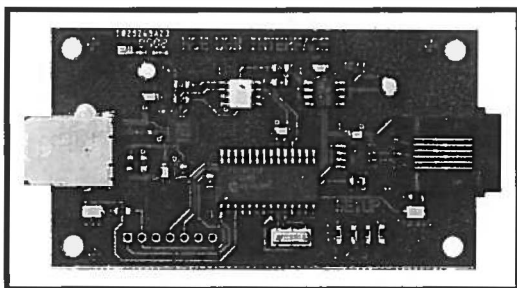


# NCE

*The Power of DCC*

## USB Interface



\$49.95

USB interface for NCE Cab Bus

Version 7.x.x

### Features of the USB Interface Board:

- ✓ Supports train/accessory/signal operation and Ops programming with all NCE DCC systems
- ✓ Also Supports **Power Cab** program track
- ✓ Optoisolated USB prevents "sneak path" short circuits
- ✓ Multiple USB boards can be used with some NCE systems
- ✓ USB drivers for Windows, Mac OS X and Linux via Internet download

Use of this product **requires** Internet access to download the latest USB drivers



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Age  
14+

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**Warning:** This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

**Notice: This product requires Power Cab version 1.28c (or newer) for proper operation. If you have version 1.28b or earlier contact NCE (585-265-0230).**

**Description:**

The USB interface board provides a means of connecting a computer to the NCE cab bus. While primarily designed to provide a computer interface to the Power Cab program track, it can additionally be used with any NCE system to run trains, control signals, turnouts and Program on the Main (OPs mode programming).

When used with the Power Cab the USB board cab bus address must be 3. When the appropriate shunts are installed to configure the USB board for use with a Power Cab the address is automatically forced to cab bus address 3. When configured for a different NCE system the cab bus address can be changed via a command (binary command 0xB1) through the USB port.

Optical isolation is provided to prevent "sneak path" short circuits when connected to a computer.

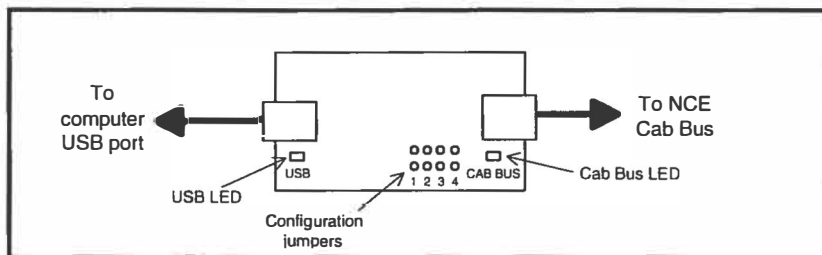
You may use as many USB interface boards as you wish, up to the limit of available cab addresses on your DCC system. Each USB board draws only 45mA from the Cab Bus power.

**Mechanical Installation:**

The USB interface has 4 mounting holes that can be used to mount it to a convenient place on your layout. We recommend using #4 x 3/4" round head wood screws with #4 flat washers. Do not over tighten the screws. Lightly snug the screws up just enough to keep the circuit board in place without bending it. Bending the circuit board can fracture the fragile ceramic electronic components.

**Electrical Connections:**

The diagram below illustrates the wiring of the USB interface between your computer and DCC system. The computer connection is via Type A to Type B USB cable. Connection to the NCE Cab Bus is via regular cab bus modular cable (If using a Power Cab you can use the coiled cord supplied with the Power Cab). This product will only work with NCE DCC system products.



