

CAN RANGER

RADIO/CAN REMOTE CONTROL SYSTEM

OPERATION MANUAL

CAN RANGER OPERATION

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TABLE OF CONTENTS

DESCRIPTION	2
SYSTEM OPERATION	3
TRANSMITTER AND RECEIVER SYNCHRONIZATION	5
OUTPUTS	8
BATTERY CHARGING	9
INSTALLATION	10
BEFORE APPLYING POWER!	10
CAN ACTUATOR ID ASSIGNMENT	11
ACTUATOR CALIBRATION	13
ACTUATOR CALIBRATION USING THE MANUAL HANDLES	13
ACTUATOR CALIBRATION USING THE TRANSMITTER	18
RPM CALIBRATION	19
OPTION SETUP	23
FACTORY SETTING	30
EXIT CALIBRATION	30
USING THE OPTIONAL PALM™ INTERFACE	31
DIAGNOSTIC	31
HISTOGRAM	34
FILE TRANSFER	35
CALIBRATION	35
RECEIVER PINOUT	38
WIRING BLOCK DIAGRAM	39
WIRING SCHEMATIC	40
ROUTINE MAINTENANCE	41
MAINTENANCE PRECAUTIONS	41
TROUBLESHOOTING	42
TROUBLESHOOTING CHART	43
PARTS LIST	45
TRANSMITTER PICTORIAL	46
RECEIVER PICTORIAL	47
ACTUATOR PICTORIAL	48
SPECIFICATIONS	49
INSTRUCTION TO THE USER	50
Appendix A	51
Appendix B	52

CAN RANGER OPERATION

DESCRIPTION

The CAN RANGER is a state of the art microprocessor based Radio Frequency (RF) control system. It will provide the operator the ability to remotely operate equipment. The operator is required to follow all OSHA www.osha.gov safety standards when operating the equipment.

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

The remote control system consists of several modules: the radio transmitter, receiver module, actuators, wiring harnesses, charger and

associated optional equipment such as Palm™ interface tools.

The transmitter is equipped with joysticks and toggle switches for various functions. It includes a port for charging the internal battery.

The system's radio receiver is designed with 8 ON/OFF outputs to drive the Horn, Engine Start, Engine Stop, RPM+, RPM-, Basket Tilt up, Basket Tilt Down, Auxiliary and an Analog RPM. There are inputs for various options like ATB/ Swing CW STOP and OVL/Swing CCW STOP. All outputs are protected for over load and short circuit.

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

CAN RANGER OPERATION

The receiver has an RS-232 communication port to interface with an optional Palm Pilot diagnostic tool.

The CAN RANGER 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.

The receiver will automatically detect the system voltage and adjust for either 12V or 24V vehicles.

SYSTEM OPERATION

In the wiring harness, there are two switches for REMOTE POWER. They provide power to the CAN Ranger Receiver if both are ON. Turning either switches OFF will power down

the CAN Ranger, and the CAN Actuators.

To turn on the transmitter, turn the key switch to the ON position. To turn it off, turn the key switch to the OFF position.

The E-STOP button on the transmitter must be up to start engine and operate any functions. To operate the boom and winch, 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.

CAN RANGER OPERATION

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 via the PALM or 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 the crane manually with at least one actuator in Auto Center mode enabled, turn off the Receiver. Otherwise the actuator will

CAN RANGER OPERATION

continue to center the valve/handle.

TRANSMITTER AND RECEIVER SYNCHRONIZATION

Each radio transmitter is preprogrammed with a unique radio ID code. Each receiver is programmed to respond only to the radio transmitter with the ID code for which it is set. This feature allows multiple systems to work in close proximity to one another without interference. In the event that a transmitter becomes damaged and a new one is needed, the receiver can be reprogrammed to respond to the new radio transmitter. To teach the ID code to the receiver, use the following procedure:

1. Receiver and transmitter power should be off
2. Press E-STOP switch, position BOOM toggle switch to NORMAL, WINCH switch to FAST, and BASKET LEVELING to AUTO
3. *Press and hold* HORN button (on side) and all joysticks down (pull joysticks)
4. Turn transmitter POWER on.
5. Release joysticks, Twist to release the E-Stop switch. At this point LEDs on transmitter should toggle.
6. Apply power to receiver

CAN RANGER OPERATION

7. LEDs on transmitter will stop toggling and the green LED will blink rapidly to indicate that the teach is complete

INDICATORS

The transmitter has four indicators. The red BATTERY/DIAGNOSTIC indicator, the green TRANSMIT indicator on top, and the red and green battery charger indicators on the side next to the connector. The green TRANSMIT indicator flashes rapidly whenever there is communication between the transmitter and the receiver. The red BATTERY indicator starts blinking once every second when the battery voltage is low and requires charging.

If the **ATB Input** is enabled in calibration and the ATB input is driven high (12/24V), the red and green LEDs on the transmitter will Flash Alternately while using a joystick.

If the **OVERLOAD Input** is enabled in calibration and the input is driven high (12/24V), the red and green LEDs on the transmitter will flash together while using a joystick.

If the **Automatic Tilt** feature has been enabled, the optional basket angle sensor needs to be attached to the transmitter's charging/CAN connector. Then the Tilt Switch should be placed in the AUTO position to operate. Switching to Manual mode disables the feature. To tare

CAN RANGER OPERATION

(or zero) the angle sensor, position the bucket to what you want level to be. NOTE: This must be within 5 degrees of what the sensor thinks is 0. Then with the transmitter and receiver on, push E-STOP down, AUTO TILT, AUX off, Crane Speed Slow. Then hold Tilt Up and press the HORN.

The receiver module can identify problems with the system in the form of an error code. Check the red indicator or display window under the HISTOGRAM screens to see the errors. The green LED indicator will blink on the receiver during normal operation.

The display on the receiver can provide the user with diagnostic information, and can be used to set up the

system. The 5 push buttons on the controller are used to navigate through the screens.

The five main menus are DIAGNOSTIC, CALIBRATION, HISTOGRAM, LCD CONTRAST and LOCAL OPERATION.

The **DIAGNOSTIC** menu lets you see the status of the inputs and the outputs.

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

The **HISTOGRAM** Menu lets you check the errors. You can check on just the active errors, all the errors, or clear the error counts.

CAN RANGER OPERATION

The **LCD CONTRAST** Menu lets you adjust the LCD Contrast.

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 Left and Right arrows to select the actuator you want to control. Hold the SET button to activate the selected actuator. Use the Up and Down arrows to extend and retract the actuator.

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 the alphanumeric display on the receiver module *or* the HISTOGRAM page on the optional Palm Pilot™.

