

CAN RANGER III

RADIO/CAN REMOTE CONTROL SYSTEM

INSTALLATION MANUAL

KAR-TECH
3B2591BK.doc
June 29, 2020
BK

TABLE OF CONTENTS

ACTUATOR ASSEMBLY	3
LOCAL/REMOTE SWITCHES	5
RPM RELAY MODULE	5
CABLES	6
CALIBRATION	9
CAN ACTUATOR ID ASSIGNMENT	9
ACTUATOR CALIBRATION	12
ACTUATOR CALIBRATION USING THE MANUAL HANDLES.....	13
OPTION SETUP	22
FACTORY SETTING.....	26
PARTS LIST.....	26
WIRING	28
TYPICAL ACTUATOR INSTALLATION PICTURES	30
Appendix A	32
Appendix B	33

CAN RANGER III INSTALLATION

Note to installer: To ensure the safety of this system the **ENGINE STOP** must functions properly. After installation and calibration, use transmitter to start the engine then move each valve lever on the crane individually away from the center to ensure that engine stops for each forward and reverse position. Next, press E-stop switch to ensure that engine stops running.

Installation video is available at:

<http://youtu.be/eLeEO1vsB6E>

CONTROL MODULE

1. Loosen the speed knobs on the load sensor module to accommodate the bracket and slide the control module on. Tighten the knobs securely (FIG. 1 & 2)



FIG. 1



FIG. 2

ACTUATOR ASSEMBLY

1. Remove the access panels both above and below the arm holding the load sensor and control module
2. Install or remove Drain plugs per instruction in Appendix A.
3. Mount the actuators to the bracket using the hardware provided
4. Mount the actuator assembly to the turret just above the valve bank using the two holes available and hardware provided (FIG. 3a)
5. Fabricate the linkages used to connect the actuators to the valve control arms from the provided hardware:

CAN RANGER III INSTALLATION

- a. Screw valve rod end to each of the actuators as shown (FIG. 3b)
- b. Attach clevis hardware to each valve rod end (FIG. 3c)
- c. Attach clevis hardware to each control arm tab as above
- d. Be sure each actuator is extended halfway out
- e. Measure and cut the rod to span between clevis ends installed previously
- f. Remove one clevis end from each actuator and install connecting rods and two jam nuts. Make sure the clevis end on both the actuator and the valve rod is lined up to prevent binding.
- g. Use manual control handles and check for proper operation and no binding issues. Tighten up the jam nuts.
- h. Dress cables as shown in FIG. 4
- i. Remove drain plugs per decal instruction.

