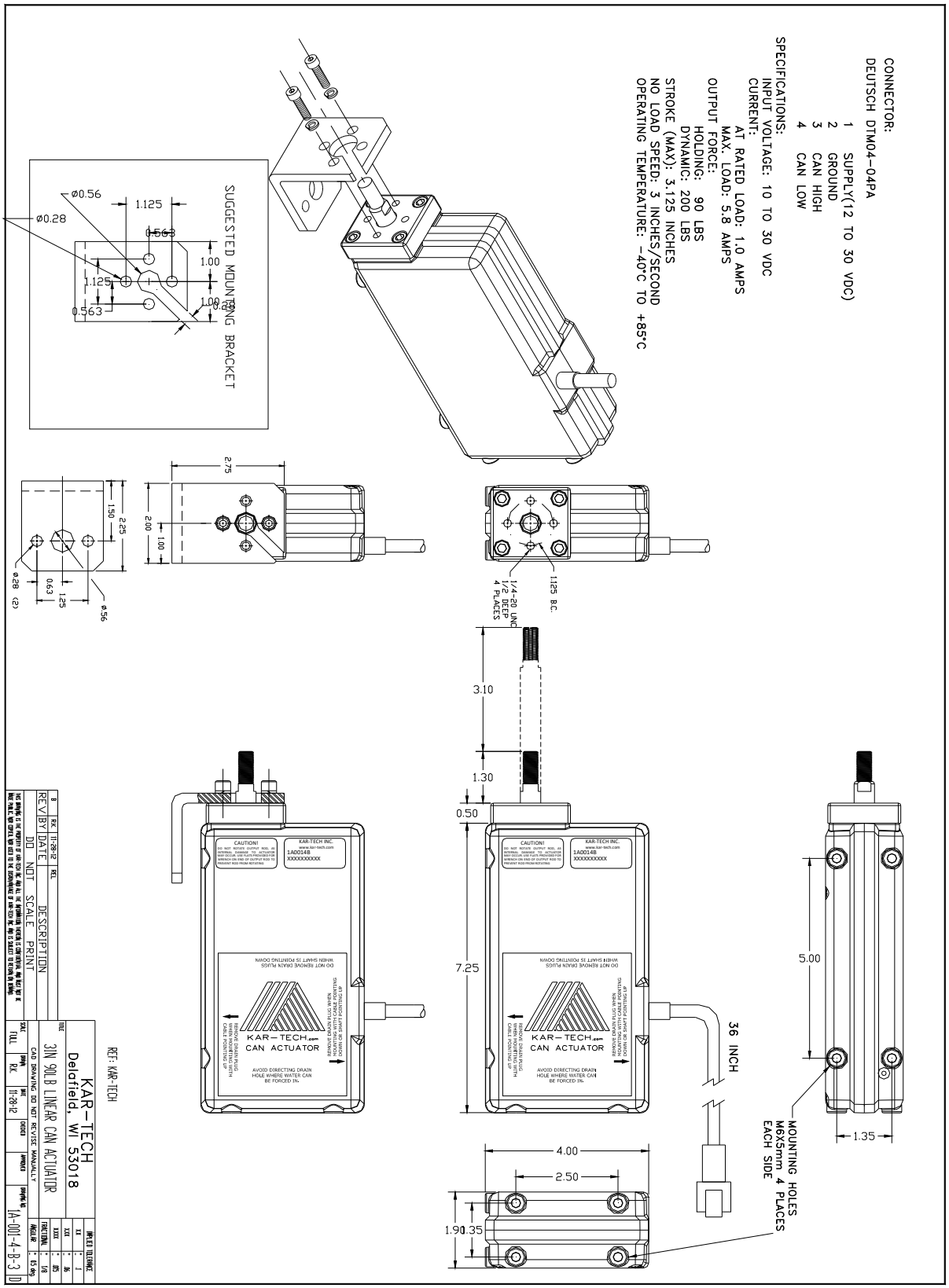




RECEIVER PICTORIAL



ACTUATOR PICTORIAL



SPECIFICATIONS

FCC ID: P4U-MOD164

Industry Canada Certification Number: 4534A-MOD164

EQUIPMENT CLASS: PART 15 SPREAD SPECTRUM TRANSMITTER

TRANSMITTER

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) ..... 100 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

Outputs ..... 5.0A max each, sourcing, 20A system 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.

