



Power Pro and Powerhouse Pro Software Update Notes

WARNING: This version will probably clear all the memory of your system!
If you have macros and/or consists they will be lost.

Summary of some of the new features

- ✓ Improved and Simplified Advanced Consisting
- ✓ Improved and Simplified Programming on the Main and Program Track
- ✓ 12 Functions now available
- ✓ Throttle Controlled Momentum
- ✓ Direct Mode Programming
- ✓ Support for Macro Panel
- ✓ Support for Analog Fast Clocks
- ✓ Support for Signal decoders
- ✓ Backup of system memory for consists, macros and system setup
- ✓ Improved support for computer operation and programming
- ✓ Support for an unlimited number of wireless cabs
- ✓ Support for an unlimited number of 'computer' cabs

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Bugs in older versions of system software that are now fixed:

1. When using "SET CFG" in STD programming on the programming track the "DIR" bit is now properly set in CV29.
2. Function commands are no longer sent to short address 0. This prevents all Horns or other functions coming on unexpectedly when an operator presses a function button with a 'blank' address.
3. The fast clock bug of showing 00 hours when it should read 12 hours in 12 hour mode is fixed. Using the SET SYSTEM CLOCK menu you must still enter 24 hour time to set the 12 hour clock. e.g. enter 15 for 3PM.
4. In the SET CMD STA menu "HORN OFF PKT" is programmable. This is the number of times a "horn off" packet is sent when the HORN button is released. Previously this was always 1 which led to a sound decoder occasionally missing the "off" packet. The factory default is 2 but can be set as high as 16.
5. The FUNCTION REFRESH RATE was not working correctly. This has been fixed. A re-cap of how Function Refresh works:

Functions are refreshed only on active locos that are moving (not locos whose speed is zero or locos in recall).

All functions (F0-F12) are now refreshed. Previously only F0-F4 was refreshed.

Three function packets are sent to each locomotive:

- Function group one (F0-F4).
- Function group two (F5-F8).
- Function group three (F9-F12).

If you set the refresh rate to 500, the functions will be refreshed about once every two seconds.

If you set it to 0 no functions will be refreshed (as always).

The recommended setting is 0 for large layouts. Otherwise the function commands can easily be more numerous than speed commands if 15 or more locomotives are running.

Changes to features found in older versions of system software:

1. OLD STYLE consists now operate in 28 speed mode.
2. The system default of TEST FOR LOCO IN USE is now OFF instead of ON.
3. Reading a CV in paged mode on the programming track can take up to 14 seconds. The system now puts up a 'WAIT' message on the LCD telling the user that the decoder is being read.
4. The "TEST FOR LOCO IN USE" prompt in the SET CMD STA menu has changed in the wording.
5. The maximum fast clock ratio have been reduced from 25 to 15.
6. The BELL button is now mapped to F1 instead of F3 by default.

New features in this version:

Momentum:

The momentum button now works. You are prompted to enter a momentum level from 0 to 9. Pressing a digit button will program the acceleration (CV3) and deceleration (CV4) rates of the locomotive(s) being controlled.

The digit is multiplied by 8 (factory default) and sent to CV3. The value sent to CV4 is ½ half (factory default) the value sent to CV3. You can change these multipliers.

If you have an Advanced or Old Style consist setup in the command station all locos will have their momentum set. If an Old Style consist includes one or more Advanced consists all locos in the Advanced consist will also have their momentum set properly.

You can setup the following momentum parameters in the SET CMD STA menu:

- The acceleration multiplier can be set to a value in the range of 0-25.
- The deceleration can be set to FULL or HALF the value sent to CV3.
- You can disable the sending of momentum commands to consists.

If a decoder follows NMRA RP-9.2.2 the rates will be as shown below with the factory default settings. (multiplier = 8 and deceleration = half)

- Rate 1 = 7 seconds to full speed, 3 seconds to stop
- Rate 2 = 14 seconds to full speed, 7 seconds to stop
- Rate 3 = 21 seconds to full speed, 10 seconds to stop
- Rate 4 = 28 seconds to full speed, 14 seconds to stop
- Rate 5 = 35 seconds to full speed, 17 seconds to stop
- Rate 6 = 42 seconds to full speed, 21 seconds to stop
- Rate 7 = 49 seconds to full speed, 24 seconds to stop
- Rate 8 = 54 seconds to full speed, 27 seconds to stop
- Rate 9 = 61 seconds to full speed, 30 seconds to stop

If a consist is active when the button is pressed the button will do nothing unless "CONSIST MOMENTUM" is enabled in the SET CMD STA menu.