**Like the V6 of the USB adapter, the V7 USB interface can run trains, run macros and control signals on all NCE DCC system. Below is the matrix of things V7 does NOT support relative to the NCE system used.**

DCC System Name	DCC System Software Version	Jumper JP2	Jumper JP3	Jumper JP4	Baud Rate	USB Cab Address	Version Reported to PC	Accessory Address Range	Accessory Ops Mode Program?	Locomotive Ops Mode Program?	Prog Track Support ?	AIU Read back?	CS memory Access?	Notes
PowerCab	1.28c	off	off	off	9600	<b>3</b>	7.3.0	1-2044	Yes	Yes	Yes	<b>NO</b>	<b>NO</b>	7
SB5 or SB3a	1.65	off	off	<b>ON</b>	19200	Set By PC	7.3.1	1-2044	Yes	Yes	<b>NO</b>	Yes	Yes	6
SB5 or SB3a	1.65	off	<b>ON</b>	off	9600	Set By PC	7.3.2	1-2044	Yes	Yes	<b>NO</b>	Yes	Yes	6
PowerCab or Twin	1.65	off	<b>ON</b>	<b>ON</b>	19200	Set By PC	7.3.3	1-2044	Yes	Yes	Yes	Yes	Yes	1
PowerCab	1.28c	<b>ON</b>	off	off	9600	<b>3</b>	7.3.4	1-250	Yes	Yes	Yes	<b>NO</b>	<b>NO</b>	7
SB3 of SB3a	1.28d	<b>ON</b>	off	<b>ON</b>	19200	Set By PC	7.3.5	1-250	Yes	Yes	<b>NO</b>	<b>NO</b>	<b>NO</b>	2
PowerPro	3.1.07	<b>ON</b>	<b>ON</b>	off	9600	Set By PC	7.3.6	1-2044	<b>NO</b>	<b>NO</b>	<b>NO</b>	Yes	<b>NO</b>	3
All Systems	1.65	<b>ON</b>	<b>ON</b>	<b>ON</b>	19200	Set By PC	7.3.7	1-2044	Yes	Yes	Yes	Yes	Yes	4
PowerPro + RS232	N/A	N/A	N/A	N/A	19200	N/A	N/A	1-2044	Yes	Yes	Yes	Yes	Yes	5

## Beyond this point is technical stuff you probably don't need to read unless you are writing your own software

### Commands supported by PowerCab-1.65 (no jumpers)

Hex	Bytes	Description
0x80	1 bytes	NOP... just returns 'I'
0x8C	1 bytes	Returns !,CR,LF
0x9B	2 bytes	Return AIU status
0x9C	2 bytes	Execute route macro
0x9E	1 bytes	Enter program track mode
0x9F	1 bytes	Exit program track mode
0xA0	4 bytes	Write a CV in paged mode
0xA1	3 bytes	Read a CV in paged mode
0xA2	5 bytes	Locomotive control command
0xA6	3 bytes	Write in register mode
0xA7	2 bytes	Read in register mode
0xA8	4 bytes	Write in direct mode
0xA9	3 bytes	Read in direct mode
0xAA	1 bytes	Return C/S software version (USB board = 7.3.x - see table for value of x)
0xAD	5 bytes	Accy/signal/macro commands
0xAE	6 bytes	Locomotive OPs program byte
0xAF	6 bytes	Accy/Signal OPs program byte
0xB0	5 bytes	reserved - factory test
0xB3	3 Bytes	Set the "cab context page" memory pointer
0xB4	2 Bytes	Write 1 byte to where the cab context page memory pointer location
0xB5	2 Bytes	Read 1,2 or 4 bytes from the cab context page memory pointer location

Notes: jumpers MUST be installed to match

### Commands supported by SB3-1.65 - JP4 only

Hex	Bytes	Description
0x80	1 bytes	NOP... just returns 'I'
0x8C	1 bytes	Return !,CR,LF
0x9B	2 bytes	Return AIU status
0x9C	2 bytes	Execute route macro
0xA2	5 bytes	Locomotive control command
0xAA	1 bytes	Return C/S software version
0xAD	5 bytes	Accy/signal/macro commands
0xAE	6 bytes	Locomotive OPs program byte
0xAF	6 bytes	Accy/Signal OPs program byte
0xB0	5 bytes	reserved - factory test
0xB1	2 bytes	Set cab address of USB device
0xB3	3 Bytes	Set the "cab context page" memory pointer
0xB4	2 Bytes	Write 1 byte to where the cab context page memory pointer location
0xB5	2 Bytes	Read 1,2 or 4 bytes from the cab context page memory pointer location

