

**OPERATION**

- The system can be used with 1, 2 or 3 actuator for controlling 3 different functions.
- Press and hold the POWER button until red and green LEDs turn on and release
- Press Fast or Slow button before pressing Extend or Retract for desired operation. When Fast button is pressed the red LED blinks rapidly to indicate fast operation
- The transmitter is designed with a power saving feature which turns the transmitter off after 15 minutes if no buttons are pressed.
- There are red and green LEDs both on the transmitter and the receiver. The green LED will blink 2 times per second when the transmitter and receiver are communicating. It will blink 1 time per second if there is no communication (i.e. - no power to the receiver)
- The red LED on the receiver will blink if there is a problem with the system. Refer to the ERROR CODE CHART on the receiver and count the number of blinks to determine the fault. To rid the receiver of the error codes of actuators that are not used, recycle power to the receiver.
- The transmitter's red LED blinks 1 time per second if the batteries are low and need to be replaced. Turn receiver off to check for low battery. The red LED also blinks rapidly when fast speed is selected.

**SYNCHRONIZING TRANSMITTER AND RECEIVER**

There are over 64000 different addresses (ID codes) available for each transmitter and receiver pair. Each transmitter and receiver pair is synchronized together at the factory. If a new transmitter is needed, synchronizing is required. Use the following procedure:

- Receiver power off
- With the transmitter off, press and hold the POWER button for 10 seconds until LEDs blink, then release. Green and red LEDs will blink together at this point
- Apply power to receiver
- Wait for a few seconds until the green LED only begins to blink
- Teach complete

**SYSTEM CALIBRATION**

The user can program the stroke distance of each actuator for the desired operation. To set the positions of fast and slow operation, connect one actuator at a time and use the following procedure:

- Turn off the transmitter and the receiver and disconnect all actuators electrically.
- Install the actuators using the linkage to the device (valve, pump, Engine throttle, etc.)
- Perform the following to calibrate each actuator:
- Turn on the transmitter
- Press and hold FAST (BUTTON 8) and SLOW(BUTTON 7) for 5 seconds and release. At this point, the red LED on the transmitter will blink rapidly to indicate it has entered program mode and is ready to memorize shaft positions. *Note: the red LED on the transmitter will change the blink speed after each position is set - fast, slow, fast, slow, etc.*
- Turn the receiver on
- Set actuator shafts to their center (neutral) positions.
- Connect the actuator to be calibrated to the receiver.
- Press Extend and Retract buttons simultaneously to store center position.
- Move actuator shaft to the desired *fast extend* position, then press Fast and the corresponding Extend button simultaneously
- Move actuator shaft to the desired *slow extend* position, then press Slow and the corresponding Extend button simultaneously
- Move actuator shaft to the desired *fast retract* position, then press Fast and the corresponding Retract button simultaneously
- Move actuator shaft to the desired *slow retract* position, then press Slow and the corresponding Retract button simultaneously
- If it is desirable for the actuator to bring the lever to center position press EXTEND and RETRACT button simultaneously, if the valve spring is centering the levers skip this step.
- Repeat steps 8 to 14 for each additional actuator requiring calibration.
- Press FAST (BUTTON 8) and SLOW(BUTTON 7) simultaneously to save calibration parameters and exit calibration mode.
- Actuator shaft position calibration complete.

**CLONING TRANSMITTERS**

**WARNING! - ONLY ONE TRANSMITTER CAN BE ON AT A TIME, THEY CANNOT BE USED SIMULTANEOUSLY - use with CAUTION!**

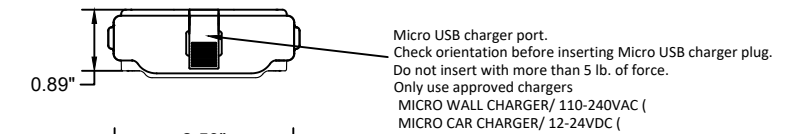
Occasionally, it is desirable to have more than one transmitter work with a single receiver. This is accomplished by a process called cloning. Cloning allows an additional transmitter (B) to have the same ID code as the original transmitter (A). If this feature is desired, use the following procedure:

- Make sure both transmitters and the receiver are off
- On Transmitter A, press and hold the POWER button for 10 seconds until LEDs blink, then release. Green and red LEDs will blink together at this point
- On Transmitter B, press and hold ACTUATOR 1 EXTEND, ACTUATOR 1 RETRACT and POWER buttons simultaneously until both LEDs start blinking then release buttons
- Wait for ~5 seconds until the green LED starts blinking rapidly on transmitter A and transmitter B turns off
- Cloning complete

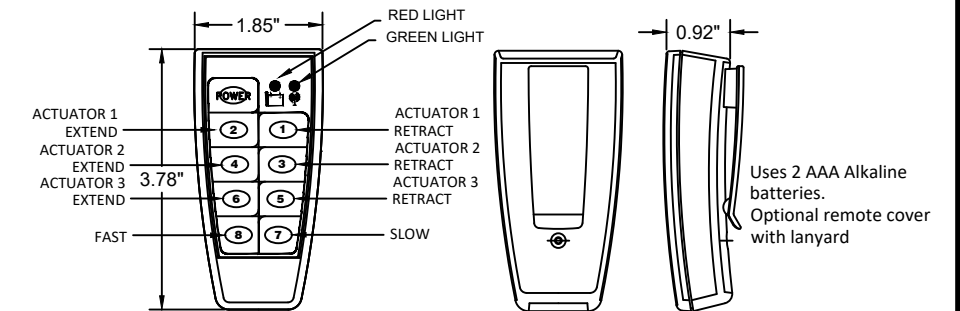
6. Synchronize one of the transmitters to the receiver using the SYNCHRONIZING TRANSMITTER AND RECEIVER procedure above

