Installation and Quick Start Guide

G2B Radio Remote Control System









System Name	Manual Part Number	Revision	Date
PODS Legacy, Quick Start Guide	MAN-G2B-127	Rev 3	Feb. 16, 2017

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Revision	Date	Name	Notes
1	10/26/2016	Scanreco NA	Initial Release
2	01/09/2017	Scanreco NA	Down and up direction were swapped on the paddles labels
3	02/16/2017	Scanreco NA	Updated the up and down on the wiring diagram

1 G2B System Overview

This guide is intended as a complement to the Service Manual and Remote Control System RC400 G2 Instruction manual. It is a brief overview of the important features of a specific radio remote control system. Installers and Operators must read the Service Manual and Instruction manual before installing / operating the system and adhere to all warnings and recommendations.

The Scanreco G2B Radio Control (RC) System offers the machine operator an extremely advanced remote control system with speed, precision, control and maximum safety. The G2B RC System is comprised of the following components:



No	SNA Part Number	Description	Qty
		Typically includes all items listed below	N/A
1	PCU-MINI-149	Portable Control Unit (PCU) Mini or Maxi (shown)	1
2	CU-3011-101	Central Unit (CU)	1
3	437-12	Battery charger with cigarette lighter	1
4	593	Battery cassette (NiMH 7.2 VDC)	2
5	47545	Tether cable (10 meters)	1
6		Cable kit; supply cables + digital outputs (Optional)	1
7		Cable kit; valves cables / analogue outputs (Optional)	1

2 CU Installation and Wiring

The following instructions will help an installer wire the Central Unit to the controls of your specific machine. The installer may choose to make the wiring harness himself or use the generic Scanreco wiring harnesses for ease of installation. Please consult your sales representative for more information regarding generic wiring harnesses.

Read this entire section before proceeding with the installation. In order to maximize product life and prevent involuntary service, **this section must be followed** when installing and wiring your CU.

Important Notice About Welding!

If you plan to do any welding on the machine after the CU has been installed; the CU's electrical connections **must always be disconnected**! Power supply cables (+ and -), all valve contacts, tether and all other wiring to the CU must be disconnected. Welding can cause severe damage to all vehicle electronics and if detected may void your warranty.

A. Locating the CU

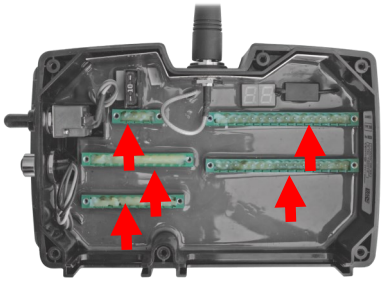


BEST No No

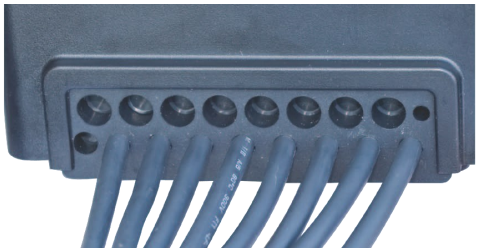
- **For optimum radio communications** the CU or external antenna should be located as high on the machine and free from obstructions as possible. An antenna screened and surrounded by fixed objects (especially metal) will considerably reduce radio range
- The antenna pin must not touch any metal object
- The central unit should be mounted in a vibration free location and not be subjected to strong sources of heat (for example exhaust pipes etc.)

B. Apply Grease to Contact Pins

If grease is not already applied to all the connector pins of the CU (shown in the picture); be sure to add water resistant grease suitable for electronic applications to the areas noted.



C. Feed Cable Through Membrane



Pierce the membrane and feed the cable through. A tight fit ensures a good seal.