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

CAN RANGER OPERATION

NOT activated, and will detect a short IF activated. The proportional outputs will detect a no-load or short condition WHEN activated.

BATTERY CHARGING

The transmitter is designed with a smart battery charger. The battery can be charged by connecting the transmitter to an AC wall charger or a car charger. The red and green LED indicators near the charging port indicate the status of the charger: The red LED indicates that the battery is charging and green LED indicates that the battery is fully charged. A complete charge can be achieved in about 1 hour.

To save battery life, the transmitter will turn off when

none of the switches or joysticks (if equipped) is used for period of 10 minutes. The user must recycle power to restore transmitter operation. However, the transmitter will stay on as long as the receiver has power applied to it.

When the battery is new, the run-time of the transmitter will be shorter until it has gone through the drain/charge cycle several times. After this point, the unit's current drain should allow at least 20 hours of run-time before a recharge is needed.

CAN RANGER OPERATION

INSTALLATION

Refer to the KAR-TECH INSTALLATION manual for guidance on all aspects of installation specific to your truck. Additionally, refer to the PINOUT sections in this manual for hookup of the harness.

All connections must be properly insulated and sealed to protect against shorts and corrosion.

- Verify that the transmitter battery is fully charged. If it is low, performance may be erratic.
- Read the rest of this manual.

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.

CAN RANGER OPERATION

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 LCD screens to CALIBRATION. Press <SET>. Use the arrow buttons to enter the password 1262. Enter the password by pressing <SET>. The first screen in the Menu is

ASSIGN ACTUATORS PUSH SET

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

CAN RANGER OPERATION

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.

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,

CAN RANGER OPERATION

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 LCD screens to CALIBRATION. Press <SET>. Use the arrow buttons to

enter the password 1262. Enter the password by pressing <SET>. Then press the right button (FWD arrow) to get to:

ACTUATOR SETUP

PUSH SET

Next presses the right button (FWD arrow) to get to the actuator you want to calibrate.

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

CAN RANGER OPERATION

its neutral position (Valve handle center).

FAST POSITION

This is the position the actuator moves to when the transmitter's BOOM SPEED switch is switched to NORMAL 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 BOOM SPEED switch is switched to SLOW and a joystick is pushed all the way in one direction. This position is normally slightly below the maximum travel of the valve

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

CAN RANGER OPERATION

enabled if the valve spring is weak.

SWING CALIBRATION

If this is the first time calibrating the actuators, start with SWING 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 LCD.

There are several settings for each actuator. Each has its own screen. Use the ←→ arrow buttons to scroll through the settings if you want to change or look at a specific setting. If you are setting up a new actuator, make sure to configure each setting to match your crane.

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

← (x.xx) x.xx →

The number in parentheses is the stored value. The other is the current actuator position. Push Set to store the current position into this parameter. The receiver will automatically move to the next setting.

For example, if you selected SWING, the first screen will be for the center position. Before pressing <SET>, move the SWING Handle back and forth. The displayed position, shown in inch, should change. If not, the wrong actuator is connected to this connection,

CAN RANGER OPERATION

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 SWING 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>.

The next screen will be to set the Fast Counter Clockwise Swing. Push the SWING

Handle all the way in the direction for Counter Clockwise Swing. Hold it there and push <SET>.

Next the Slow Counter Clockwise Swing needs to be set. Hold the SWING Handle in the position for slow Counter Clockwise Swing, and press <SET>.

The next screen will be to set the Engine Stop Position for Counter Clockwise Swing. Hold the SWING Handle in the position that you want the Engine to be stopped and push <SET>.

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

CAN RANGER OPERATION

Next the Slow Clockwise Swing needs to be set. Hold the SWING Handle in the position for slow Clockwise Swing, and push <SET>.

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

The next screen lets you Enable or Disable the Auto Center feature for the Swing Actuator. Push <SET> to toggle between ENABLE and DISABLE. Push → Next menu.

The final step in calibrating the SWING function is to save the settings or if you don't want to save them, just escape.

PUSH SET TO SAVE
USE ↑ TO QUIT

Pushing <SET> will save the settings. Pushing ↑ will exit the Swing Calibration and will revert to the previous settings.

If you push <SET> the controller will automatic move to Telescope setup. If you want to calibrate the Telescope function next, push <SET>.

Repeat this procedure for the Telescope, Winch and Boom actuators. If enabled, also repeat this for Boom 2 and Telescope 2. If this is the only actuator that requires calibration or to exit calibration keep pressing the right button (FWD arrow). The Actuator calibration is now complete. Make sure

CAN RANGER OPERATION

crane works properly with remote before delivery.

ACTUATOR CALIBRATION USING THE TRANSMITTER

This procedure is similar to the calibration using valve handles, instead you will be using the joysticks to move the actuator to the desired position and pressing Horn button on the transmitter or SET button on the receiver will store the new position in the receiver. Actuator calibration using transmitter is normally used if valve handles are not present or not accessible. Be sure the E-STOP is up before proceeding.

CAN RANGER OPERATION

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.

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 ← to back out of this screen and return to the Calibration Menu. Once you have changed all 4 digits, push <SET>. If you entered the correct password you get the help screen:

USE ↔ TO PICK

Then push the right button (FWD arrow) to get to the RPM SETUP screen:

RPM SETUP

← PUSH SET →

Push <SET>.

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

Caterpillar

Cummins

International

Mercedes

CAN RANGER OPERATION

Bump Throttle

Cruise Control

On Off Throttle

PWM

Inverted PWM

Analog

Actuator

These are followed by an exit screen if you don't want to change the RPM setting.

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 (PIN 4 of connector 'CA') which increments the engine RPM to the next sequential setting. These are set in the engine, not in the Ranger II 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+ (pins 2 & 4 of CA) 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.

CAN RANGER OPERATION

PWM generates a pulse width modulated output with an amplitude of BATTERY + on PWM/Analog output (Pin1 of CA). 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 PWM/Analog output (Pin1 of CA). 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 PWM/Analog output (Pin1 of CA). 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.

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

CAN RANGER OPERATION

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.

After going through the selected setup screens, you have the choice to save or to quit without saving:

PUSH SET TO SAVE

PUSH ← TO QUIT

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 RMP to another, the parameters will revert to the default settings.

CAN RANGER OPERATION

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 right/FWD arrow to get to the OPTION SETUP screen:

OPTION SETUP
← PUSH SET →

Push <SET>.

After a help screen (press→ to move on), the TILT enable/disable screen will appear:

TILT DIS
THEN PUSH SET

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the Tilt function. If your crane basket has the Tilt feature and tilt valve, you want to set

this to ENABLE (ENB). Otherwise disable it (DIS). If you leave it enabled but do not have the feature, you will get errors indicating that there are output errors.