## Commands supported by Power Pro 2012 version - JP3 only

Hex	Bytes	Description
0x80	1 bytes	NOP... just returns '!'
0x8C	1 bytes	Returns !,CR,LF
0x9B	2 bytes	Return AIU status
0x9C	2 bytes	Execute route macro
0xA2	5 bytes	Locomotive control command
0xAA	1 bytes	Return C/S software version
0xAD	5 bytes	Accy/signal/macro commands (no limit on accy/sig addresses)
0xAE	6 bytes	not supported due to bug in command station software
0xAF	6 bytes	not supported due to bug in command station software
0xB0	5 bytes	reserved - factory test
0xB1	2 bytes	Set cab bus address of this USB device (this command only works internally to the USB interface it does not get to the command station)
0xB3	3 Bytes	Set the "cab context page" memory pointer
0xB4	2 Bytes	Write 1 byte to where the cab context page memory pointer location
0xB5	2 Bytes	Read 1,2 or 4 bytes from the cab context page memory pointer location

## Commands supported by ALLSYS - JP3 and JP4

Hex	Bytes	Description
0x80	1 bytes	NOP... just returns '!'
0x8C	1 bytes	Returns !,CR,LF
0x9C	2 bytes	Execute route macro
0x9B	2 bytes	Return AIU status
0x9E	1 bytes	Enter program track mode
0x9F	1 bytes	Exit program track mode
0xA0	4 bytes	Write a CV in paged mode
0xA1	3 bytes	Read a CV in paged mode
0xA2	5 bytes	Locomotive control command
0xA6	3 bytes	Write in register mode
0xA7	2 bytes	Read in register mode
0xA8	4 bytes	Write in direct mode
0xA9	3 bytes	Read in direct mode
0xAA	1 bytes	Return C/S software version
0xAD	5 bytes	Accy/signal/macro commands
0xAE	6 bytes	Locomotive OPs program byte
0xAF	6 bytes	Accy/Signal OPs program byte
0xB0	5 bytes	reserved - factory test
0xB1	2 bytes	Set cab bus address of this USB device (this command only works internally to the USB interface it does not get to the command station)
0xB3	3 Bytes	Set the "cab context page" memory pointer
0xB4	2 Bytes	Write 1 byte to where the cab context page memory pointer location
0xB5	2 Bytes	Read 1,2 or 4 bytes from the cab context page memory pointer location

### A list of the expected number of bytes (by the USB) for all binary commands

Command	Bytes	Command	Bytes	Command	Bytes
0x80	1	0x93	5	0xA6	3
0x81	4	0x94	6	0xA7	2
0x82	1	0x95	7	0xA8	4
0x83	1	0x96	8	0xA9	3
0x84	1	0x97	4	0xAA	1
0x85	3	0x98	5	0xAB	1
0x86	2	0x99	7	0xAC	1
0x87	2	0x9A	11 dec	0xAD	5
0x88	3	0x9B	2	0xAE	6
0x89	1	0x9C	2	0xAF	6
0x8A	2	0x9D	3	0xB0	5
0x8B	1	0x9E	1	0xB1	2
0x8C	1	0x9F	1	0xB2	1
0x8D	4	0xA0	4	0xB3	3
0x8E	20 dec	0xA1	3	0xB4	2
0x8F	3	0xA2	5	0xB5	2
0x90	18 dec	0xA3	4	0xB6	-
0x91	18 dec	0xA4	5	0xB7	-
0x92	10 dec	0xA5	6	0xB8	-

### Unsupported commands

The following commands are completely unsupported by the current version of the USB board.  
The USB board will buffer the expected number of bytes (1 byte for unsupported commands) then return ASCII '0' indicating the command is not supported.

NOTE: Commands 0x9b, 0xb3, 0xb4 and 0xb5 will not work with PowerCabs, SB3a with software revisions before V1.65 and PH-Pro Systems with versions older than 9/22/2012

0x81 -> 0x8B  
0x8D -> 0x9A  
0x9D  
0xA3  
0xA4  
0xA5  
0xAB  
0xAC  
0xB6 -> 0xBF

## Description of command formats used with NCE RS232 and USB interfaces

The RS-232 port binary commands are designed to work in a computer friendly mode.