D. Secure Cable



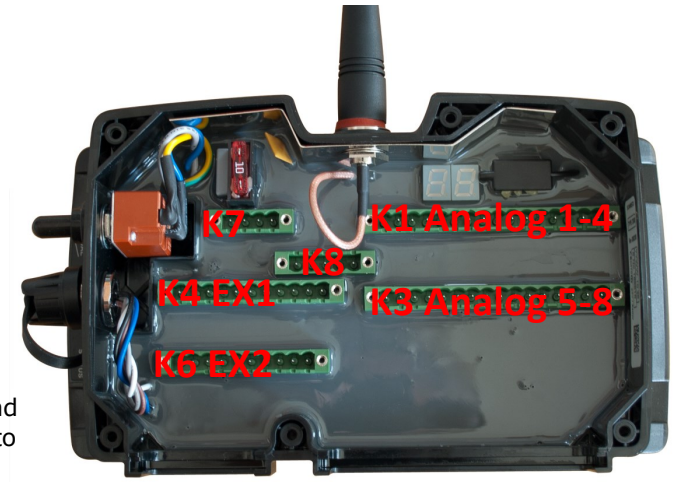
Secure the inner side of the cable with a cable tie or similar.

E. Terminal Schematic

K7 **Main**

Pin no	Function
K7.1	Supply (+12/24VDC)
K7.2	Ground (GND)
K7.3	Dump Valve Out (DV+)
K7.4	DV GND

Note: An electrically controlled dump valve should always be connected, for safety reasons, between the function valves and the hydraulic tank. **During a system stop DV+ will be off** to ensure the system is without hydraulic pressure.



Note: Pin 1 starts on the Left for all connectors.

K1 **Analog Outputs**

Pin no	No	Function Name
K1.1	1A	Left Front Up
K1.2		GND
K1.3	1B	Left Front Down
K1.4		GND
K1.5	2A	Right Front Up
K1.6		GND
K1.7	2B	Right Front Down
K1.8		GND
K1.9	3A	Left Rear Up
K1.10		GND
K1.11	3B	Left Rear Down
K1.12		GND
K1.13	4A	Right Rear Up
K1.14		GND
K1.15	4B	Right Rear Down
K1.16		GND

K3 **Analog Outputs**

Pin no	No	Function Name
K3.1	5A	Left Drive Forward
K3.2		GND
K3.3	5B	Left Drive Reverse
K3.4		GND
K3.5	6A	Right Drive Forward
K3.6		GND
K3.7	6B	Right Drive Reverse
K3.8		GND
K3.9	7A	Unused PWM +
K3.10		GND
K3.11	7B	Unused PWM +
K3.12		GND
K3.13	8A	Unused PWM +
K3.14		GND
K3.15	8B	Unused PWM +
K3.16		GND

K4 **EX1—Digital Outputs / Inputs**

Pin no	Function
K4.1	Output 1: Spread + (Extend)
K4.2	Output 2: Spread — (Retract)
K4.3	Output 3: On Button
K4.4	Output 4: On with Link
K4.5	Unused Digital Output 5
K4.6	Unused Digital Output 6
K4.7	GND
K4.8	Digital input 1
K4.9	Digital input 2
K4.10	Digital input 3
K4.11	Output (+VDC Supply)

K6 **EX2—Digital Outputs / Inputs**

Pin no	Function
K6.1	Unused Digital Output 7
K6.2	Unused Digital Output 8
K6.3	Unused Digital Output 9
K6.4	Unused Digital Output 10
K6.5	GND
K6.6	Unused Digital Output 11
K6.7	Unused Digital Output 12
K6.8	Unused Digital Output 13
K6.9	Unused Digital Output 14
K6.10	GND

K8 **EX3—Optional Features**

Pin no	Function
K8.1	CAN High
K8.2	CAN Low
K8.3	CAN GND
K8.4	Not Used
K8.5	Not Used

F. Special Logic Functions

The transmitter will turn off after 5 minutes of paddle inactivity.

G. Wire Inputs / Outputs

Inputs and Outputs need to be wired to the appropriate functions on the machine and in the CU. Leave unused and spare functions un-terminated.

Install 22-18AWG wire, appropriate for current consumption of loads (1.5 Amps max per output) with proper sized Ferrell cable end.