When you have enabled or disabled the Tilt feature, press <SET>.

The next option is TILT AUTO. The screen will appear:

TILT AUTO DIS
THEN PUSH SET

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the Automatic Tilt feature. If your crane has the Tilt outputs, a the tilt sensor required for this feature, you want to set this to ENABLE (ENB). Otherwise disable it (DIS).

When you have enabled or disabled the TILT AUTO feature, press <SET>.

If you enabled the Automatic

CAN RANGER OPERATION

Tilt feature, you can set 3 parameters, TILT WINDOW, TILT DELAY, and TILT DEBOUNCE.

Tilt Window is in degrees. It is the deadband around level where no correction is made. The larger the window, the more tilt will be allowed. However, if the Tilt Window is too small, the system may start oscillating or hunting.

Tilt Delay is in ms. It is the time the bucket needs to be tilted outside the Tilt Window before a correction is made. The larger the Tilt Delay, the slower the response. However too small of a Tilt Delay could cause the system to react to noise.

Tilt Debounce is a number from 1 to 200. The Tilt

Debounce is used to smooth out the angle sensor's readings. If your machine vibrates a lot, use a higher Tilt Debounce. If your machine is very stable, use a smaller Tilt Debounce. Note that the larger the Tilt Debounce, the slower the Auto Tilt feature will react.

The next option is for Input 1. The screen will appear:

INPUT 1 DISABLE
 THEN PUSH SET

Use ↑ or ↓ to switch between DISABLE, ATB, and CW STOP modes for Input 1. ATB Mode monitors Input 1, and when it goes high (active), the transmitter's LEDs will alternate when a joystick is operated. In CW STOP mode, the Ranger Controller will stop any swing CW motion by the transmitter when this input

CAN RANGER OPERATION

goes high (active). The output will ramp off to allow for a smooth stop. If you do not want either of these features, just disable Input 1.

When you have made your selection, press <SET>.

If you chose CW STOP, a CW RAMP screen comes up. Use the arrows to set the time for the function to go from full speed to stop. The maximum number is 2000ms (2 second). The larger the number, the longer it takes to stop moving.

The next option is for Input 2. The screen will appear:

INPUT2 DISABLE

THEN PUSH SET

Use ↑ or ↓ to switch between DISABLE, OVL, and CCW STOP modes for Input 2. OVL Mode monitors Input 2, and

when it goes high (active), the transmitter's LEDs will flash together when a joystick is operated. In CCW STOP mode, the Ranger Controller will stop any swing CCW motion by the transmitter when this input goes high (active). The output will ramp off to allow for a smooth stop. If you do not want either of these features, just disable Input 2.

When you have made your selection, press <SET>.

If you chose CCW STOP, a CCW RAMP screen comes up. Use the arrows to set the time for the function to go from full speed to stop. The maximum number is 2000ms. The larger the number, the longer it takes to stop moving.

CAN RANGER OPERATION

Next the Auxiliary setup screen will appear:

AUX DISABLE

THEN PUSH SET

Use ↑ or ↓ to select between DISABLE, WINCH FAST, and TOGGLE functions. These functions are for the Auxiliary toggle switch on the transmitter and the Auxiliary output on the receiver. If your machine has the Winch Speed feature, you want to set this to WINCH FAST. If you have some other function tied to the Auxiliary output, set this to TOGGLE mode. Otherwise 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 the TELE 2 setup screen will appear:

TELE 2 DIS

THEN PUSH SET

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the TELESCOPE #2 function (actuator). If your machine has a second boom TELESCOPE feature, you want to set this to ENABLE (ENB). Otherwise disable it. NOTE: You can use TELE 2 for another actuator controlled function you might have, other than the standard functions. If you enable TELE 2 but do not have the feature or actuator, you will get an error indicating that there is an actuator error. No damage will occur.

When you have enabled or disabled the TELE 2 feature, press <SET>.

CAN RANGER OPERATION

Next the BOOM 2 setup screen will appear:

BOOM 2 DIS
THEN PUSH SET

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the BOOM #2 function (actuator). If your machine has a second BOOM lift feature, you want to set this to ENABLE (ENB). Otherwise disable it. NOTE: You can use BOOM 2 for another actuator controlled function you might have, other than the standard functions. If you enable BOOM 2 but do not have the feature or actuator, you will get an error indicating that there is an actuator error. No damage will occur.

When you have enabled or disabled the BOOM 2 feature, press <SET>.

Next the Units setup screen will appear:

UNIT ENGLISH
THEN PUSH SET

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>.

Next 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

CAN RANGER OPERATION

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.

To set the REACH ERR TIME the REACH ERR TIME setup screen will appear:

REACH ERR TIME

xx.xs PUSH SET

Use ← and → to select the digit and ↑ or ↓ to increase and decrease the selected digit. Push SET when you are done.

The REACH ERR WINDOW setup screen will appear:

REACH ERR WINDOW

x.xx in PUSH SET

Use ← and → to select the digit and ↑ or ↓ to increase and decrease the selected

digit. Push SET when you are done.

Next the HORN LOGIC setup screen will appear:

HORN LOGIC ENB

THEN PUSH SET

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

CAN RANGER OPERATION

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 the START ERROR setup screen will appear:

START ERROR ENB

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the Engine Start error code. When Enabled, the receiver's red LED will blink an error if it detects a problem with the Engine Start output. When Disabled, the receiver's red LED will not blink an error if it detects a problem with the Engine Start output.

Next the STOP ERROR setup screen will appear:

STOP ERROR ENB

Use ↑ or ↓ to toggle between

ENABLE or DISABLE for the Engine Stop error code. When Enabled, the receiver's red LED will blink an error if it detects a problem with the Engine Stop output. When Disabled, the receiver's red LED will not blink an error if it detects a problem with the Engine Stop output.

Next the HORN ERROR setup screen will appear:

HORN ERROR ENB

Use ↑ or ↓ to toggle between ENABLE or DISABLE for the Horn error code. When Enabled, the receiver's red LED will blink an error if it detects a problem with the Horn output. When Disabled, the receiver's red LED will not blink an error if it detects a problem with the Horn output.

Finally you will then have the

CAN RANGER OPERATION

choice to save or to quit
without saving:

PUSH SET TO SAVE

PUSH ← TO QUIT

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.

EXIT CALIBRATION

To Exit the Calibration Mode, scroll to the EXIT screen and push the SET button.

CAN RANGER OPERATION

USING THE OPTIONAL PALM™ INTERFACE

The Patented Palm Pilot™ interface, US patent No. 6,907,302, software is a very useful tool for troubleshooting the control system.

To use this tool, connect the Palm™ serial cable to the serial connector on the receiver control harness or adaptor, and apply power to the system.