Momentum commands will be sent to a limit of 6 locos per Advanced consist.

Notes regarding momentum commands and decoders:

There are special commands for setting *consist* momentum (CV23 and CV24) but many decoders *do not* support these CV's.

CV3 and CV4 are **required** and have standardized values in decoders per RP-9.2.2.

Support for consist CV23 and CV24 is **not required** in decoders.

Macros:

The number of macros has now been increased to 256.

A macro can now be linked to another macro by entering an accessory address of 9999 when programming the macro. You will then be prompted for the macro number to link.

You can chain as many macros together as you like but use caution. If you chain macros in a 'circular' fashion the system will appear to crash (it is busy sending macros) until you press PROG/ESC on the cab that issued the macro. If a computer is used the only solution is to cycle the power to the system and fix the circular reference.

Functions:

Functions 9-12 now work. If you have an old System One cab you can only get F9 as it doesn't have buttons for F10-F12.

Function commands are now optionally sent to the consist address. You can turn this off (it's on by default) in the SET CMD STA menu.

Consists:

The long awaited improvements to advanced consist are here!

When prompted for the "CON ADDRESS:" the highest open consist address is displayed on the LCD. If you wish to use this address (recommended) just push ENTER. You can also enter any other short address just as with previous versions.

After entering the usual LEAD LOCO address (and direction), you are prompted to enter an optional REAR LOCO address (and direction). You can skip either or both loco addresses by pressing ENTER.

When you exit, the LEAD LOCO will be selected for running. If there is no LEAD LOCO the REAR LOCO will be selected. If there is neither a LEAD or REAR loco the consist address will be selected. In this case "CON:" will NOT be displayed on the top line of the LCD as there is no "other" address by which the consist is known.

You can now BROWSE CONSISTS by pressing PROG 9 times (the short cut is to press PROG followed by 9). Then press enter at the "BROWSE CONSISTS" prompt. The LCD will display something like:

```
CON: 127 10:42AM  
LEAD: 2190 R: 4484
```

Use the speed buttons or thumbwheel to scroll the next higher or lower consist in the list. When you get to the end of the list it will roll over to the 'other' end.

Pressing ENTER will show any mid consist locomotives of the displayed consist.

Pressing SEL LOCO will exit browsing and select the displayed consist for running.

Pressing CLEAR then pressing 1 at the "KILL CON?" prompt will kill the displayed consist.

Press PROG/ESC at any time to exit browsing.

Program On The Main:

There are now 9 sub menus for OPS programming (there were three in previous versions). Press ENTER or use the thumbwheel to see each subsequent sub menu item at the "1=ADR 2=CV 3=CFG" prompt. Then press the number corresponding to the sub menu you desire.

1. **ADR** - Sets loco addresses

Programming the loco address is now under this menu instead of the CV programming menu. Setting the address is now simplified. Just select the new address type (short or long) then enter the new address. There are no longer restrictions on programming the same address type as the one in use.

2. **CV** - Programs CVs from 1-999.

Locomotive address setting has been removed. There are no other changes from previous versions.

3. **CFG** - Setup of CV29

No change from previous version.

4. **Motor Control**

Prompts and receives input for:

- Start voltage (CV2)
- Max voltage (CV5)
- Mid Voltage (CV6)
- Acceleration (CV3)
- Deceleration (CV4)
- PWM frequency (CV9)
- Kick rate (CV116)
- Kick depth (CV117)

5. Function Mapping

You are prompted for the function number to map. If "0" you are asked if it is forward or reverse. Press the appropriate digit. The top line of the LCD displays the function number and the output numbers that can be controlled by the function. Pressing of a digit key will enable the output on the decoder when the function is activated. Pressing the same digit key again will disable the output. The top line of the LCD will have small output numbers on the display when the output numbers are 10 through 14. To enable/disable these high numbers press the digit key that is 10 less than the output number. Example: press 0 for output 10, 1 for output 11, etc.

6. NCE Effects

You are prompted for the output number to setup. Use the thumbwheel or up/down speed buttons to scroll through the lighting effect options. Press ENTER when you get the one you want. Next press 1,2 or 3 to select the 'directionality' of the output. Last, press 1 if the output has an LED connected, any other key if incandescent lamps.

7. Soundtraxx - Special SOUNDTRAXX Tsunami indexed feature programming

When programming CV120-127 you are asked for an index number before you are asked for the CV value. CV119 is then automatically set with the index value before the original CV is set with the desired data. All other CVs are programmed in the normal manner.