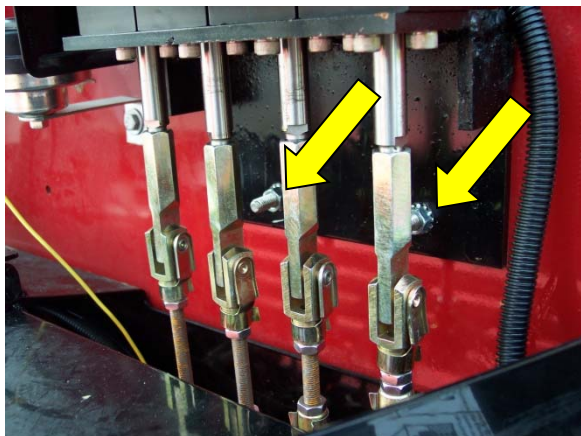


FIG. 3a

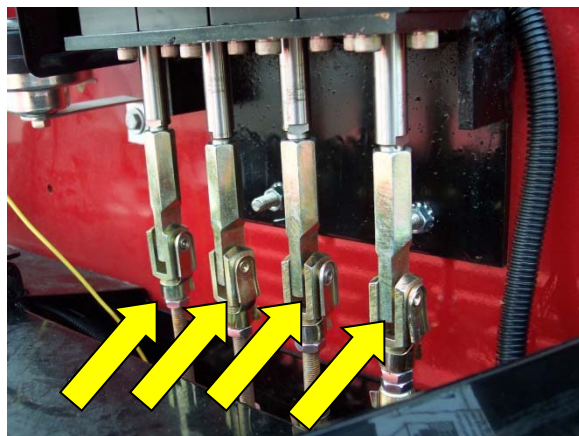


FIG. 3c

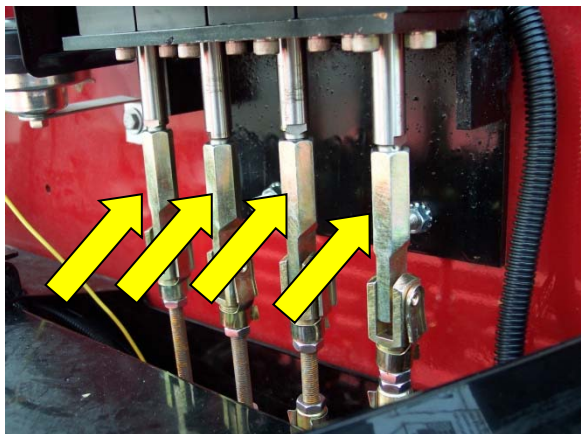


FIG. 3b

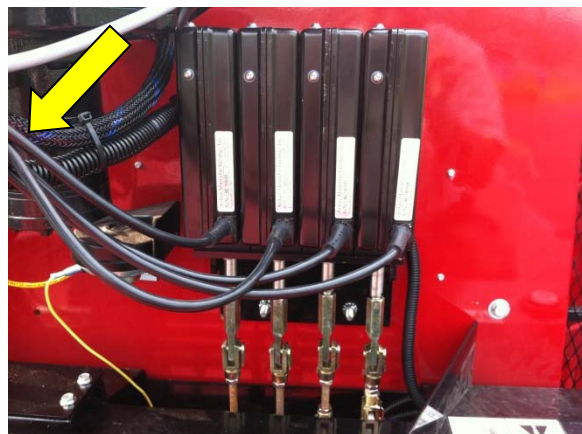


FIG. 4

CAN RANGER III INSTALLATION

LOCAL/REMOTE SWITCHES

1. Remove the switch hole cover on both sides of the operator console and mount a switch as shown by pressing until it is fully seated (FIG. 5)



FIG. 5

RPM RELAY MODULE

1. Remove the driver's side turret access panel
2. Mount the RPM relay module to the right inside wall of the turret on the driver's side as shown using the supplied hardware (FIG. 6)



FIG. 6

CAN RANGER III INSTALLATION

CABLES

NOTE: PLEASE REMOVE PIGTAIL PLUGS FROM REMOTE, BA, and BB CONNECTORS BEFORE PROCEEDING. THESE WILL NOT BE NEEDED IF MATTING CONNECTORS ARE SUPPLIED WITH CRANE HARNESS.

1. Beginning at the lower access panel, feed the main harness with the 6 and 12-position connectors first, behind the valve assembly, around the back of the actuator assembly, and up toward the arm (FIG. 8 & 9)
2. Plug the 6 and 12-position connectors into the control module (FIG. 11). Leave enough slack on the cable so that the arm can pivot freely
3. Pull up the cable with the connector marked CA and route it through the upper hole in the turret (FIG. 10)
4. Connect each of the actuator cables to one of the 4 jacks provided on the Y-cable from the receiver. Loop any extra cable and bundle these neatly, tying them to a convenient point (FIG. 4).

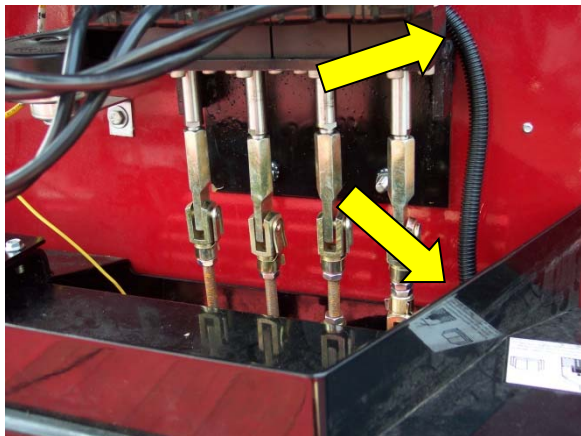


FIG. 8

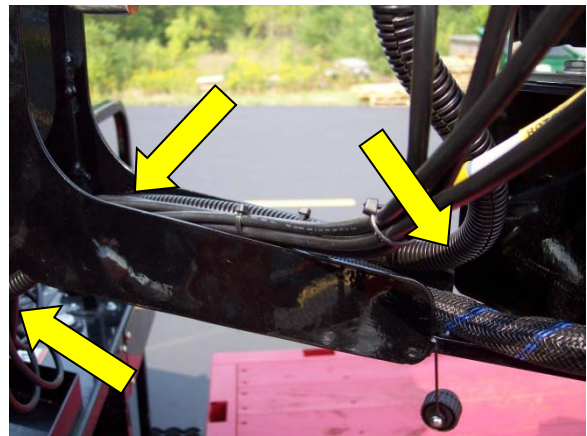


FIG. 9

CAN RANGER III INSTALLATION

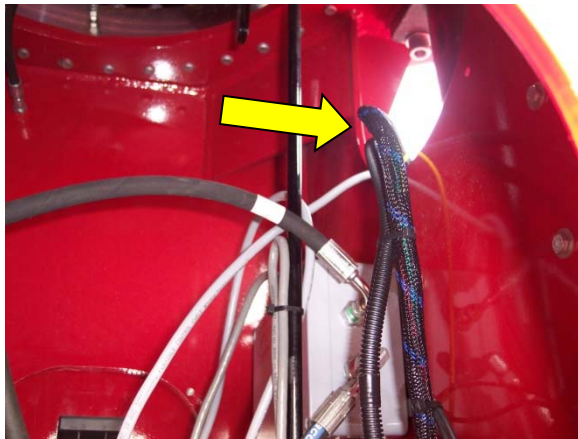


FIG. 10



FIG. 11

CABLES (continued)