Main Page

Use the Palm's stylus pen and tap the icon 'RANGER II' to launch the application.

DIAGNOSTIC

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

CAN RANGER OPERATION



RF Communications Page



Digital Inputs Page

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

Tap the **Next Page** button to switch between pages of inputs.

CAN RANGER OPERATION

Tap the button labeled Outputs to view output screens.



Digital Inputs Page 2



ON/OFF Outputs Page



Analog Inputs Page

CAN RANGER OPERATION



Motor Output Page



Histogram Page 1

Tap the **Done** icon return to the main menu page.

HISTOGRAM

Tap the **Histogram** icon to see a set of screens that show which error codes are active and how many times the specific error code has been active.

This feature can be used to troubleshoot machine wiring and other problems. Tapping the **Reset** button resets the error code counts. The password to reset error codes is 1262. Tapping **Next** and **Back** allows access to all the histogram pages. Tap the **Done** button to return to the main menu.

CAN RANGER OPERATION

FILE TRANSFER

Tap the File Transfer button to send new program files from the Palm to the receiver. New programs are uploaded to the Palm via the Palm™ desktop as a *.pdb file using HotSync™.



File Transfer Page

This is only used for software updates to the receiver. Tap the 'i' icon for more information on this procedure.

CALIBRATION

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



Calibration Page

The password to gain access to the calibration screens is 1262. In these screens, manual configuration for actuator positions and RPM configuration is available.

CAN RANGER OPERATION

Automatic configuration of actuator positions is outlined in the Kar-Tech INSTALLATION manual.



Output Selection Menu

To adjust an actuator output's configuration, use the following procedure:

1. Select the output to change from the first drop-down menu
2. Select the parameter of the output to change

from the second drop-down menu

3. Enter the new value on the line above the Factory Setting button by tapping on the line and using the scratch pad to enter a new value
4. Tap the Save button to send the setting to memory

The lines below the drop-down menus indicate the present value of the joystick voltage on the transmitter and corresponding input sensor levels.

CAN RANGER OPERATION



Calibration Parameters Menu

Tap **Save** to send these settings to memory. Tap the **Factory Setting** button to return all outputs to standard values. Tap **Done** and **Exit** to quit configuration and return to the main menu.

CAN RANGER OPERATION

RECEIVER PINOUT

P1:12 PIN DEUTSCH DT15-12PA

WIRE		
PIN#	COLOR*	DESCRIPTION
1	GRAY	RPM+
2	GREEN	RPM-
3	GRAY	HORN
4		TILT UP OUTPUT (OPTIONAL)
5		TILT DOWN OUTPUT (OPTIONAL)
6	YELLOW	ENGINE START
7	WHITE	ENGINE STOP
8	PURPPLE	WINCH SPEED
9		ATB INPUT (OPTIONAL)
10		OVERLOAD INPUT (OPTIONAL)
11	ORANGE	ANALOG/PWM RPM+
12		NOT AVAILABLE

P2:6 PIN DEUTSCH DT15-06A

WIRE		
PIN#	COLOR*	DESCRIPTION
1	RED	POWER (9 TO 35 VDC)
2	RED	POWER (9 TO 35 VDC)
3	BLACK	GROUND
4	BLACK	GROUND
5	GREEN	CAN LOW
6	WHITE	CAN HIGH

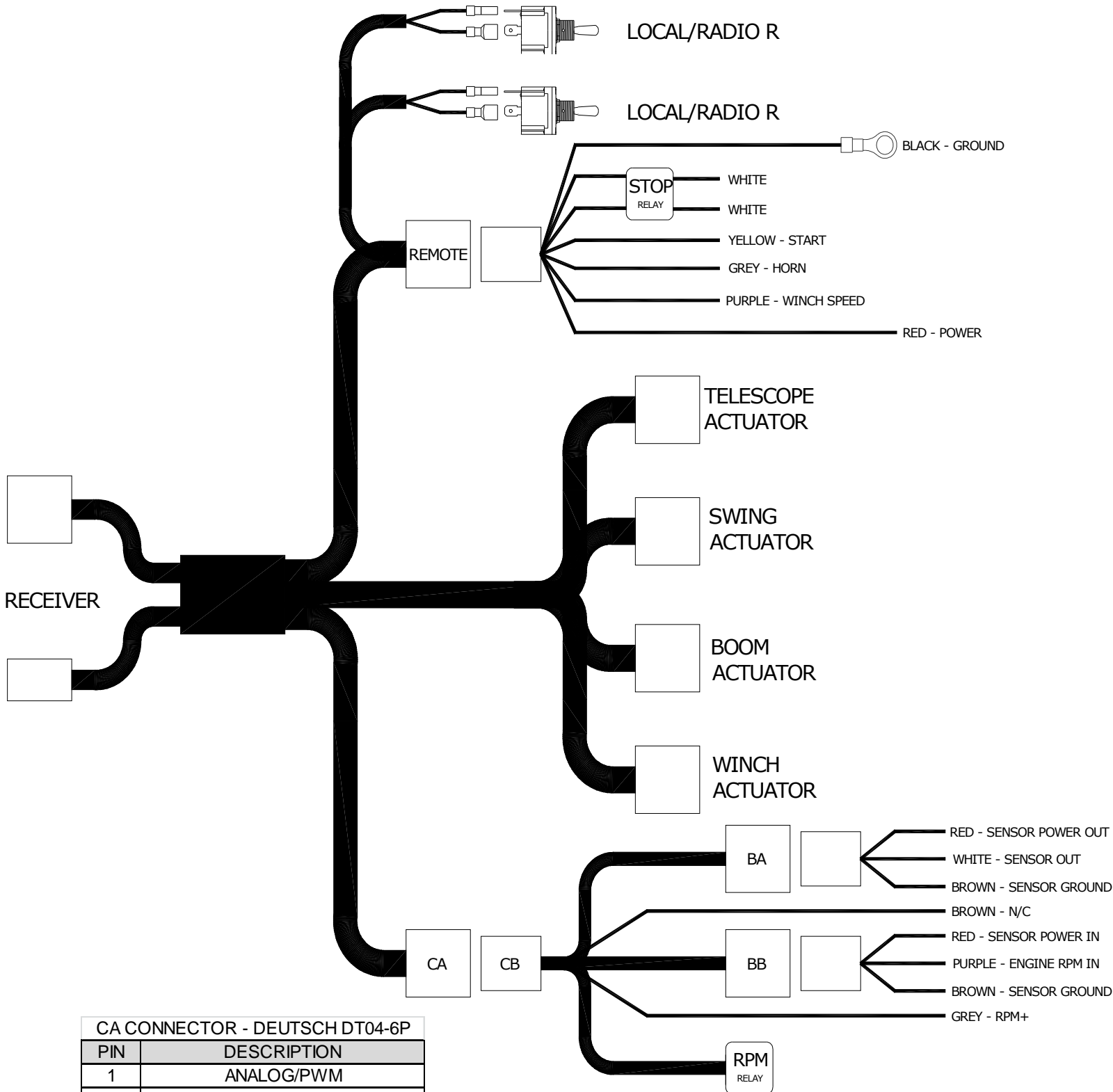
P7: DB-9F (DIAGNOSTICS)