8. QSI - Special QSI indexed feature programming

When programming CV51,CV52,and CV56 you are asked for an index number before you are asked for the CV value. CV49 is then automatically set with the index value before the original CV is set with the desired data. When programming CV56 you are asked for primary and secondary index numbers before you are asked for the CV value. CV49 and CV50 are then automatically set with the index numbers before CV53 is set with the desired data. All other CV's are programmed in the normal manner.

9. Bin - Programs a CV with binary input.

Enter CV number to program then press bit number to toggle individual bits to make up a binary byte. Press enter to program.

When using Function Mapping and NCE Effects programming, the fast clock is not displayed. It still runs in the background and will be displayed when function mapping or NCE effect programming is finished. **Note:** Lenz decoders do not conform to NMRA function mapping rules. They use other methods which will not work with the NMRA standard function mapping.

Program Track:

A complete rewrite of the programming track operation has been done.

1. STD Mode

Automatically detects whether the decoder can use the faster direct programming or paged mode.

Setting the locomotive address

This is now broken out as a separate, skipable choice. The display indicates whether the long or short address is in use.

Motor control

Prompts and gets input for:

Start voltage (CV2)

Max voltage (CV5)

Mid Voltage (CV6)

Acceleration (CV3)

Deceleration (CV4)

PWM frequency (CV9)

The following NCE specific CV's only show if using an NCE decoder

Kick rate (CV116, an NCE specific CV)

Kick depth (CV117, an NCE specific CV)

Function mapping

You are prompted for the function number to map. If "0" you are asked if it is forward or reverse. The top line of the LCD displays the function number and the output numbers that can be controlled by the function. The bottom line of the LCD displays the outputs that are enabled for that function. A digit means that output number is enabled,a dash means it is disabled. Pressing a digit key will enable the output on the decoder when the function is activated. Pressing the same digit key again will disable the output. The top line of the LCD will have small output numbers on the display when

the output numbers are 10 through 14. To enable/disable these high numbers press the digit key that is 10 less than the output number. Example: press 0 for output 10, 1 for output 11, etc.

Set (any) CV

No changes from previous version

2. CV mode

Sets any CV. The same as previous versions

3. CFG mode

Sets CV29. Setting the direction to reverse now works correctly but no other changes.

4. Paged

Forces paged mode programming to be used and jumps to STD mode

5. Direct

Forces direct mode programming to be used and jumps to STD mode

6. NCE Effects

You are prompted for the output number to setup. Use the thumbwheel or up/down speed buttons to scroll through the lighting effect options. Press ENTER when you get the one you want. Next press 1, 2 or 3 to select the 'directionality' of the output. Last, press 1 if the output has an LED connected, any other key if incandescent lamps.

7. Rescue mode

Updated factory reprogram of major decoder CV's (works with more decoders)

When using the programming track the fast clock is stopped and not displayed, It will be re-started and displayed when programming is finished.

Note. Lenz decoders do not conform to NMRA function mapping rules. They use other methods which will not work with the NMRA standard function mapping

System Setup Stuff

In the SET CMD STA menu there is now a selection called "RADIO FIX". This is on by default. If on, steps are taken in the command station to prevent runaways when using radio cabs. The command station notices if speed buttons or a pot is being used on a cab by cab basis. If speed buttons are in use a bit is set and any "full speed" pot commands (the most common kind of erroneous radio command) are ignored thus preventing most runaways.

You may need to disable the "fix if you are using a CAB04e with both "halves" of the cab set to the same cab address AND one half is set to yard mode while the other is set to normal mode or the Procab set to yard mode.

System Reset:

You can reset the command station to factory defaults as one of the options under the SET CMD STA menu.

Other New Features:

The following is big news but you will not be able to test these features until the associated products are released

- Support for Analog fast clocks is now included
- Support for Signal decoders is now included
- Support for Macro Panels is now included
- Support for an unlimited number of the new single direction radio cabs is now included
- Support for CAB02r and CAB03r is now included
- Support for CAB07 and CAB08 is now included

Fast Clock:

A 2 byte "time sync" is sent to cab 0 at the 30 second mark of the fast clock. This helps our new analog fast clock to quickly synchronize with the system time.

The format of the time sync is as follows: <0xD0><0xC1-0xCF>

0xC1-0xCF indicates the fast clock ratio (1-15)

COMPUTER RELATED STUFF BELOW

You can use the PROCAB to send signal aspect commands. Program your Procab <OPTION> to a value of 108. Pressing OPTION will allow you to access the signal aspect entry menu. Signal addresses range from 1-2044 and valid aspects are currently 0-31.