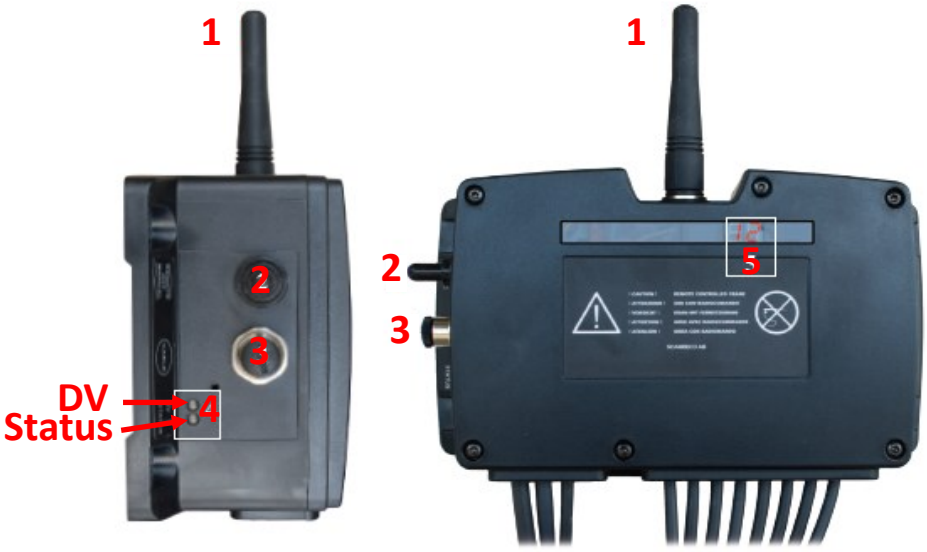
Orient cables as shown and apply water resistant grease suitable for electronic applications to the terminal connectors.



3 CU (Receiver)

3.1 CU Layout and Indicators

The Central Unit is equipped with 2 individual positions where status and operational indications can be read, the external LED's: DV and STATUS provide basic information. The internal LED display provides more detailed information. Below is the layout of the CU:



No	Description
1	RF Antenna
2	Remote / OFF / Manual Switch
3	Tether / Programming Connector
4	DV and STATUS LED's
5	Internal LED Display

Note: For CU's build before Fall 2010 the CU cover must be removed to view the Internal LED Display; for later units there is a viewing window as shown.

3.2 RF Antenna

The Central Unit show has a standard whip antenna with TNC connector. Optional antennas are available for various types of installations and range requirements. Please consult your sales representative for more information.

3.3 Remote / OFF / Manual Switch

The Central Unit is equipped with a Remote / OFF / Manual Switch to power the CU in different modes of operation:



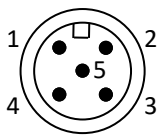
- OFF: there is no power to the internal electronics, Dump Valve or any outputs
- REMOTE: electronics are powered; PCU can link to CU and Dump Valve and outputs operate as specified
- MANUAL: there is no power to the internal electronics or any outputs; Dump Valve is ON. This bypasses the Dump Valve output to enable operation of manual or hand lever controls, if equipped.

3.4 Tether / Programming Connector

The CU can be connected through the Tether Connector to the PCU via a 5 wire tether cable. The cable has M12 connectors at each end.

The tether cable disables the RF transmission and charges the PCU battery, if installed. The cable is available in standard lengths of 10 meters.

The CU can also be connected to a PC for programming an calibration. Refer to Service Manual and WinSCI Manual for further details.



Pin No	Description
1	Data
2	Ground
3	RS232 TX
4	RS232 RX
5	+ Battery (VDC)

3.5 DV and STATUS LED's

Operational status indications can be read from the DV and STATUS LED's as follows:

Status LED	Description
OFF	CU is OFF or not powered
RED	CU is ON with no link to PCU
GREEN	CU is ON and linked with PCU (via cable or RF)
RED Flashing	Error code on Internal LED Display (see Section 3.6.2)

DV LED (Dump Valve)	Description
OFF	Dump Valve Output is OFF
RED	Dump Valve Output is ON



3.6 Internal LED Display

3.6.1 Operational Indicators

The Central Unit will indicate various operational states via the Internal LED display as shown below:

Indication		**Meaning**
Block 1	**Block 2**	
	(Rotating CCW)	CU is powered and not Linked to PCU
	N/A	Primary PCU is linked to CU via Radio, **H**opping (IH flashes as link gets weaker)
	N/A	CU is linked to primary PCU (ID programmed) via tether cable
	N/A	CU is linked via tether cable to PCU (**ID not programmed**)
		ID Programming initiated. See section 4.6 for details
		ID Programming Blocked; reset power on CU and Download ID again. See section 4.6 for details

3.6.2 Error Indicators

The Central Unit will indicate detected errors via the internal double 7-segment LED display. If the Central Unit detects an error it will be indicated by the STATUS LED flashing red; while the Internal LED Display indicates the error code. The digits "Er" are flashed, followed by two blocks with the corresponding error code.

