POWER PRO DCC ᵀᴹ
Digital Command Control

ProCab Wireless
Supplement

Versions 1.5

Operate your cab without "plugging in"

Features:
- √ True two way wireless capability to your ProCab
- √ All features of your ProCab are available without plugging in
- √ Uses ANY battery chemistry: Alkaline, NiCad, NiMH, Lithium, Lead Acid
- √ 40+ hours of operation (typical) with Alkaline batteries
- √ Automatic switchover to bus power when plugged in
- √ Graceful degradation of operation when approaching maximum range

NOTE: We do not recommend that wireless systems be used in "show" environments due to the possibility of interference to/from other DCC radio systems or from Cell phone repeaters.

About your wireless Procab:

The Procab-R is designed to eliminate the need for tethered operation of an NCE ProCab. All present and planned features of the cab are usable while untethered from the cab bus.   The adapter is battery powered and will supply power for both cab operation and the adapter itself. Although the installed wireless adapter is designed to operate at any voltage from 2 to 16 volts we recommend the use of 4 AAA cells. The ProCab has a built in battery chamber for 4 AAA battery cells. The transmitter power of the Procab is .00025 Watts. By comparison your cell phone can put out 3 Watts or about 12,000 times the power of the ProCab. For this reason a general discussion of wireless communications follows.

Wireless communications:

We are continuously asked about the operating distance of the wireless cab. There are many factors governing the useful range of wireless products. The Procab-R operates in the ISM (Industrial, Scientific and Medical) radio band at 916.5 MegaHertz (Mhz). Many cordless phones, wireless computer networks, home automation systems, and wireless security devices also operate in this portion of the radio band and all contribute to radio interference. In any radio system, propagation of the radio signal will suffer in the presence of 'in band' intererence. When devices operate in the same frequency band they may contribute interference to the point where your cab may not work at all. On the other hand your wireless cab may interfere with the operation of the other devices you already own. Radio waves are like one big telephone 'party line' where everyone is talking at once. A device using these radio waves must attempt to sort out what 'voices' are relevant to its operation and which ones are 'noise'.   If there is too much noise it can't do this successfully and will operate poorly or not at all. *This is especially prevalent in Arenas and convention Centers due to multiple cell phone repeaters and security devices*.

Indoor radio propagation is an issue for special consideration. The human body readily absorbs RF energy in the frequency band used by the cab radio. Placement of the base station can mitigate blocking of the radio signal due to human body absorption. In most indoor situations 'dead spots' can be found where reception is very difficult. These can occur even if there appears to be a direct line of sight between the transmitter and receiver. These dead spots, or 'nulls', are the result of multiple radio transmission paths between two points caused by reflections off metal objects such as steel beams, screen wire, concrete rebar, metal door and window frames, ceiling tile frames, model railroad track, etc. Nulls occur where the path lengths differ by an odd ½ wavelength (about 6 inches at 900 MHz). Deep nulls are usually very localized and can be avoided by moving slightly, usually only a few inches. When performing complex tasks involving many messages displayed on the ProCab, communications between the cab and command station may take longer than expected thus slowing down your programming. In these instances you may find it more expedient to plug in the cab while doing extensive programming or system setup.

Operation of the Cab:

Cab Addresses:

Wireless **Procabs** must be set to cab addresses in the range of **2-7 or 9-17 (do not use address 8).**
Wireless **Cab04p, Cab04e and Cab05** must be set to cab addresses in the range of 19-48 **(do not use address 49)**
Cabs with addresses outside these ranges will not work wireless.

To turn on the cab:

Press "EMERGENCY STOP". The display will activate and show the 'version message' but the backlight of the LCD display will not be on. The 'version message' will not disappear until the cab successfully communicates with the RB01 base station.   After the cab communicates with the base station normal operations can begin just as if you were plugged in to the cab bus.

Description of LED activity:

The LED on top of the cab will flicker every time it communicates with the base station. A regular 'pulse' of this LED indicates good quality communications. The flickering will become erratic when you are getting out of range from the base station. You can use this LED activity to 'map out' weak signal areas and 'nulls' of the layout room.

Priority is placed on commands getting from the cab to the base station. As you approach the maximum range of the cab, updates to the LCD display will lag behind the commands being sent to the base. If the base station is not able to complete sending display updates it will try to re-send them 16 times before giving up. The base station LEDs flash brightly when it is trying to send display update information.

Updating the LCD:
If you turn the cab on and the "NCE WIRELESS 1.0" text is not replaced by the normal cab display press "ENTER" to refresh the display on your cab with the 'normal' display information.

To turn off the cab:
Press "EXPN" and select option #1 (TURN CAB OFF).