Currently only NCE signal decoders (not released yet) support NMRA signal packets so you will not be able to try it out.

DELETIONS

- All ASCII mode RS232 commands have been removed except the "M" command to enter ASCII programming mode.
- The ASCII help menu has been deleted. The maintenance mode help menu is still there for programming.

ADDITIONS

- The RS232 baud rate is now configurable in the SET CMD STA menu. There are three rates available:
 - 1 = 9600
 - 2 = 19.2K
 - 3 = 38.4K
- The command station can now be setup to send Event driven RS-232 output data for changes to AIU inputs. Each change of an AIU input is an AIU "event". A 3 byte RS-232 message is generated for each event listing the AIU input number that changed and what polarity it changed to. The format for the data is:
 - 1st byte = 0x60 ("a" for AIU event)
 - 2nd byte = 0x30 + AIU cab address (addresses start at ASCII '0')
 - 3rd byte = 0x3F + input number for input high (input 1=A, 2=B, etc)
= 0x5F + input number for input low (input 1=a, 2=b, etc)

Each input change of the AIU is reported separately. 14 messages are sent at power up for each AIU to update your computer as to status of all AIU inputs.

The reason for oddball reporting of AIU data is so you can test AIU installations and read the results in ASCII with Hyperterminal using a simple PC connection.

This feature can be enabled/disabled in the SET CMD STA menu.

- In the SET CMD STA menu:
 - You can now backup and restore the battery backed command station RAM to a computer. This has been tested (so far) with PCs running Hyperterminal on WIN XP and WIN98se.

There are three backup options:

Macro backup

Saves all 256 macros
5120 memory locations from 0xC800 to 0xDBFF

System backup

Saves the system setup (SET CMD STA menus stuff)
80 memory locations from 0xDC00 to 0xDC4F

Consist backup

Saves the advanced consist tables
1536 memory locations from 0xF500 to 0xFAFF

The data is sent as an ASCII file to the terminal program.
Format for the data is:

```
:aaaa dddd dddd dddd ..... dddd (macro and consist data)
```

or

```
:aaaa dd dd dd dd dd dd ..... dd (system data)
```

```
:aaaa = RAM address in hex (high byte first)  
dd or dddd = 8 or 16 bit data (high byte first if 16 bit)
```

The data is formatted for easy(?) modification with a text editor. Well, easy if you know how the data in RAM is setup and understand hex.

Each line of the Macro data contains one macro. There are ten 2 byte macro commands on each line. Macro 0 is at memory location C800. Addresses are in DCC format (Refer to RP-9.2.1).

Each line of the system data has 16 bytes of individual system setup 'flags'. (see partial memory map below)

Each line of the Consist data holds 8 locomotive addresses.

Locations F500-F5FF hold lead loco addresses. The first two bytes are consist address 0 (not used) addresses are in DCC format (bits 6,7 of high byte set if long address).

Locations F600-F6FF hold rear loco addresses. The first two bytes are consist address 0 (not used) addresses are in DCC format (bits 6,7 of high byte set if long address).

Locations F700-FbFF hold mid consist loco addresses. The first 8 bytes are up to 4 locos in consist address 0 (not used) addresses are in DCC format (bits 6,7 of high byte set if long address).