Example of an error code sequence:



Repeated 3 times

The example above would indicate that there is a Short Circuit on PWM Output 1A

The error code sequence will repeat itself three times if the error is considered a soft error and reboot to standby mode to try and clear the error. If the error is considered a hard error the error code sequence will repeat until the power is disconnected.

Below is a list of error codes and their meaning:

Block 2	Block 3	Description	Cause	Action
01	01	EEPROM Failure	Incorrect checksum on EEPROM, last stored data will be set.	Reset system, if persistent; Re-load application program.
01	02	Flash Memory Failure	Incorrect checksum on flash memory.	Reset system, if persistent; Re-load application program.
01	03	Stack Memory Failure	Incorrect sizes of data in CANopen protocol, incorrect dataflow or stack overflow.	System will self reset automatically. If persistent; Re-load application program.
01	04	RAM memory failure	Incorrect RAM and/or hardware identification.	System will self reset automatically. If persistent; Re-load application program.
02	01	Illegal voltage DV-output	DV-output (DV+) externally supplied System will self reset.	Check DV-output connection. Remove terminal connector and reset system.
02	02	Short circuit DV-output	DV-output error; DV output (DV+) short circuited or overloaded.	System will self reset. Check DV-output connection. Remove terminal connector and reset system.
02	03	Safety switch error	Safety switch output read back error, incorrect voltage (High instead of Low).	System will self reset. Remove all terminal connectors and reset system.
02	04	Safety switch error	Safety switch output read back error, incorrect voltage (Low instead of High).	System will self reset. Remove all terminal connectors and reset system.
02	05	CAN Safety loop error	Incorrect status of CAN safety loop.	System will self reset. Check CAN safety loop connection. Reset system.
03	00	Illegal voltage Digital output	Digital output (1-14) illegal voltage, expected low signal but read as high (could be any of the available 14).	System will self reset. Check digital output connections. Remove terminal connector and reset system.
04	00	Short circuit; Digital output	Digital output (1-14) short circuited or overloaded (could be any of the available 14 outputs).	System will self reset. Check digital output connections. Remove terminal connector and reset system.
05	00	Error input triggered (Danfoss CU	Error signal for Danfoss valve triggered (Could be any of the available 8 inputs)	System will self reset. Check analog output connections. Remove terminal connector and reset system.
06	xx	Illegal voltage Analog output	Wrong voltage on analog output (**Block 3** declares related output; 1A,1B….).	System will self reset. Check analog output connections. Remove terminal connector and reset system.

