NCE Cab Wireless Supplement
Version 1.5

Operate your cab without "plugging in"

✓True two way wireless capability to your NCE Cab

✓All features of your Cab 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

No guarantees are made by NCE or authorized NCE dealers as to the suitability of this product for its intended use.   As with all radio products, communication integrity in the presence of interference can not be guaranteed.

NOTE: We do not recommend that wireless systems (versions 1.0 - 1.5) be used in "show" environments due to the possibility of interference to/from other DCC radio systems or from Cell phone repeaters.

The ProCab r

To select a locomotive

- Press "**SELECT LOCO**"

- Type in loco number

- Press "**ENTER**"

Push **RED** button to turn **ON**

Press "**EXPN**" then "**1**" to turn off

4 x AAA batteries

Observe polarity

82 East Main Street, Webster, NY 14580 585-265-0230

Push **HORN** button to turn **ON**

Cab04 and Cab05 throttles use 2 x AAA batteries. The Cab06 throttles use 4 x AAA batteries. Observe polarity.

To select a locomotive

- Press "**SELECT LOCO**"

- Type in loco number

- Press "**ENTER**"

The Cab04 r, Cab05 r, Cab06 r

About your wireless Cab:
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 in the Pro Cab, we recommend the use of 4 AAA cells. In the Cab04 or Cab 05 cabs, we recommend the use of 2 AAA cells. Each cab has a built in battery chamber for the appropriate number of AAA battery cells. The transmitter power of our cabs is .00025 Watts. By comparison your cell phone can put out 3 Watts or about 12,000 times the power of our cabs. 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 NCE wireless cabs operate 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 cab, 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.

Legalese:
The RU01-Pro, RU01-4/5 and RB02 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. (Current +countries of certification: USA, Canada, Australia)

This device has been tested to comply 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 item (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. $5.00 USD 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 (USD)
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
ProCab screws (set of 9)	$2.00
Cab04/05/06 rear cover w/battery door	$7.00
Cab04/05/06 screws (set of 4)	$1.00
Cab04/05 battery holder	$1.50
Cab 06 battery holder	$3.00
Rubber keypad for Cab04/05/06	$8.00

Operation of the Cab:

To turn on the Pro 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 RB02 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. If you have difficulty turning the cab on, HOLD DOWN the ENTER key while pressing the EMERGENCY STOP key. This will "kick Start" the radio.

To turn on the Intermediate Cabs:

Press "HORN". The cab will activate and the LED very briefly flash. After the cab communicates with the base station normal operations can begin just as if you were plugged in to the cab bus.

To turn off the Pro Cab:

Press "EXPN" and select option #1 (TURN CAB OFF).

To turn off the Cab04 or Cab05:

Just let it "timeout" and shut itself off. Optionally, you can also program the "OPTION" button to be the "EXPN" button (see your CAB04/5 manual). Then press "OPTION" followed by "1" to turn the cab off.

To turn off the Cab06:

Hold down the Shift key while pressing the Horn key.

Automatic shutdown:
As it comes from the factory, the cab will automatically shut itself off after 10 minutes of inactivity.

Cab Addresses:

Wireless **Procabs** must be set to cab addresses in the range of **2-17.**
Wireless **Cab04p, Cab04e and Cab05** must be set to cab addresses in the range of **18-48**.
Cabs with addresses outside these ranges will not work wireless. If you set a ProCab r to a cab address in the range of 18-49, you <u>will</u> have control of your loco but the cab screen will not update.

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 Pro Cab LCD:

If you turn the cab on and the "NCE WIRELESS 1.5" text is not replaced by the normal cab display press "ENTER" to refresh the display on your cab with the 'normal' display information.

Pro Cab Setup Option 2:

Automatic shutdown:
As it comes from the factory, the cab will automatically shut itself off after 10 minutes 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 sets 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. Factory default is 10 minutes (value of 5)

Turning on the LCD backlight:

The LCD backlight comes on for 3 seconds 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 backlight.

Tips:

When you press a button on the wireless cab 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 of these panels to facilitate plugging in during an emergency.

You may find it more expedient to plug in the Pro 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 cabs seem 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.

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