Command format is: <cmd number> <data> <data> ...

Commands range from 0x80 to 0x8F

NOTE: For commands 0x9F, 0xA0, 0xA1 and 0xA6- 0xA9 a single byte of 0 will be returned if not in programming mode

Errors returned:

- '0' = command not supported
- '1' = loco/accy/signal address out of range
- '2' = cab address or op code out of range
- '3' = CV address or data out of range
- '4' = byte count out of range
- !' = command completed successfully

CMD	FORMAT	DESCRIPTION	# OF BYTES RETURNED	RESPONSES
0x80		NOP, dummy instruction	(1)	!
0x81	xx xx yy	assign loco	(1)	!,1,2
0x82		read clock	(2)	<hours> <minutes>
0x83		Clock stop	(1)	!
0x84		Clock start	(1)	!
0x85	xx xx	Set clock hr/min	(1)	!,3
0x86	xx	Set clock 12/24 0=12 hr 1=24 hr	(1)	!,3
0x87	xx	Set clock ratio	(1)	!,3
0x88	xx xx	Dequeue packet by loco addr	(1)	!,1,2
0x89		Enable main trk, kill prog	(1)	!
0x8A	yy	Return status of AIU yy	(4)	<current hi byte> <current lo byte> <change hi byte> <change lo byte>
0x8B		Kill main trk, enable prog	(1)	!
0x8C		Dummy instruction returns "!" followed by CR/LF	(3)	!,0x0D,0x0A
0x8D	xxxx mm	Set speed mode of loco xxxx to mode mm, 1=14, 2=28, 3=128	(1)	!,1,3 <speed mode, 0 to 3>
0x8E	aaaa nn	<16 data bytes> Write nn bytes, start at aaaa Must have 16 data bytes, pad them out to 16 if necessary	(1)	!,4
0x8F	aaaa	Read 16 bytes, start at aaaa	(16)	16 bytes
0x90	cc xx...	Send 16 char message to Cab cc LCD line 3. xx = 16 ASCII char	(1)	!,2

0x91 cc xx...	Send 16 char message to Cab cc LCD line 4. xx = 16 ASCII char	(1)	!,2
0x92 cc xx...	Send 8 char message to Cab cc LCD line 2 right. xx = 8 char	(1)	!,2
0x93 ss xx xx xx	Queue 3 byte packet to TEMP_Q Send ss times	(1)	!
0x94 ss xx xx xx xx	Queue 4 byte packet to TEMP_Q Send ss times	(1)	!
0x95 ss xx xx xx xx xx	Queue 5 byte packet to TEMP_Q Send ss times	(1)	!
0x96 ss xx xx xx xx xx xx	Queue 6 byte packet to TEMP_Q Send ss times	(1)	!
0x97 aaaa xx	Write 1 byte, to aaaa	(1)	!
0x98 aaaa xx xx	Write 2 bytes to aaaa	(1)	!
0x99 aaaa <4 data bytes>	Write 4 bytes to aaaa	(1)	!
0x9A aaaa <8 data bytes>	Write 8 bytes to aaaa	(1)	!
0x98 yy	Return status of AIU yy (short form of command 0x8A)	(2)	<current hi byte> <current lo byte>
0x9C xx	Execute macro number xx	(1)	!,0,3
0x9D aaaa	Read 1 bytes from aaaa	(1)	1 byte
0x9E	Enter Programming track mode	(1)	! = success 3 = short circuit
0x9F	Exit Programming track mode	(1)	! = success
0xA0 aaaa xx	Program CV aa with data xx in paged mode	(1)	! = success 0 = program track no enabled
0xA1 aaaa	Read CV aa in paged mode NOTE: cv data followed ! for ok, 0xff followed by 3 for can't read	(2)	!,0,3
0xA2 <4 data bytes>	Locomotive control command	(1)	!,1
Sends a speed or function packet to a locomotive. Command Format: 0xA2 <addr_h> <addr_l> <op_1> <data_1>			
Addr_h and Addr_l are the loco address in DCC format. If a long address is in use, bits 6 and 7 of the high byte are set. Ex: Long address 3 = 0xc0 0x03 Short address 3 = 0x00 0x03			
	op_1	data_1	Operation description
	01	0-7f	Reverse 28 speed command
	02	0-7f	Forward 28 speed command
	03	0-7f	Reverse 128 speed command
	04	0-7f	Forward 128 speed command
	05	0	Estop reverse command
	06	0	Estop forward command
	07	0-1f	Function group 1, bits 0-3 = F1-F4, bit 4=F0
	08	0-0f	Function group 2, bits 0-3 = FS-F8