3.6.2 Error Indicators (cont'd…)

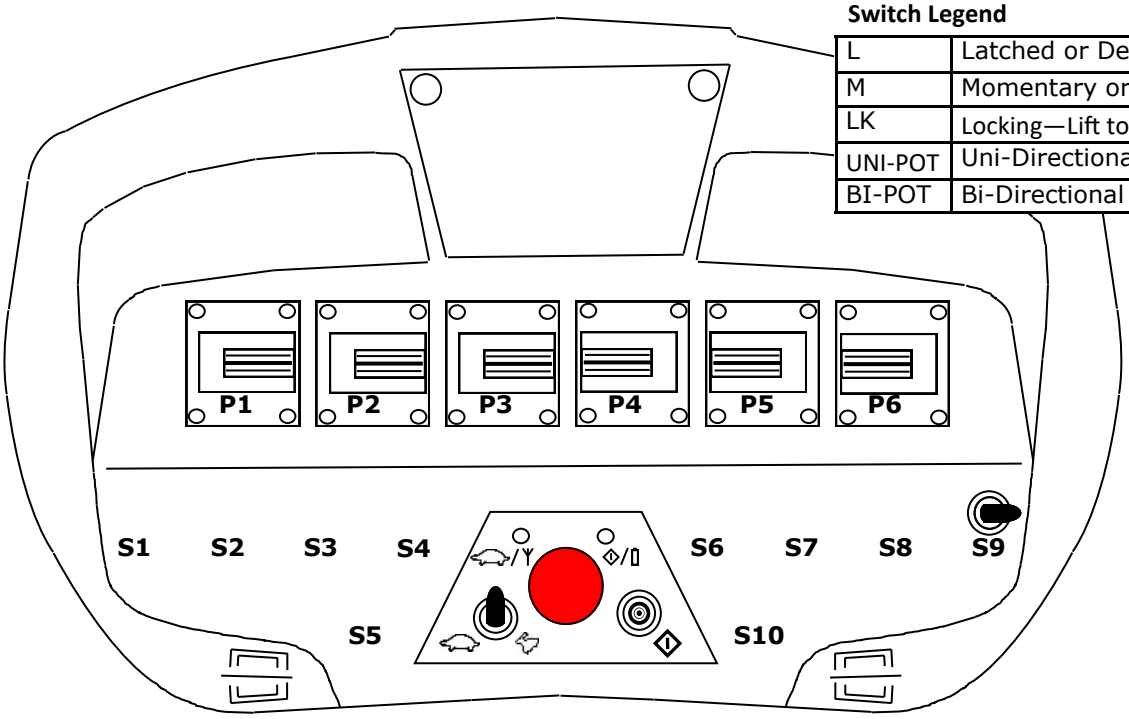
Block 2	Block 3	Description	Cause	Action
07	xx	Illegal voltage Analog output	Wrong current on analog output (**Block 3** declares related output; 1A,1B….).	System will self reset. Check connections. Remove terminal connector and reset system.
08	01	CAN Passive	CAN bus in passive mode.	System will self reset. Check CAN connections. Check other nodes on bus and reset system.
08	02	CAN I/O buffer overflow	CAN overrun; either the CAN input or CAN output buffer are full.	System will self reset. Reset system, re-initiate via CAN controller.
08	03	CAN physical layer error	Bad communication/transmission.	System will self reset. Check CAN connections. Check other nodes on bus and reset system.
08	04	CAN PDO length exceeded	PDO length is to long.	System will self reset. Reset system, re-initiate via CAN controller.
08	05	CAN PDO length error	PDO length is too short.	System will self reset. Reset system, re-initiate via CAN controller.
08	06	CAN Transmit COB-ID collision	To many collisions on CANbus.	System will self reset. Check CAN connections. Check other nodes on bus and reset system, re-initiate via CAN controller.
10	N/A	PCU failure; E-Stop	Error transmitted from PCU: Illegal signal from PCU emergency stop switch.	System will self reset. Check emergency stop switch on PCU.
11	N/A	PCU failure; Analog input	Error transmitted from PCU: Analog input active on start-up.	System will self reset. Ensure all analogue inputs on PCU are at zero/ neutral position. Restart PCU.
13	N/A	PCU failure; Analog input	Error transmitted from PCU: Signal redundancy test; illegal signal from analog input.	System will self reset. Diagnose PCU via TEST MODE.
14	01	ID programming failure	ID-code and/or parameter settings not accepted.	System will self reset. Retry ID-programming procedure.
14	02	Program failure	Programmable logic parameter error.	System will self reset. Reset application program.
15	xx	PWM output failure	Analog output short circuited or overloaded. (**Block 3** declares related output; 1A,1B….).	System will self reset. Check analog output connections. Remove terminal connector and reset system.
16	xx	PWM output failure	Analogue output not connected (programmable feature). (**Block 3** declares related output; 1A,1B….).	System will self reset. Check analog output connections. Remove terminal connector and reset system.
17	01	Low supply power	Low power supply (Below 8.5 VDC).	System will self reset. Check power supply and supply connections.
17	02	High supply power	High power supply (Above 36 VDC).	System will self reset. Check power supply and supply connections.