5. Route the cable remaining left by the lower access cover with the connector marked REMOTE underneath the passenger side operator console
6. Find the connector available from the truck marked REMOTE CONTROL and plug the connector of the main harness marked REMOTE into it (FIG. 12)
7. While still underneath the passenger side console, plug the red wires exiting near the connector marked REMOTE (with spade terminals) of the main harness into the switch previously installed (FIG. 13) Connect to the two silver colored terminals that are close together
8. Route the remaining cable left by the lower access cover underneath the driver's side operator console, locate the LOCAL/REMOTE switch installed earlier and connect the two red wires as above

CAN RANGER III INSTALLATION

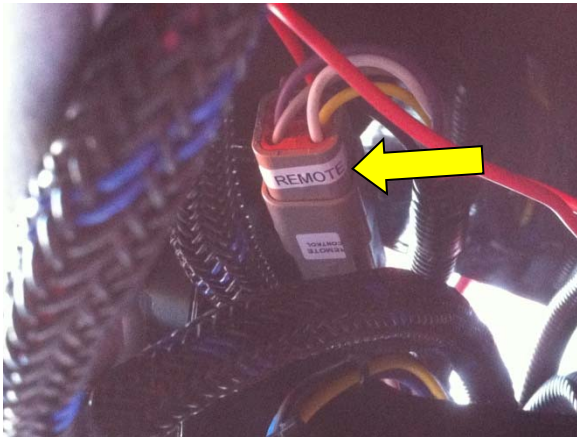


FIG. 12

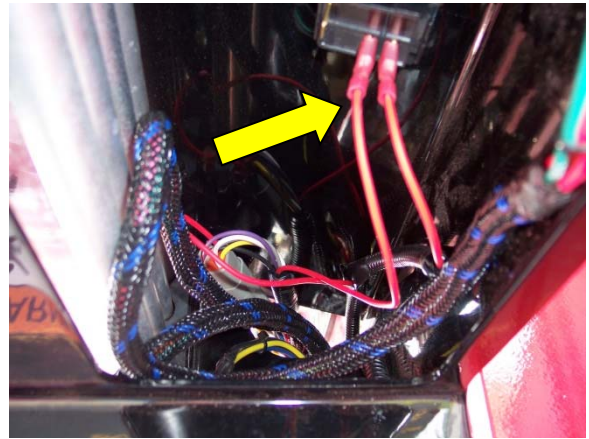


FIG. 13

CABLES (continued)

9. Inside the turret, referring to FIG. 14, locate and disconnect CONN B of the truck harness
10. Into the connector marked CONN B, connect BA from the RPM relay harness installed earlier
11. Into the other connector, plug BB from the RPM relay harness
12. Locate the connector CA previously fed into the turret and plug in CB from the RPM relay into it

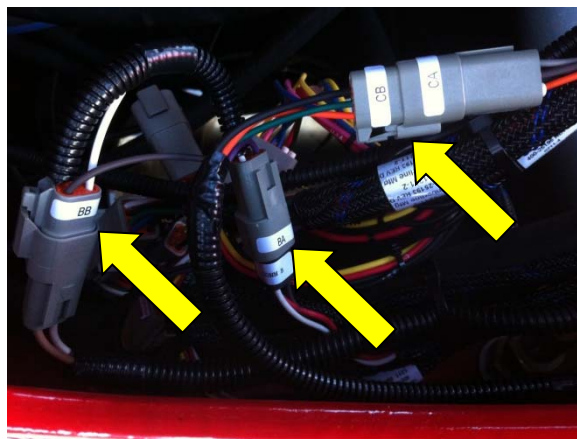


FIG. 14

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

CAN RANGER III INSTALLATION

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.

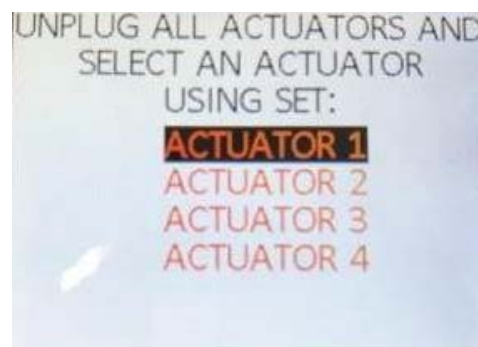
Note: If the receiver ever detects two or more actuators with the same ID, it will stop operation and indicate errors. The receiver tests for this every time it is powered up and continually as it runs.

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.



CAN RANGER III INSTALLATION

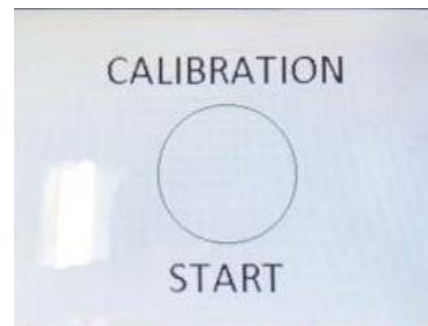
Assign Actuators Main Screen

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:

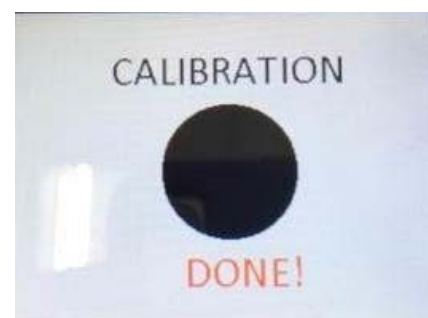


Assign Actuator 1 Screen

After <SET> is pressed:



Calibration Start Screen



Calibration Completed Screen

Things to keep in mind while concerning Actuator IDs:

CAN RANGER III INSTALLATION

- 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

CAN RANGER III INSTALLATION

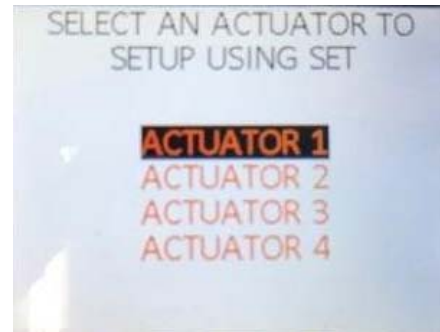
ACTUATOR SETUP

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>:



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

CAN RANGER III INSTALLATION

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

CAN RANGER III INSTALLATION

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

CAN RANGER III INSTALLATION

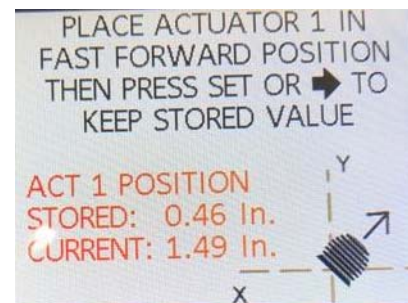
actuator is not functioning correctly. Try the other handles to see if the one of the other handles control the displayed position. If so, swap the actuator locations or re-ID the actuators. If no handle controls the position, make sure the actuators are linked to the valves.

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

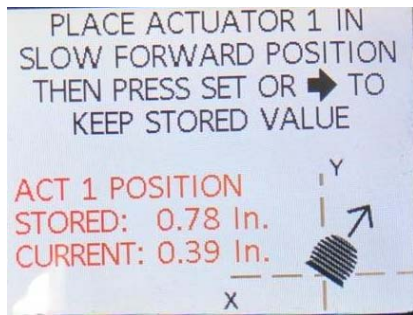
The next screen will be to set the Fast Forward. Push the ACTUATOR 1 Handle all the way in the direction for Forward. Hold it there and push <SET>.



Fast Forward Calibration Screen

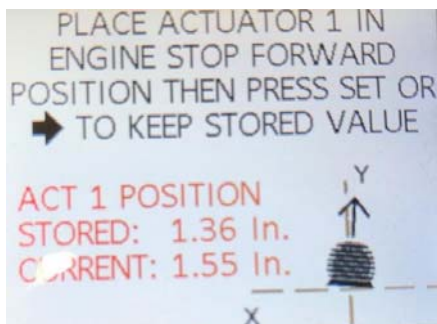
Next the Slow Forward needs to be set. Hold the ACTUATOR 1 Handle in the position for slow Forward, and press <SET>.

CAN RANGER III INSTALLATION



Slow Forward Calibration Screen

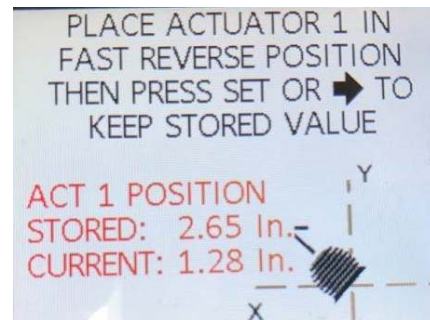
The next screen will be to set the Engine Stop Position for Forward. Hold the ACTUATOR 1 Handle in the position that you want the Engine to be stopped and push <SET>.



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

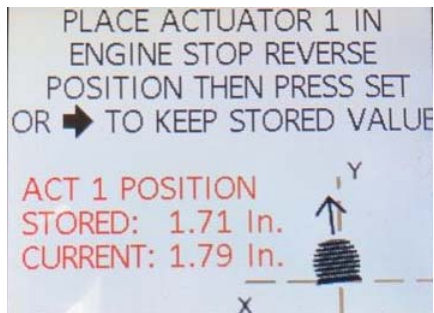
Next the Slow Reverse needs to be set. Hold the ACTUATOR 1 Handle in the position for slow Reverse, and push <SET>.



Slow Reverse Calibration Screen

CAN RANGER III INSTALLATION

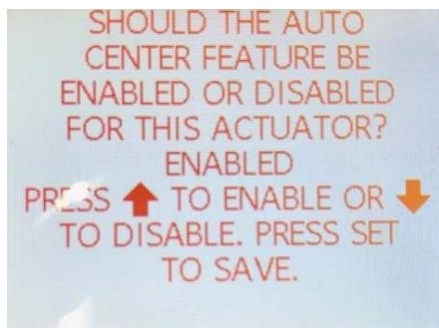
The next screen will be to set the Engine Stop Position as described above for Reverse. Hold the ACTUATOR 1 Handle in this position, and push <SET>.



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.

CAN RANGER III INSTALLATION

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.