09	0-0f	Function group 3, bits 0-3 = F9-F12
0a	0-7f	Set reverse consist address for lead loco
0b	0-7f	Set forward consist address for lead loco
0c	0-7f	Set reverse consist address for rear loco
0d	0-7f	Set forward consist address for rear loco
0e	0-7f	Set reverse consist address for additional loco
0f	0-7f	Set forward consist address for additional loco
10	0	Del loco from consist
11	0	Kill consist
12	0-9	Set momentum
13	0-7f	No action, always returns success
14	0-7f	No action, always returns success
15	0-ff	Functions 13-20 control (bit 0=F13, bit 7=F20)
16	0-ff	Functions 21-28 control (bit 0=F21, bit 7=F28)
17-7f	reserved	reserved

0xA3 xx xx	Queue 3 byte packet to TRK_Q (replaces any packet with same address if it exists)	(1)	!,1
0xA4 xx xx...	Queue 4 byte packet to TRK_Q (replaces any packet with same address if it exists)	(1)	!,1
0xA5 xx xx...	Queue 5 byte packet to TRK_Q (replaces any packet with same address if it exists)	(1)	!,1
0xA6 rr xx	Program register rr with data xx in register mode	(1)	! = success 0 = program track no enabled
0xA7 rr	Read register rr in register mode(2) NOTE: cv data followed ! for ok, 0xff followed by 3 for can't read	(2)	!,3 0 = program track no enabled
0xA8 aaaa xx	Program CV aaaa with data xx in direct mode	(1)	! = success 0 = program track no enabled
0xA9 aaaa	Read CV aaaa in direct mode NOTE: cv data followed ! for ok, 0xff followed by 3 for can't read	(2)	!,3 0 = program track no enabled
0xAA	Return software revision number FORMAT: VV.MM.mm	(3)	<data1>,<data2>,<data3>
0xAB	Perform a soft reset of command station (like cycling the power)	(0)	Returns nothing
0xAC	Perform a hard reset of command station (reset to factory defaults)	(0)	Returns nothing
0xAD <4 data bytes>	Accy/signal and macro commands	(1)	!,1
Command Format: 0xAD <addr_h> <addr_l> <op_1> <data_1>			
Addr_h and Addr_l are the accessory/signal address (NOT in DCC format). Ex: Accessory Address 513 = 0x02 0x01 (hi byte first)			
NOTE: accy/signal address 0 is not a valid address			
Op_1	Data_1	Operation description	
01	0-255	NCE macro number 0-255	
02	0-255	Duplicate of Op_1 command	
03	0	Accessory Normal direction (ON)	
04	0	Accessory Reverse direction (OFF)	
05	0-1f	Signal Aspect 0-31	
05-7f	reserved	reserved	

```

-----
0xAE <5 data bytes>
***USB COMMAND ONLY***
OPs program loco CV (1) !,0,1,3

Command Format: 0xA2 <addr_h> <addr_l> <CV_h> <CV_l> <data>

addr_h,addr_l are loco address (same as 0xA2 command)
CV_h, CV_l are cv address high byte first
data is 8 bit data for CV
-----
0xAF <5 data bytes>
***USB COMMAND ONLY***
OPs program accessory/signal (1) !,0,1,3

Command Format: 0xA2 <addr_h> <addr_l> <CV_h> <CV_l> <data>

addr_h,addr_l are accy/sig address (same as 0xAD command)
CV_h, CV_l are CV address high byte first
data is 8 bit data for CV
-----
0xB0 <4 data bytes> Reserved for future PowerCab use (1) 0=not supported
***USB COMMAND ONLY*** !=success
-----
0xB1 xx (1) 0=not supported
***USB COMMAND ONLY*** !=success
SET cab bus address of USB board to xx

Command Format: 0xB1 <data>
-----
0xB2 xx (1) 0=not supported
Enable/disable echo of binary command !=success
to RS-232 port. This command is used
when AIU broadcast is enabled so computer
can distinguish between command response
or AIU broadcast

Command Format: 0xB2 <data>

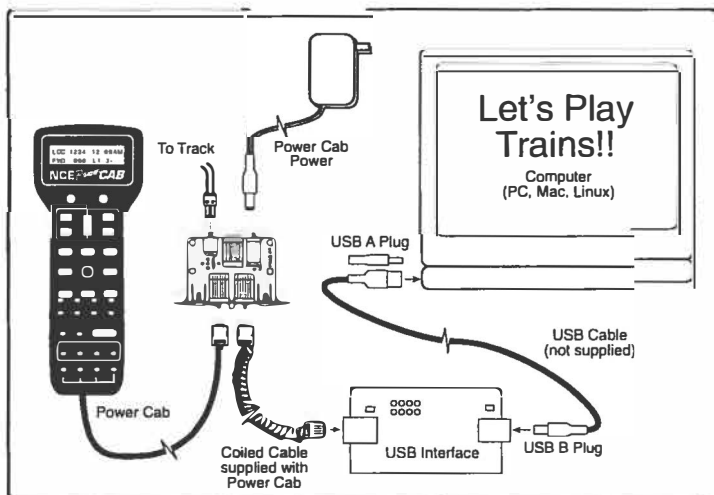
0=no echo, 1=echo 1st byte of command, 2=echo entire command
-----
0xB3 yy xx (1) != success
Set the cab context page memory read/write
pointer to cab address yy memory location xx
with yy in the range of 0-255 and cab bus address
ranginf from 0-63

Command Format: 0xB3 <data><data>
-----
0xB4 xx (1) != success
Write 1 byte to cab bus memory at the memory
pointer location. The pointer will increment
after the write
-----
0xB5 xx (1,2, or 4 bytes)
Return 1,2 or 4 bytes (indicated by XX = 1,2,or 4)
from cab memory at the memory pointer location.
The pointer will increment with each byte read.
-----