WIRE		
PIN#	COLOR*	DESCRIPTION
2	WHITE	RS-232 TRANSMIT
3	GREEN	RS-232 RECEIVE
5	BLACK	GROUND

*OPTIONAL WIRE HARNESS P/N: 3B1906A

CAN RANGER OPERATION

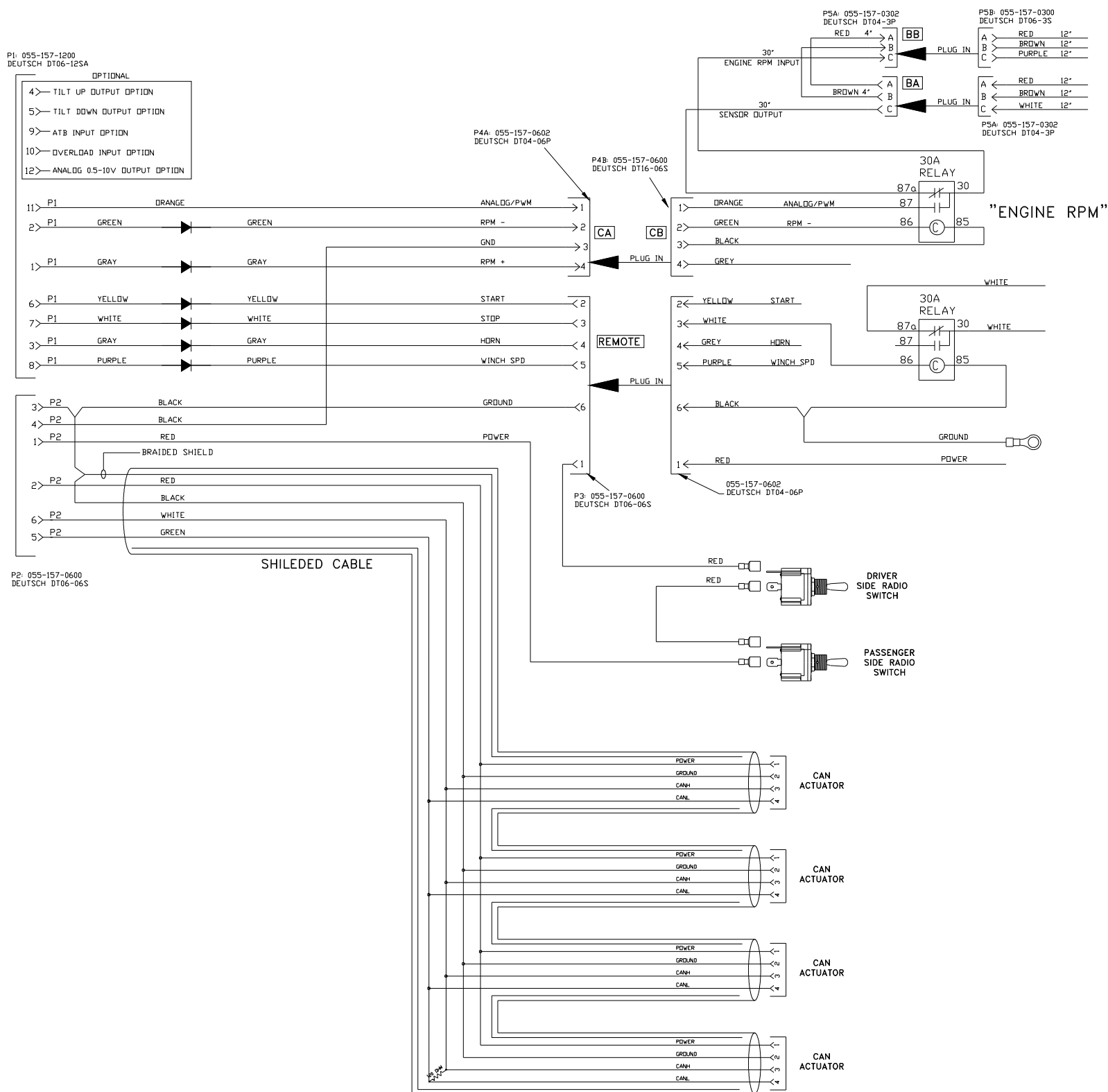
WIRING BLOCK DIAGRAM



CA CONNECTOR - DEUTSCH DT04-6P	
PIN	DESCRIPTION
1	ANALOG/PWM
2	RPM -
3	GROUND
4	RPM +
5	N/C
6	N/C

CAN RANGER OPERATION

WIRING SCHEMATIC



CAN RANGER OPERATION

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.

CAN RANGER OPERATION

TROUBLESHOOTING

This next section provides basic operator level troubleshooting for the CAN RANGER REMOTE system. If, after following these instructions, the system still does not function, contact your KAR-TECH representative for further instructions or servicing.

CAN RANGER OPERATION

TROUBLESHOOTING CHART

PROBLEM	SOLUTION
1. No functions work	<ol style="list-style-type: none">1. Check that transmitter power is on2. Check that receiver power is on3. Check system wiring for power into the system4. Check LCD status display for system status5. Check for proper grounding of system's electrical circuit6. Check hydraulic system
2. Certain functions do not work	<ol style="list-style-type: none">1. Check the wiring connection from the system to the actuators and valve coil for the output function that does not work2. Check LCD status display for possible fault or error indication3. Check hydraulic system4. Check system's electrical system

CAN RANGER OPERATION

TROUBLESHOOTING CHART

PROBLEM	SOLUTION
3. Functions operate intermittently	<ol style="list-style-type: none">1. Check for Loose connections.2. Check LCD status display for system status3. Check receiver antenna for any damage and proper connection4. Check system's hydraulic system
4. Engine stops while operating remote control.	<ol style="list-style-type: none">1. Check actuator feedback sensor.2. Check that the hydraulic valve levers are not moved during the radio remote operation.3. Check system wiring for proper connections.4. Check LCD status display for system status5. Check for proper grounding of system's electrical circuit
5. Wrong functions operate while using remote control.	<ol style="list-style-type: none">1. Actuators assigned incorrectly. Either swap actuators, or reassign them in the Calibration Screens.