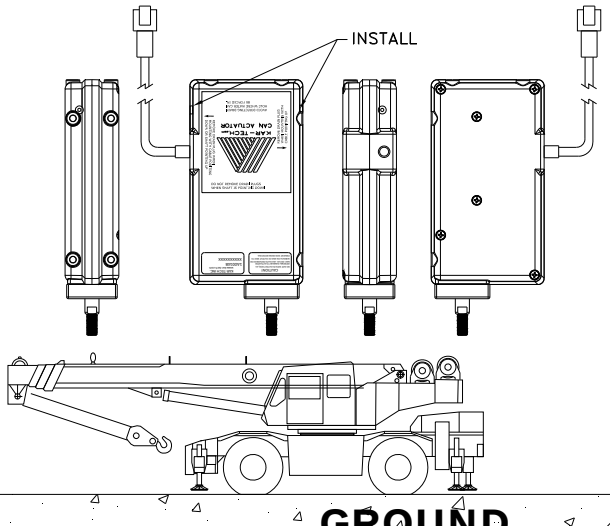
* Consult the dealer or an experienced radio/TV technician for help.

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.

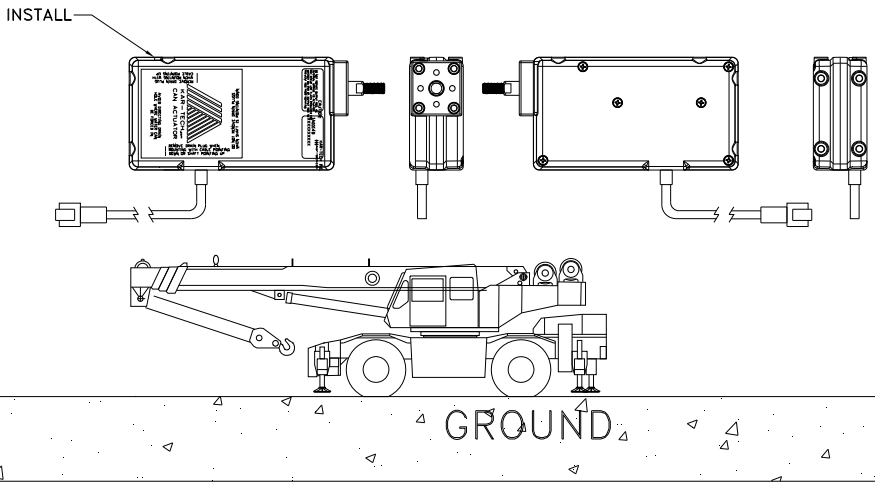
Appendix A

USE THE FOLLOWING INSTRUCTION TO REMOVE DRAIN PLUGS TO ALLOW MOISTURE TO EXIT OR INSTALL DRAIN PLUGS WHERE FLUIDS CAN ENTER THROUGH THE DRAIN HOLES. SHIELD DRAIN HOLES IF IT IS DIRECTED WHERE FLUIDS CAN BE FORCED IN.