```

## USB -> Power Cab Quick Start:

- 1) Connect one end of your Power Cab coiled cable to the USB board and the other end to the Right hand jack of the Power Cab Panel (you must remove any extra cab that may be plugged in).
- 2) Power up your computer and Power Cab.
- 3) Locate and connect a USB cable that will connect The USB board Type B connector to the USB connector used on your computer (usually Type A)
- 4) If you are installing on a Windows computer you can just let Windows search the Internet for the proper driver. It will find the right one. Otherwise follow the installation instructions for the computer USB driver.
- 5) If it did not install automatically, manually download and install the appropriate USB driver for your computer operating system from our website.
- 6) <https://ncedcc.zendesk.com/hc/en-us/sections/200178629-USB-interface>
- 7) Verify the driver is installed correctly before installing other software.
- 8) Download and install Decoder Pro or other DCC software that you are going to use.
- 9) Fire up Decoder Pro (or other software) and follow the software's instructions for initial connection and operation.



## Known problems when USB board is used with the Power Cab.

Using Decoder Pro to read non-existent "indexed" CVs of QSI decoders on the program track will occasionally cause the Power Cab to crash (the LCD fills with black squares). This will require a reboot of the Power Cab and USB board. Pulling the power plug from the Power Cab Panel will cycle the power to both the Power Cab and USB board accomplishing a reboot of both items at once.

### Device Warranty

This device is fully factory tested and warranted against manufacturing defects for a period of 1 year. As the circumstances under which it is installed can not be controlled, failure of the device due to installation problems can not be warranted. This includes misuse, miswiring, or operation under loads beyond the design range of the device. For warranty or non-warranty replacement send the device (and any payment, if required) to:

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



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