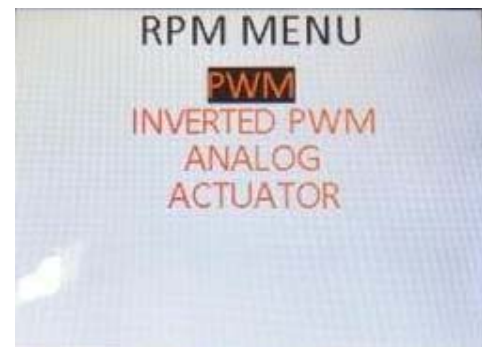
The CAN Ranger is calibrated at the factory for Cummins engine. Refer to appendix B for factory setting parameters.

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

CAN RANGER III INSTALLATION

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.

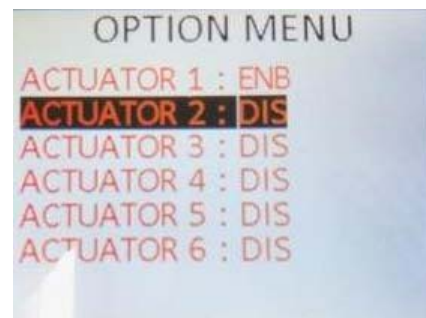
Use the ← arrow button to return to Calibration Menu or <MENU> button to return to the Main Menu.

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.

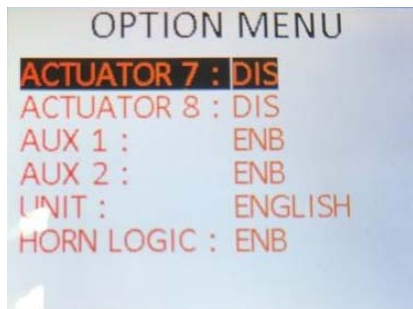
OPTION SETUP

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:

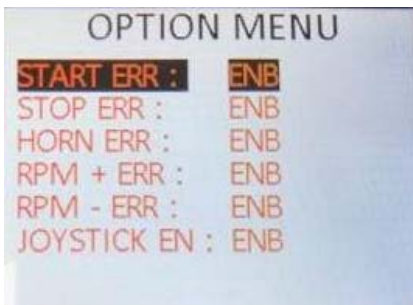


Option Menu First Screen

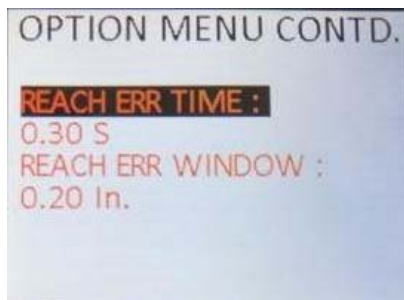
CAN RANGER III INSTALLATION



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

CAN RANGER III INSTALLATION

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

CAN RANGER III INSTALLATION

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

PARTS LIST

CAN RANGER III INSTALLATION

<i>PART NUMBER</i>	<i>DESCRIPTION</i>
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
3B2591AJ	OPERATION MANUAL
3B2591AK	INSTALLATION MANUAL

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

CAN RANGER III INSTALLATION

WIRING

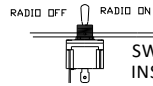
CONNECTOR, DT06-4S-E		
PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
3	WHITE	CAN HIGH
4	GREEN	CAN LOW
CONNECTOR, DT06-4S-E		
PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
3	WHITE	CAN HIGH
4	GREEN	CAN LOW
CONNECTOR, DT06-4S-E		
PIN	COLOR	DESCRIPTION
1	RED	POWER (9-30V)
2	BLACK	GROUND
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

CAN RANGER III INSTALLATION

ACTUATOR MOUNTIN AND BRACKET

INSTALL SWITCH IN THE SAME LOCATION ON THE OTHER SIDE OF THE TRUCK



SWITCH MUST BE INSTALLED AS SHOWN

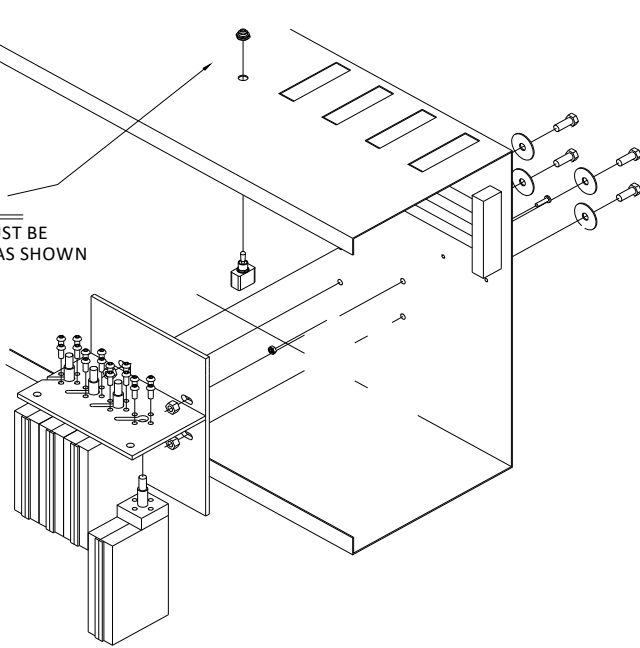
ACTUATOR RANGE
±0.500IN FROM CENTER
MAX: 3.00IN