If the 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:

- Make sure the receiver and transmitter are OFF
- Press and hold ACTUATOR 1 EXTEND, ACTUATOR 2 RETRACT, FAST and POWER buttons simultaneously until both LEDs start toggling then release buttons
- Press any button again to select a new ID
- Uncloning complete
- Follow the SYNCHRONIZING TRANSMITTER AND RECEIVER procedure above to link the uncloned transmitter to a new receiver



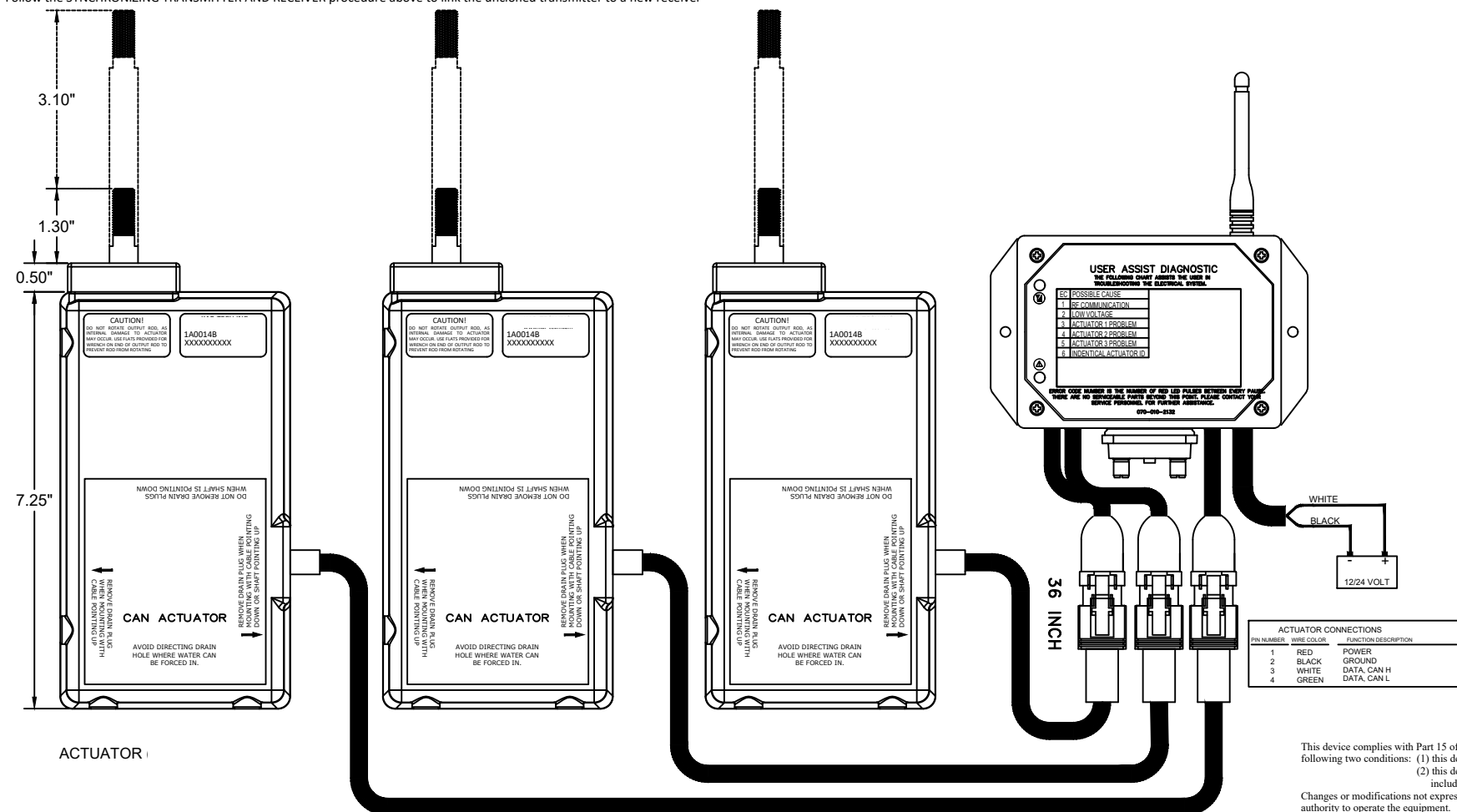
**MACRO TRANSMITTER**



**MINI TRANSMITTER**



**MICRO TRANSMITTER | CHOICE OF TRANSMITTERS**



**ACTUATOR CONNECTIONS**

| Pin Number | Wire Color | Function/Description |
|------------|------------|----------------------|
| 1          | RED        | POWER                |
| 2          | BLACK      | GROUND               |
| 3          | WHITE      | DATA, CAN H          |
| 4          | GREEN      | DATA, CAN L          |

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by Kar-Tech will void the user's authority to operate the equipment.

|                                    |       |                   |           |
|------------------------------------|-------|-------------------|-----------|
| TITLE                              |       | IMPLIED TOLERANCE |           |
| 2 SPEED RANGER REMOTE SYSTEM       |       | XX                | + .1      |
|                                    |       | XXX               | + .06     |
|                                    |       | XXXX              | + .015    |
| CAD DRAWING DO NOT REVISE MANUALLY |       | FRACTIONAL        | + .05 deg |
| SCALE                              | DRAWN | DATE              | CHECKED   |
| FULL                               | BK    | 01-10-19          | APPROVED  |
| DRAWING NO.                        |       |                   |           |