Setup Option 2:

Automatic shutdown:
As it comes from the factory, the cab will automatically shut itself off after 10 munites of inactivity. This time can changed from 2 to 20 minutes by pressing "EXPN" and selecting option #2 (SETUP RADIO). Press 1 through 9 to select ½ the number of minutes before the cab automatically shuts off. Entering 5 set the shutoff to 10 minutes. If you enter 0 the cab will never automatically shut off and you will have to manually shut it off. Press enter to skip setting/changing the Layout ID. The cab should return to normal operation. Factory default is 10 minutes (value of 5)

Layout ID:
The layout ID is used in situations where multiple layouts using the NCE wireless are running in the same area. When the ID is set to 0 all layout IDs are ignored by the cab and it will communicate with any base station it hears. When set to 1,2 or 3 the layout ID must match between the cab and base station. The layout ID is set by pressing "EXPN" and selecting option #2 (SETUP RADIO). Press "ENTER" to skip setting/changing the automatic shutdown timer. Press 0 to 3 to set the Layout ID. Only values of 0 to 3 are accepted. Press enter and the cab should return to normal operation.

Turning on the LCD backlight:
The LCD backlight comes for 3 seconds on when you press any key which might require reading the LCD display such as SEL LOCO, PROG/ESC, MACRO, etc. Each subsequent key press will extend the time the light stays on by 3 seconds. Pressing the "SHIFT" key will also turn on the backlig ht.

Tips:
When you press a button on the ProCab press and hold for about a second. You don't have to press harder than normal but pressing slightly longer results in better performance.

We recommend having several our UTP or DIN plug-in panels located around the layout where you can plug in the cab in case the battery goes dead or conditions such as severe interference cause loss of control via radio. We usually hang a short cab cable about 2 feet long from a small number these panels to facilitate plugging in in an emergency.

You may find it more expedient to plug in the cab while doing extensive programming or system setup. When performing complex tasks that require many messages to be displayed on the ProCab, communications between the cab and command station may take longer than expected thus slowing down your programming.

The LED on the cab flashes every time it sends a cab status update to the base station.
You can use this flashing to map out the dead spots in the layout room. The cab is communicating best when the LED has a steady flicker. Move about the room noting where the spots wher the flashing stops or becomes erratic. Then move the base station to a different location until you get good reception at at the most important operating spots.
The cab may not operate when you get within 1 foot (300mm) of the base station (other cabs will still operate normally).

The ProCab seems to propogate the radio signal better to the sides of the cab than to the front or rear. Turning the cab sideways to the base station will sometimes result in better communications.

Antenna Radiation Patterns from RB01 Base Station

Side View

Top View
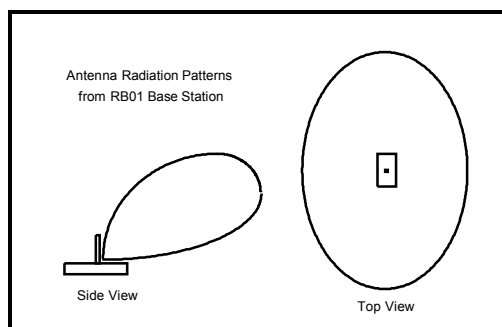
The cab works much better with the antenna vertical.

In crowded layout rooms we've had good luck attaching the base station to the ceiling with the antenna pointing down. See the diagram below for how the radio signal propagates from the antenna.

Legalese:
The RU01-Pro, RU01-4/5 and RB01 wireless adapters for NCE cabs areRF products and may only be used in countries in which the units have been Type Approved or Certified for sale and operation.   Use of these products in countries where they are not certified may result in interference to other critical radio services and legal penalties. (Current +countries of certification: USA, Canada, Australia)

This devicehas been tested tocomply with Part 15 of the FCC rules. Operation is subject to the following 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.

Warranty
This product is fully factory tested and warranted against manufacturing defects for a period of 1 year. As the circumstances under which this product is installed can not be controlled, failure of the product due to installation problems can not be warranted.   This includes misuse, miswiring, operation under conditions beyond the design range of the product. No guarantees are expressed or implied as to the suitability of the product for its intended use by the purchaser. No guarantees can be made as to the communications range or performance of this product in the presence of radio or other electromagnetic interference. It is possible that interference can cause undesired operation including loss of control of speed, direction etc. Damage to purchaser's equipment due to loss of control is not warranted or covered by NCE.

For warranty or non-warranty replacement send the decoder (and any payment, if required) to:

NCE Warranty Center
82 East Main St
Webster, New York 14580

Spare Parts:
Spare parts for your cab or RU01 wireless adapter may be ordered from the list below. $4 US will be added to your order for US priority mail and packaging.   Check or credit card will be accepted.

Send parts orders to:

NCE Spare Parts
82 East Main St
Webster, New York 14580

Description	Price (US $)
ProCab bottom w/ battery door	$8.00
Procab top	$8.00
Rubber keypad for ProCab	$7.00
ProCab battery clip set w/wires	$3.00
Antenna-HG	$10.00
Pro Cab screws (set of 9)	$2.00
Cab04/05 rear cover w/battery door	$6.00
Cab04/05 screws (set of 4)	$1.50
Cab04/05 battery holder	$1.50
Rubber keypad for Cab04/05	$6.00