KEEP THE VALVE ROD END AT LEAST 0.500IN FROM THE TOP OF THE PLATE

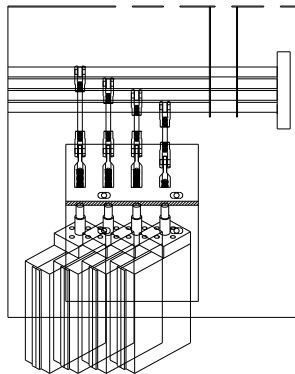
ADJUST LINKAGES AFTER THE ACTUATORS AND PLATE HAVE BEEN MOUNTED IN PLACE

MANUALLY TEST THE LEVER TO MAKE SURE THE LINKAGES DO NOT BIND. THERE SHOULD BE NO ADDITIONAL FORCE OR NOISE CREATED BY MOVING THE LEVERS

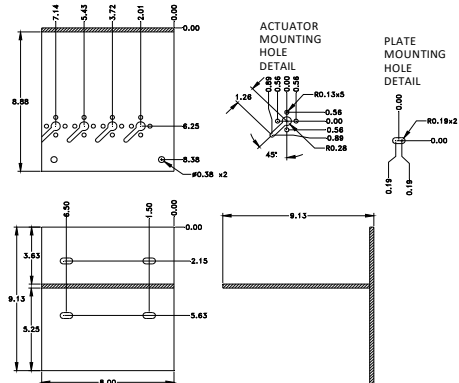
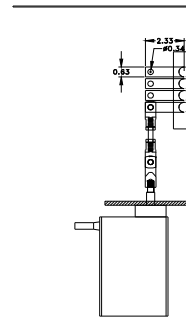
DROP A TARP OR RUBBER MEMBRANE OVER THE ACTUATOR AND LINKAGES TO PREVENT WATER AND ICE BUILD UP.