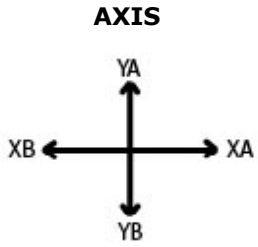
4 PCU

4.1 Mini Switch and Paddle Layout

Switch Legend

L	Latched or Detent
M	Momentary or Spring return
LK	Locking—Lift to operate
UNI-POT	Uni-Directional Potentiometer (0-10)
BI-POT	Bi-Directional Potentiometer (10-0-10)





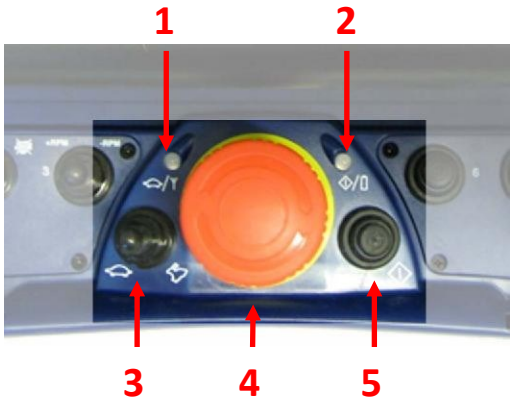
Paddles

Position	Function in UP (A) Direction	Function in DOWN (B) Direction
P1	Left Drive Forward	Left Drive Reverse
P2	Left Front Up	Left Front Down
P3	Right Front Up	Right Front Down
P4	Left Rear Up	Left Rear Down
P5	Right Rear Up	Right Rear Down
P6	Right Drive Forward	Right Drive Reverse

Switches

Position	Axis	Function A		Center	Function B	
		Type	Name		Type	Name
S1						
S2						
S3						
S4						
S5						
S6						
S7						
S8						
S9	X	M	Spread +	Idle	M	Spread -
S10						

4.2 Power / Stop / Micro Speed Switch Panel

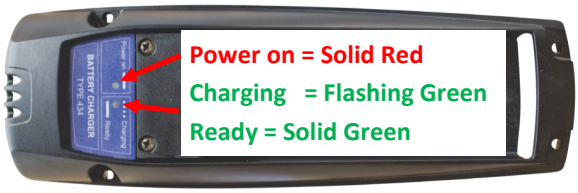


No	Description
1	Micro Speed (Green) / RF Indicator (Red) LED
2	Power ON / Low Battery LED
3	Micro Speed Switch
4	Stop Function Mushroom Button; twist to reset
5	Power / Function Button

The above figure and table detail the layout of a **Maxi** generic Power / Stop / Micro Speed Switch panel. **Mini** switch panels are very similar in layout with the same functionality. Indicators and switch functions are detailed in the sections below.

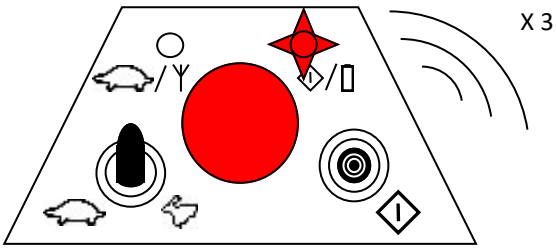
4.3 PCU Battery and Charging

- Each Battery needs to be fully charged before use. Connect charger to 10-32 VDC or 120 VAC depending on type supplied.
- PCU battery compartment is located in the bottom of the PCU housing. Batteries are keyed to ensure correct orientation.





- Ensure terminals are clean and free from debris before installation of a battery
- A new fully charged battery will last approximately 8 hours on a charge. Extremely cold conditions can reduce battery performance.
- PCU's are typically programmed with a 5 minute inactivity timeout as a battery saving feature; turning off the PCU after X minutes of paddle / joystick inactivity. This is a configurable feature that can be adjusted or removed as requested.



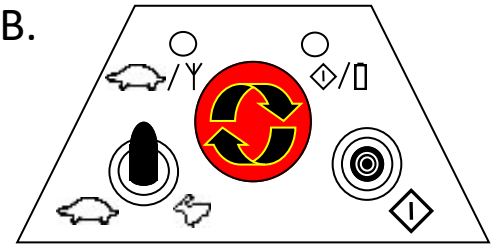
Low Battery is indicated on the PCU when the internal Buzzer beeps 3 times and the Power ON / Low Battery LED flashed Red.

4.4 Powering the PCU

A.