CAN RANGER OPERATION

PARTS LIST

PART NUMBER	DESCRIPTION
3B1902E	RADIO TRANSMITTER
3B1903C	RADIO RECEIVER
1A0014E	CAN ACTUATOR, 3" 90lb
3B1906B	RECEIVER WIRING HARNESS
3B1908B	ACTUATOR EXPANSION CABLE
3B087MA	LINKAGE KIT, UNIVERSAL
020-506-0120	RS-232 ADAPTOR CABLE
010-001-2200	RECHARGABLE TRANSMITTER BATTERY
B20032	CHARGER, 12 VDC CIGARETTE LIGHTER PLUG
B20072	FAST CHARGER SUPPLY, 110V AC WALL
B40022C	OPTIONAL PALM PILOT WITH SOFTWARE

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

Note: For operation with negative ground systems only.

WARNING:

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

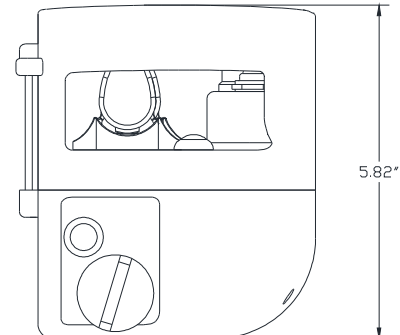
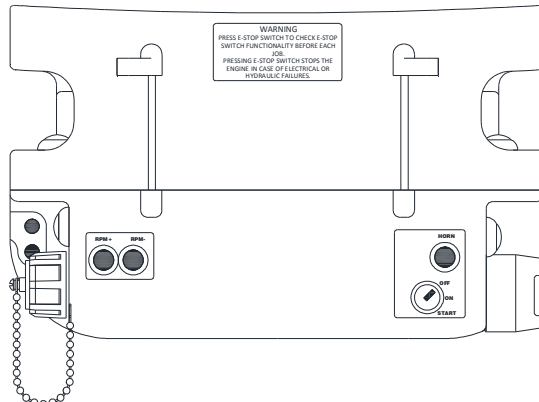
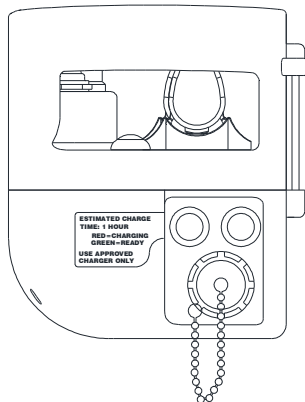
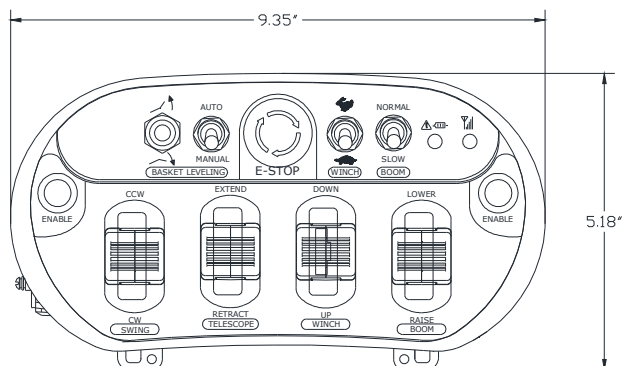
The information, specifications, and illustrations in this manual are those in effect at the time of printing. We reserve the right to change specifications or design at any time without notice.