TRUCK
REAR VIEW
ACTUATOR PLATE MOUNTING



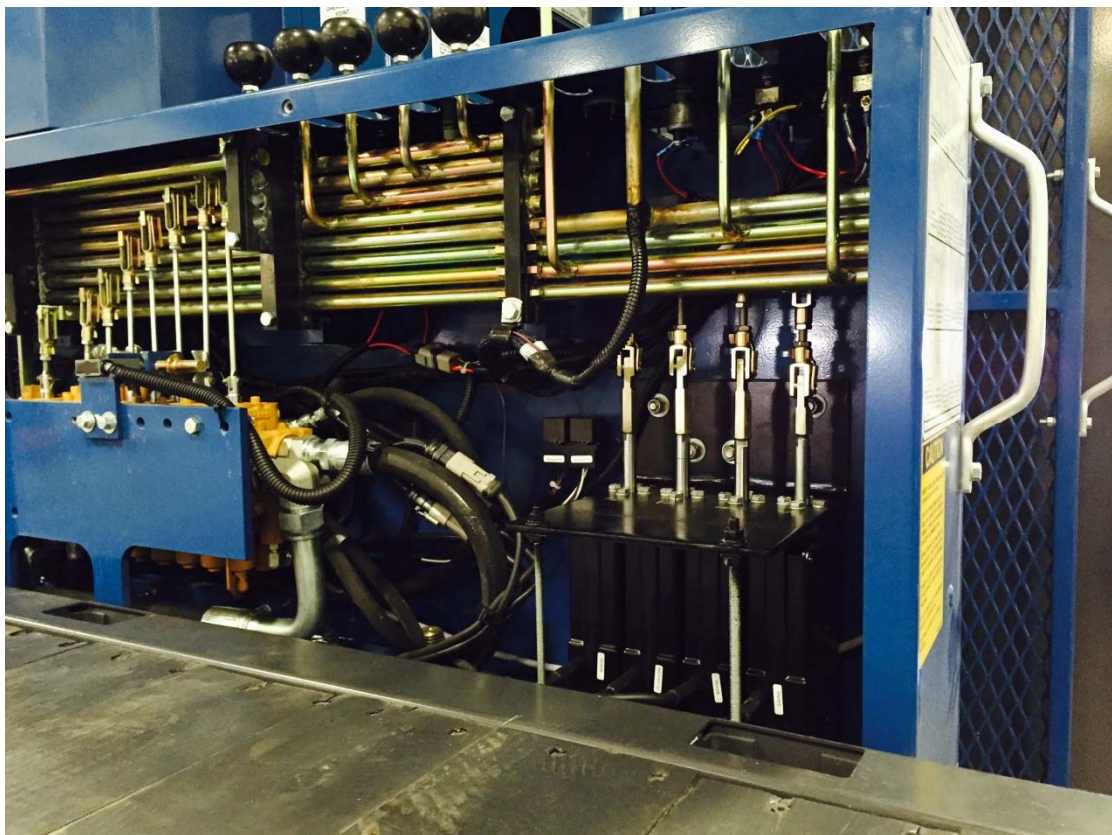
TRUCK
SIDE VIEW



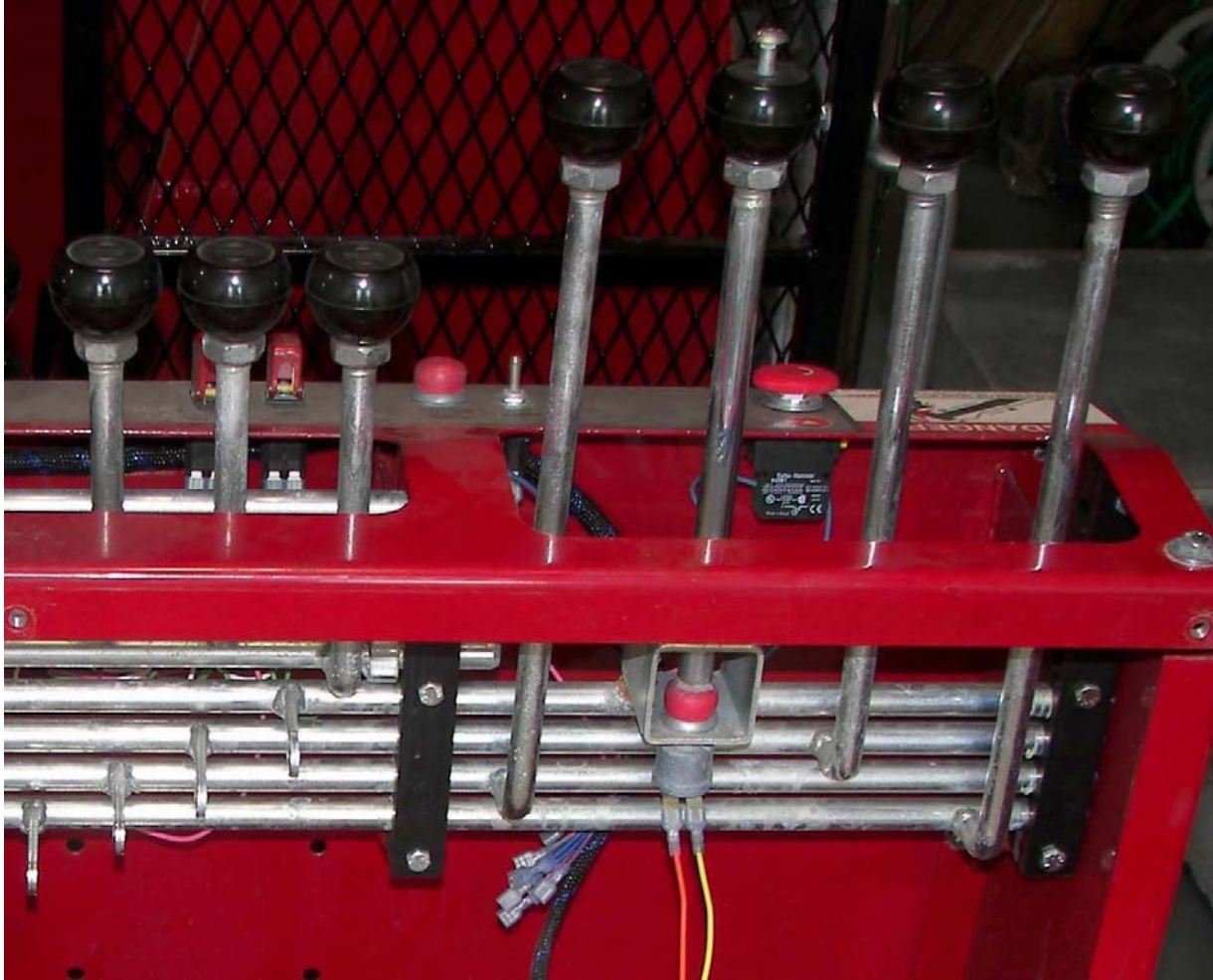
SUGGESTED ACTUATOR
MOUNTING BRACKET

CAN RANGER III INSTALLATION

TYPICAL ACTUATOR INSTALLATION PICTURES



CAN RANGER III INSTALLATION



MOUNTING TAB INSTALLATION ON TEREX



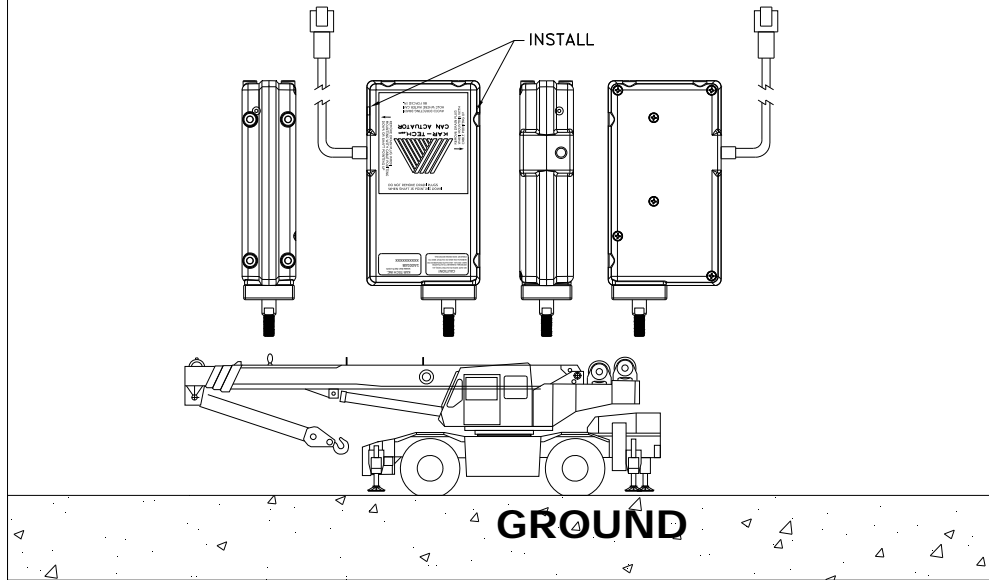
PROTECTION AGAINST WATER AND ICE BUILD UP

CAN RANGER III INSTALLATION

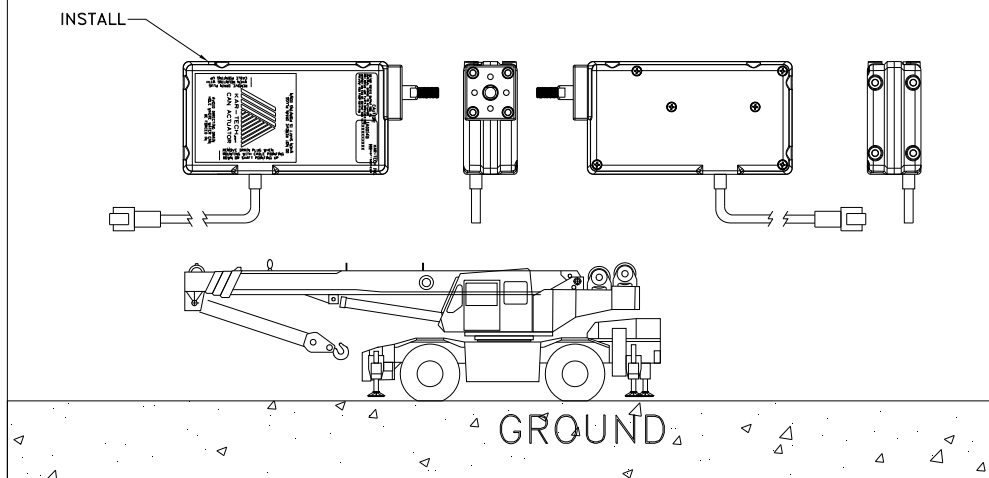
Appendix A

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



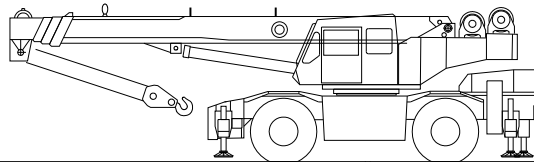
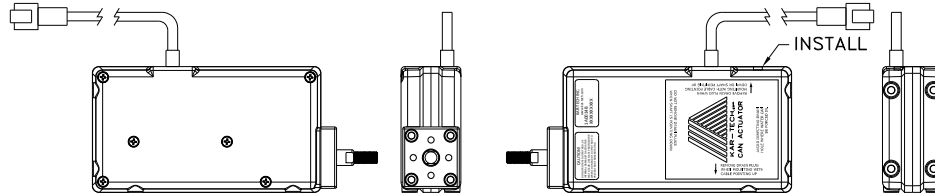