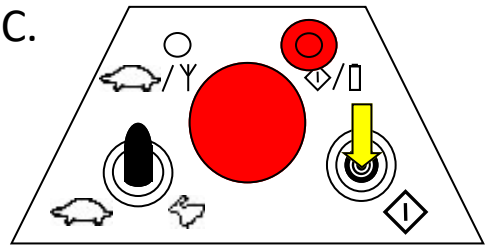
Install charged battery or connect tether cable

B.



Rotate E-Stop CW

C.



Press and hold Power Button until Power ON LED will illuminates solid RED

D.

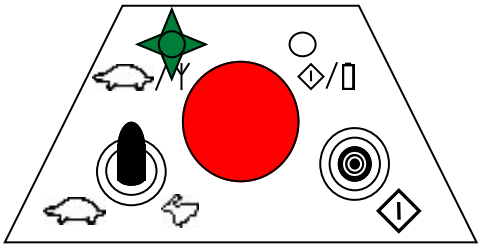


Note: If no link is established the RF indicator LED will flash RED 4 times then turn off. Continue to Section 4.6 Downloading ID: Pairing PCU and CU.

Tether Note: Tether connection has priority over RF transmission, if a tether link is present between the PCU and CU the radio will be disabled and battery will be charged (if installed). The PCU inactivity timeout will also be disabled when connected via tether cable.

4.5 Micro Switch Operation

The Micro Speed Switch can be programmed to reduce the maximum speed of any Proportional Paddle / Joystick outputs. Typically in five (5) steps as indicated in the table below. The number of steps and percentage of reductions is adjustable.



Micro / RF LED Green	Indication
not lit	0 to 100 % speed (normal speed)
1 blink every third second	0 to 60 % speed
2 blink every third second	0 to 50 % speed
3 blink every third second	0 to 40 % speed
4 blink every third second	0 to 30 % speed
5 blink every third second	0 to 20 % speed



Pressing the Micro Speed switch to the Turtle position will decrease the proportional outputs by one step in the above table.



Pressing the Micro Speed switch to the Rabbit position will return the proportional outputs to 100% operation.

- For safety reasons, a return to 100% steering can only be made if all Paddles / Joysticks are in their center positions.
- When the green LED is blinking, the Micro-speed function is activated. The number of blinks indicates the operating speed as defined in the table above. If the Stop Function is pressed on the PCU, the PCU will start from the last chosen speed.

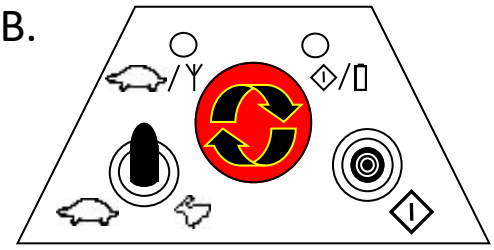
4.6 Downloading ID: Pairing PCU and CU

Programs the unique ID-code required for radio communication between the Portable Control Unit and Central Unit. Typically the CU may store a maximum of 1 PCU ID-code. If another PCU is required to operate the CU via radio, the ID-code procedure is required to be done and the previous ID-code will be overwritten.

A.

Remove battery from PCU and connect tether cable between CU and PCU.

B.



Release E-Stop; Rotate CW

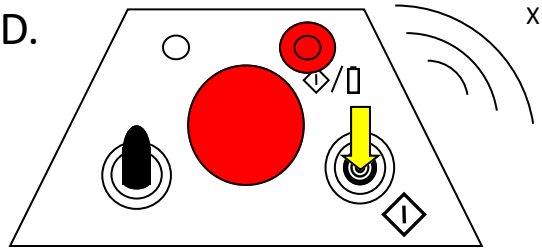
C.

Remote / OFF / Manual Switch

Cycle power on CU -> Toggle switch from OFF (center) to Remote (up) position. *Step D. must be done within 45 seconds of C.*



D.



Press and hold Power Button (approx. 10 Seconds) until Power ON LED illuminates solid RED and Buzzer in PCU beeps once.

PCU ID is now being sent to CU.



E.

The PCU will beep in quick succession to confirm programming is completed.

F.

If this procedure does not work, repeat the programming (see items B-E). If it still does not work, contact Scanreco North America.