CAN RANGER OPERATION

TRANSMITTER PICTORIAL

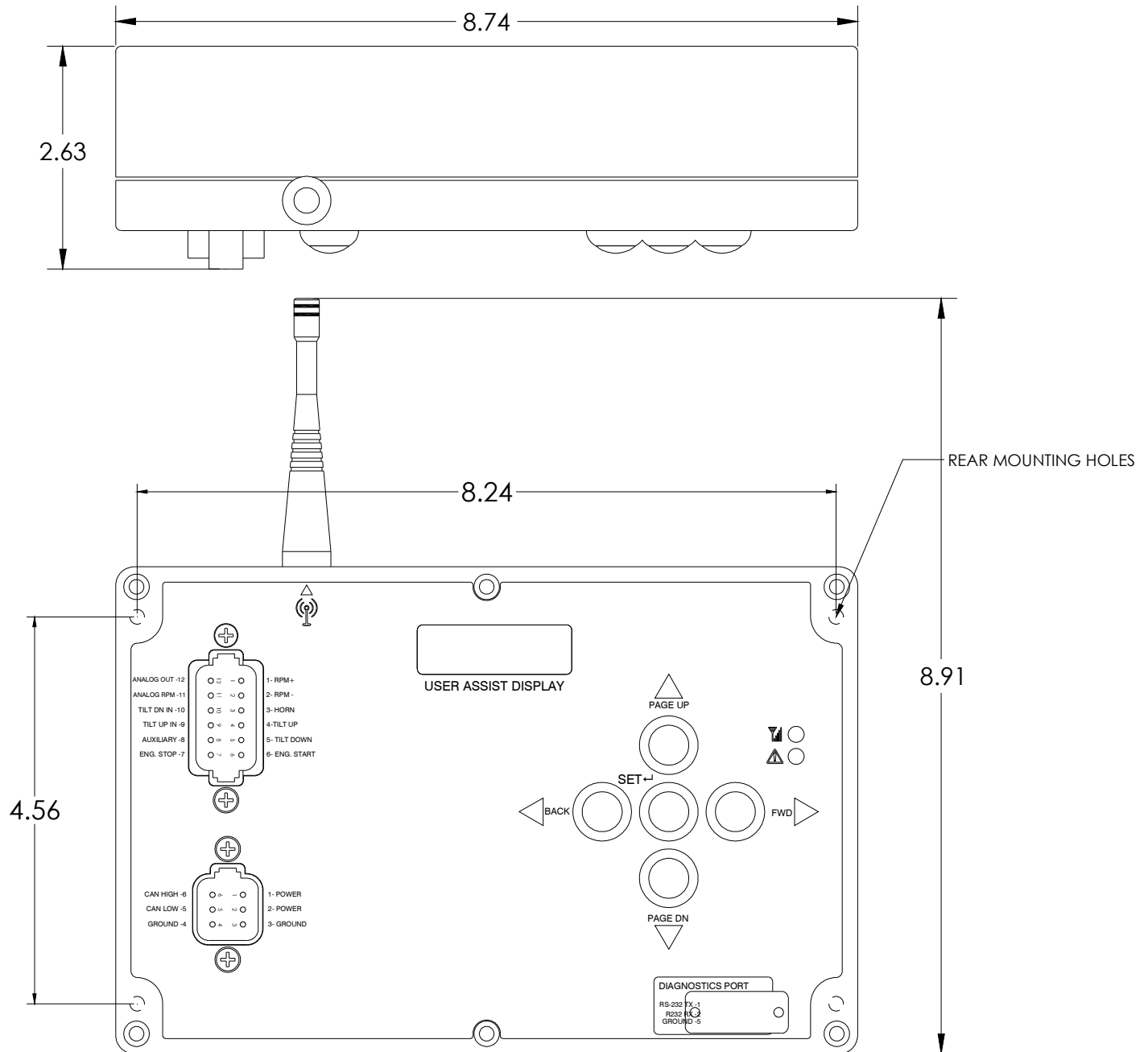
CONNECTOR P1: MS-3102E14S-5P

- A POWER (12 VDC)
- B GROUND
- C CAN HIGH
- D CAN LOW
- E SHIELD



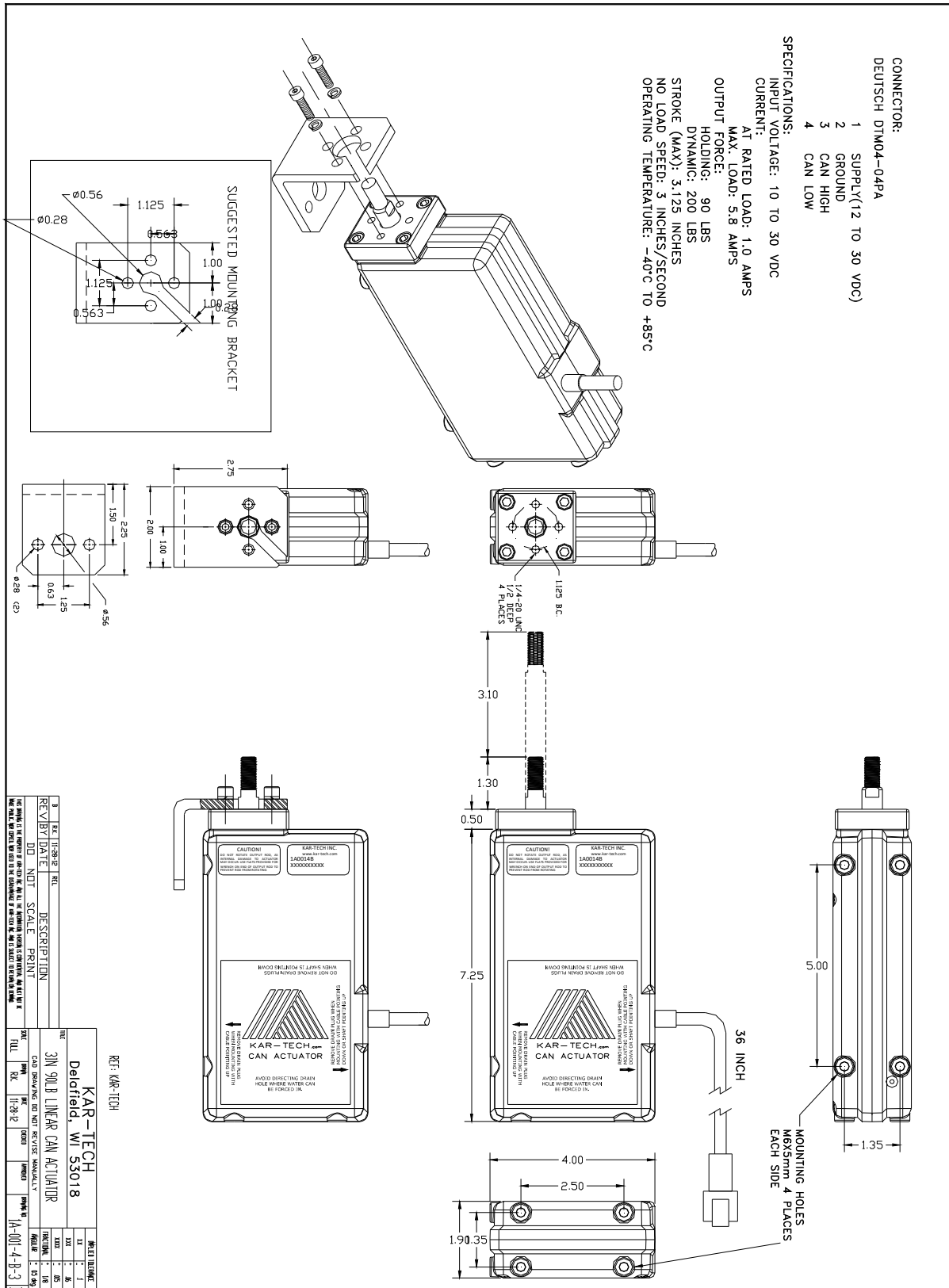
CAN RANGER OPERATION

RECEIVER PICTORIAL



CAN RANGER OPERATION

ACTUATOR PICTORIAL



CAN RANGER OPERATION

SPECIFICATIONS

FCC ID: P4U-VRTS

Industry Canada Certification Number: 4534A-VRTS

EQUIPMENT CLASS: PART 15 SPREAD SPECTRUM TRANSMITTER

TRANSMITTER

Power supply 7.2 Volt Rechargeable, NiMH battery.

Operating temperature - Radio -40°C to +85°C

Storage temperature -40°C to +100°C

RF Frequency 902-928 MHz

RF Transmit power (EIRP) 33 mW

Vibration..... 3G to 200Hz

Shock..... 50G

NEMA 12

RECEIVER

Power supply voltage..... 9-35VDC

Operating temperature -40°C to +85°C

Storage temperature -40°C to +100°C

Outputs 5.0A max each

RF Frequency 902-928 MHz

Vibration..... 3G to 200Hz

Shock..... 100G

NEMA 4X

CAN RANGER OPERATION

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.

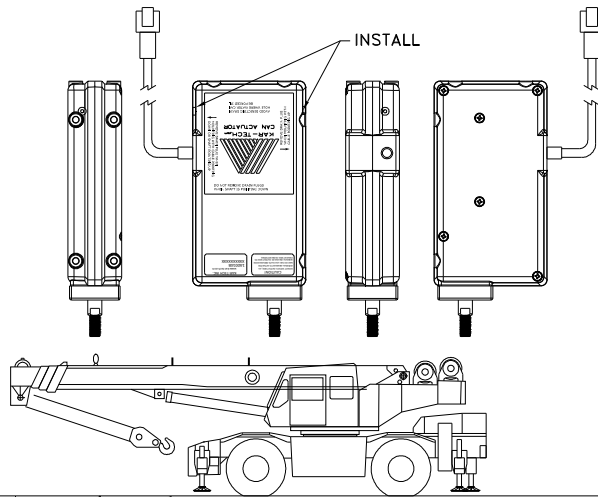
This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in 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.

