Installation and Reference

Manual for the

POWER PRO DCC ™

Digital Command Control

RB01 Wireless Base Station

Version 1.0

Operate your cabs without cables

Features:

- No annoying delay after turning your speed knob. Speed changes instantly!
- Handles up to 48 cabs.
- Add wireless capability to your NCE powered layout
- Two way communication with the cab
- All features of your Cabs are available without plugging in
- Just plug it in - no soldering!
- Cabs automatically switchover to bus power when plugged in
- Graceful degradation of operation when approaching maximum range

About your wireless adapter:

The RB01is designed to work with the RU01-pro 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 RU01-Pro adapter is designed to operate at any voltage from 8 to 16 volts we recommend plugging it into the 12 volt DC cab bus. The transmitter power of the RB01 is .00025 Watts. By comparison your cell phone can put out 3 Watts or 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 RB01 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. 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.

Indoor radio propagation is an issue for special consideration. The human body readily absorbs RF energy in the frequency band used by the RU01 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 operations. In these instances you may find it more expedient to plug in the cab while doing extensive programming or system setup.

Installation:

Just plug it in to the NCE cab bus. See **tips** section for locating the base station**.**

Operation of the RB01:

Operation is automatic when connected to the NCE cab bus. There are no adjustments or other installation required.

Description of LED activity:

The LED on side of the RB01 will flicker every time it communicates with a wireless cab. A regular low intensity 'pulse' of this LED indicates it is receiving status updates from cabs. The messages are very short so the intensity of the flash is low. The flashing will intensify when the base station is attempting to send updates to ProCab LCD displays. These message are quite long (2-8 times longer) compared to cab status updates so they result on 2-8 times brighter flashes of the LED.

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.

Tips:
When you press a button on a Cab hold it down 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 conventional cab plug-in panels located around the layout where you can plug in the cab in case the battery goes dead or conditions such as interference cause loss of control via radio. We usually hang 2 or 3 short cab cables about 2 feet long from a small number these panels to facilitate plugging in if an operator experiences problems.

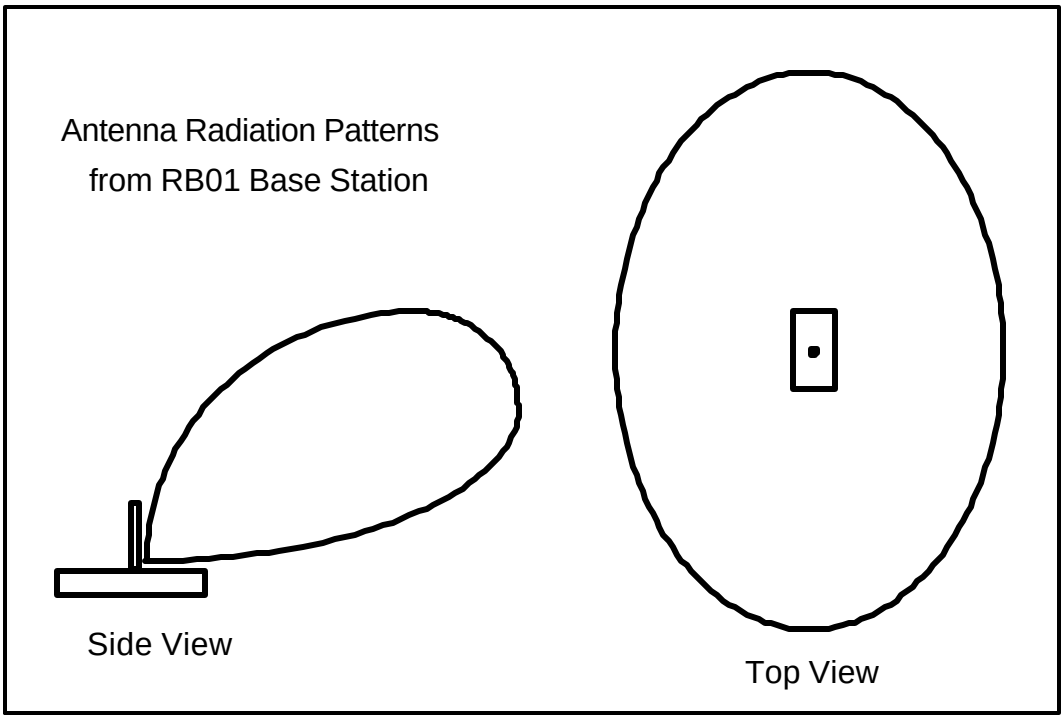
You may find it more expedient to plug in the cab while doing extensive programming or system setup. When performing complex tasks that require many messages to be displayed on the ProCab, communications between the cab and command station may take longer than expected thus slowing down your operations.

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 where 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 (300 mm) of the base station (other cabs will still operate normally). The LED on the cab will flicker but the will not seem to communicate with the base station. This is due to overloading of the base station radio receiver. In this situation we've found that covering the antenna with your hand will attenuate the signal enough for reliable communication. Due to the extreme low power of the cab radios we've had to make the radio receivers in the base station very sensitive. This can result in the receiver being overloaded when a cab is too close.

Cabs will work much better with the antenna vertical rather than pointing the antenna at the base station.

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 are RF 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.

FCC ID: NC4RB01
This device complies 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, and 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 issues send the product (plus payment, if required) to:

NCE Warranty Center
899 Ridge Road
Webster, New York 14580

Spare Parts:
Spare parts for your RB01 wireless base station 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.

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

Address all parts orders to :

NCE Spare Parts
899 Ridge Road
Webster, NY 14580