WHEN MOUNTING WITH SHAFT DOWN, INSTALL BOTH DRAIN PLUGS

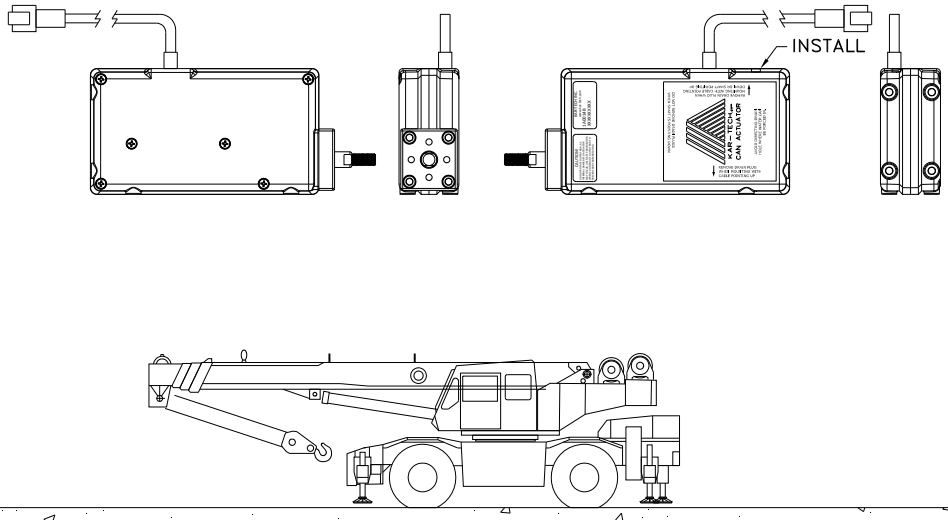


WHEN MOUNTING WITH SHAFT HORIZONTAL AND CABLE DOWN, INSTALL ONE DRAIN PLUG AS SHOWN

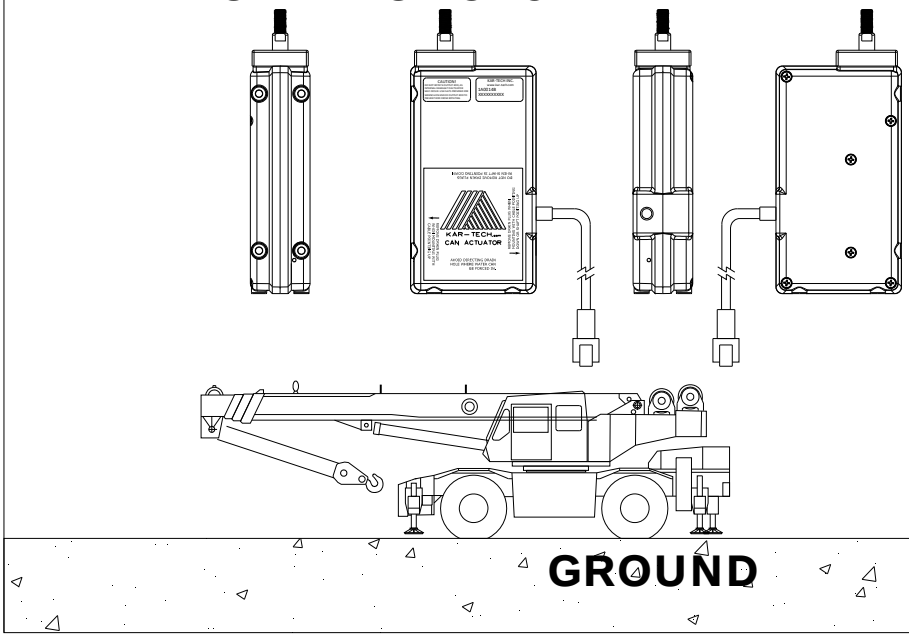


Appendix A

WHEN MOUNTING WITH SHAFT HORIZONTAL AND CABLE UP, INSTALL ONE DRAIN PLUG AS SHOWN



WHEN MOUNTING WITH SHAFT UP, REMOVE DRAIN PLUG WHICH IS NOT IN DIRECTION OF WATER GETTING FORCED IN.



Appendix B

CRANE MANUFACTURER	
CRANE MODEL	
CRANE SERIAL NUMBER	

	Factory setting	New setting
SWING CCW FAST POSITION	1	
SWING CCW SLOW POSITION	1.2	
SWING CCW ENGINE STOP POSITION	1.4	
SWING CENTER	1.5	
SWING CW ENGINE STOP POSITION	1.6	
SWING CW SLOW POSITION	1.8	
SWING CW FAST POSITION	2	
AUTO RETURN TO CENTER	ENABLE	

BOOM EXTEND FAST POSITION	1	
BOOM EXTEND SLOW POSITION	1.2	
BOOM EXTEND ENGINE STOP POSITION	1.4	
BOOM TELESCOPE CENTER	1.5	
BOOM RETRACT ENGINE STOP POSITION	1.6	
BOOM RETRACT SLOW POSITION	1.8	
BOOM RETRACT FAST POSITION	2	
AUTO RETURN TO CENTER	ENABLE	

WINCH DOWN FAST POSITION	1	
WINCH DOWN SLOW POSITION	1.2	
WINCH DOWN ENGINE STOP POSITION	1.4	
WINCH CENTER	1.5	
WINCH UP ENGINE STOP POSITION	1.6	
WINCH UP SLOW POSITION	1.8	
WINCH UP FAST POSITION	2	
AUTO RETURN TO CENTER	ENABLE	

BOOM DOWN FAST POSITION	1	
BOOM DOWN SLOW POSITION	1.2	
BOOM DOWN ENGINE STOP POSITION	1.4	
BOOM CENTER	1.5	
BOOM UP ENGINE STOP POSITION	1.6	
BOOM UP SLOW POSITION	1.8	
BOOM UP FAST POSITION	2	
AUTO RETURN TO CENTER	ENABLE	

	Factory Settings	New Settings
BOOM 2 DOWN FAST POSITION	1	
BOOM 2 DOWN SLOW POSITION	1.2	
BOOM 2 DOWN ENGINE STOP POSITION	1.4	
BOOM 2 CENTER	1.5	
BOOM 2 UP ENGINE STOP POSITION	1.6	
BOOM 2 UP SLOW POSITION	1.8	
BOOM 2 UP FAST POSITION	2	
AUTO RETURN TO CENTER	ENABLE	

BOOM 2 EXTEND FAST POSITION	1	
BOOM 2 EXTEND SLOW POSITION	1.2	
BOOM 2 EXTEND ENGINE STOP POSITION	1.4	
BOOM 2 CENTER	1.5	
BOOM 2 RETRACT ENGINE STOP POSITION	1.6	
BOOM 2 RETRACT SLOW POSITION	1.8	
BOOM 2 RETRACT FAST POSITION	2	
AUTO RETURN TO CENTER	ENABLE	

ENGINE CALIBRATION

ENGINE	CUMMINS	
MINIMUM RPM (Idle)	0.6 V	
MAXIMUM RPM (Full throttle)	3.8 V	
FREQUENCY	N/A	