CAN RANGER OPERATION

Appendix A

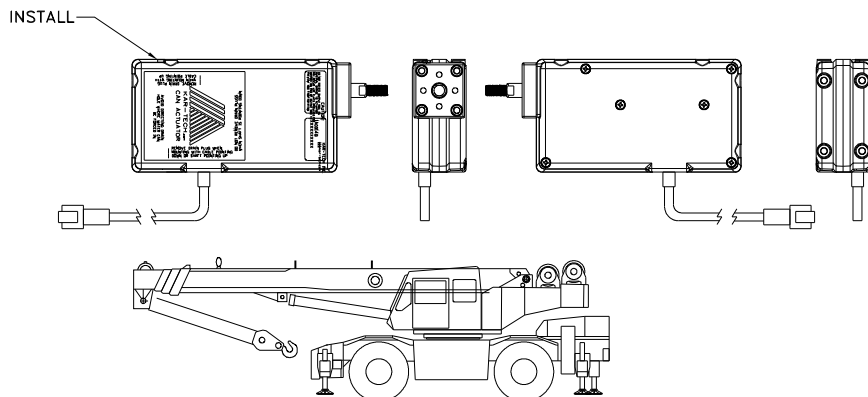
USE THE FOLLOWING INSTRUCTION TO REMOVE DRAIN PLUGS TO ALLOW MOISTURE TO EXIT OR INSTALL DRAIN PLUGS WHERE FLUIDS CAN ENTER THROUGH THE DRAIN HOLES. SHIELD DRAIN HOLES IF IT IS DIRECTED WHERE FLUIDS CAN BE FORCED IN.

WHEN MOUNTING WITH SHAFT DOWN,
INSTALL BOTH DRAIN PLUGS



GROUND

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

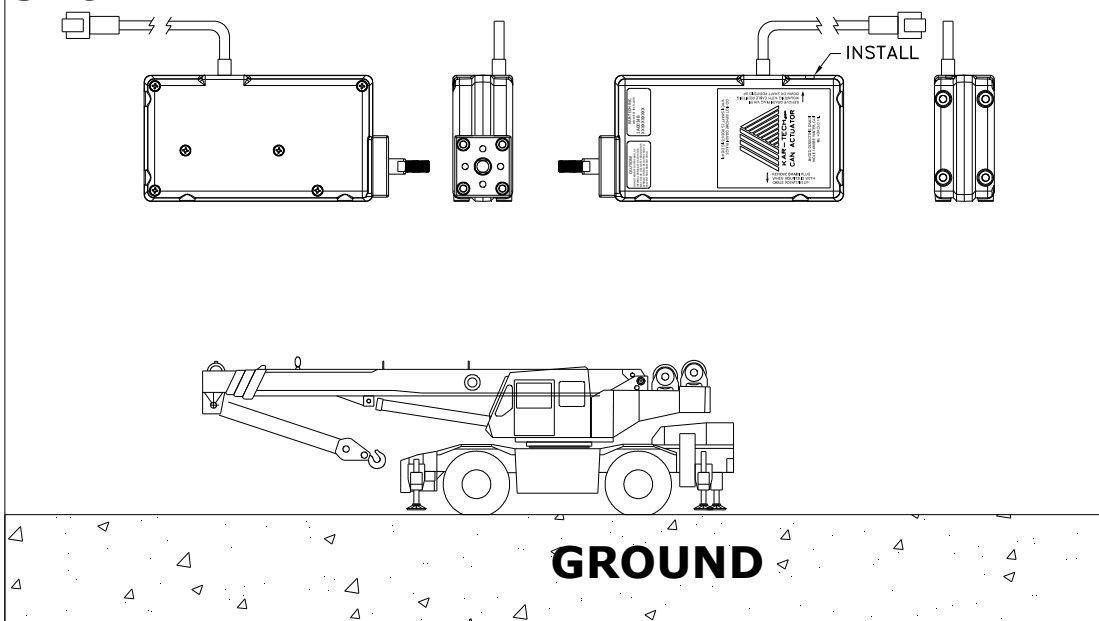


GROUND

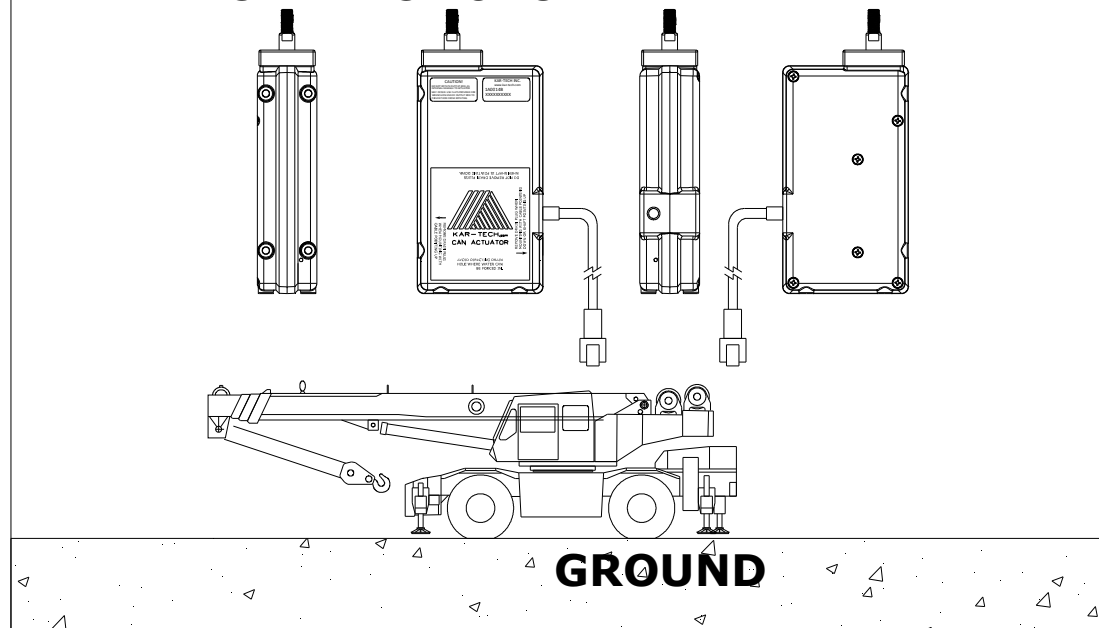
CAN RANGER OPERATION

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.



CAN RANGER OPERATION

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 OPERATION

ENGINE CALIBRATION

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