System Setup memory map below

```
-----  
;Battery backed System Setup variables  
-----  
NAME ADDRESS DESCRIPTION  
-----  
TIME_SCALE ;DC00 value reloaded into countdown TIMER_A  
TICK_CNT ;DC01 1 scale second has elapsed when = 4  
; TICK_CNT is incremented every time  
; TIMER_A expires  
SECONDS ;DC02 seconds counter for fast clock  
MINUTES ;DC03 minutes counter  
HOURS ;DC04 hours counter  
HOUR24 ;DC05 'A' = AM, 'P' = PM  
HOURS12_24 ;DC06 flag for 12/24 hour clock, 0=12 hours  
PROG_TIMES ;DC07 number of times to send programming packet  
TMP_TIMES ;DC08 number of times to send TEMP_Q packet  
ACC_TIMES ;DC09 number of times to send accessory TEMP_Q packet  
STOP_TIMES ;DC0A number of times to send speed zero packet  
HORN_OFF ;DC0B number of "horn off" packets to send  
RECALL_NUM ;DC0C depth of recall buffer, 6 max  
STOP_CLK ;DC0D flag for clock stoppage, 0=run  
BCAST_MSG ;DC0E flag for Cab 0 broadcast message available  
TST_IN_USE ;DC0F flag to test for loco in use in SEL_LOCO, 1=don't test  
CON_FUNC ;DC10 1=send function commands to consist address, 0=don't  
ACC_OPS_ENAB ;DC11 1=enable legacy accy ops mode programming  
ACC_X_OPS_EN ;DC12 1=enable extended accy ops mode programming  
ESTOP_ENABLE ;DC13 1=enable 3x ESTOP test for global stop  
RADIO_FIX ;DC14 1=enable  
AIU_BCAST_EN ;DC15 1=enable AIU event driven RS-232 broadcast, 0=disable  
PING_REFRESH ;DC16 and DC17 (2 bytes) accessory packet refresh rate  
-----
```



```

SYS_FLAGS      ;DC18 system flags to replace DIP switches
;             bit 0 - 1=use direct service mode, 0=use paged
;             bit 1-7 not used
LAST_CS_CAB    ;DC19 highest cab allowed to access SET CMD STA
LAST_AS_CAB    ;DC1A highest cab allowed to access ASSIGN LOCO
LAST_CLK_CAB   ;DC1B highest cab allowed to access SET CLOCK
LAST_PRG_CAB   ;DC1C highest cab allowed to access USE PROGRAM TRK
LAST_OP_CAB    ;DC1D highest cab allowed to access PROG ON MAIN
LAST_CP_CAB    ;DC1E highest cab allowed to access SET CAB PARMS
LAST_OPA_CAB   ;DC1F highest cab allowed to access PROG ACCESSORY
LAST_MAC_CAB   ;DC20 highest cab allowed to access PROGRAM MACROS
BAUD_RATE      ;DC21 baud rate divisor
CON_MOMENTUM   ;DC22 1=enable momentum to consists, 0=disable
MOM_MULTIPLIER;DC23 multiplier for momentum button, range 0-25
MOM_DEC_RATE   ;DC24 momentum decel rate. 1=full, 0=half

```

Bytes DC25 to DC4F are unused (for now)

HYPERTERMINAL settings for backup:

```

CONNECT TO->CONFIGURE menu
  9600 or 19200 baud (38400 only works right on some computers)
  No parity
  8 data bits
  1 Stop bit
  Flow Control - none

```

```

SETTINGS->TERMINAL MODE
  ANSI

```

```

SETTINGS->ASCII setup
  Echo typed characters locally
  Append line feeds to incoming line ends
  Line Delay: 10mS

```

Use Capture Text to backup data
 Use Send Text File to restore it

The memory address is included with each back up so
 only one restore command is needed.

ADDITION - new binary mode RS232 commands

CMD	FORMAT	DESCRIPTION	# OF BYTES RETURNED	POSSIBLE RESPONSES
0x9E		Enter Programming track mode	(1)	! = success 3 = short cir.
0x9F		Exit Programming track mode	(1)	! = success
0xA0	aa xx	Program CV aa with data xx in paged mode (CV address range in paged 1-256)	(1)	! = success
0xA1	aa	Read CV aa in paged mode NOTE: register data followed by != data ok, 0xff followed by '3' =can't read	(2)	!,3
0xA2	aaaa nn dd	Locomotive control command aaaa - loco address nn - operation (see below) dd - data	(1)	!,3
0xA6	rr xx	Program register rr with data xx in register mode (Register range 1-8)	(1)	! = success
0xA7	rr	Read register rr in register mode	(2)	!,3

NOTE: register data followed by != data ok,
0xff followed by '3' =can't read

0xA8 aaaa xx Program CV aaaa with data xx (1) != success
in direct mode. CV address range 1-1024

0xA9 aaaa Read CV aaaa in direct mode (2) !,3
NOTE: register data followed by != data ok,
0xff followed by '3' =can't read

New command 0xA2:

- "Computer" cabs are now supported with a new binary
mode command (NOTE: the computer cab feature of 11/12/04
has been removed).

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.

Examples: 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	Forward 128 speed command
04	0-7f	Reverse 128 speed command
05	0	Estop reverse command
06	0	Estop forward command
07	0-1f	Function group 1 (same format as DCC packet for FG1)
08	0-0f	Function group 2 (same format as DCC packet for FG2)
09	0-0f	Function group 3 (same format as DCC packet for FG3)
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	Delete loco from consist
11	0	Kill consist
12-7f	reserved	reserved

Returns: != success
1 = bad loco address