WHEN MOUNTING WITH SHAFT HORIZONTAL
AND CABLE DOWN, INSTALL ONE DRAIN PLUG
AS SHOWN



CAN RANGER III INSTALLATION

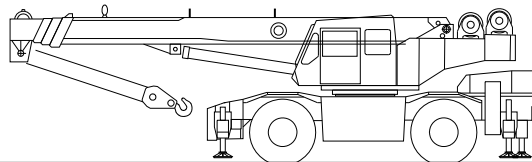
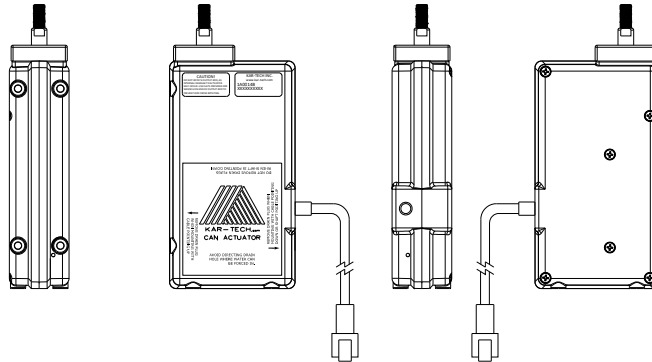
Appendix A

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



GROUND

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



GROUND

CAN RANGER III INSTALLATION

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	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 HOIST	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	

CAN RANGER III INSTALLATION

ENGINE CALIBRATION

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