DCC CAPABILITIES

Locomotive Control & Performance
Layout Control
Function Only Decoders
Animation Control

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LOCOMOTIVE CONTROL & PERFORMANCE

- **Independent Locomotive Control**

- **Command Station/Booster**
  - Number of Locomotives
  - Number of Engineers
  - Amperage, number of throttles, etc.

LOCOMOTIVE CONTROL & PERFORMANCE

- **Multiple types of throttles**
  - Tethered, radio, infrared
  - Full Function
  - Engineers throttle

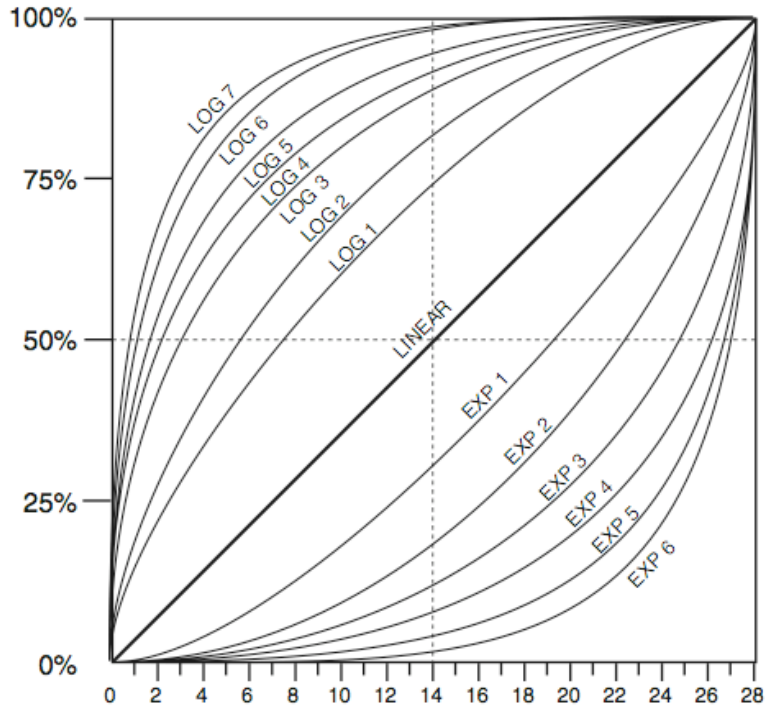
LOCOMOTIVE CONTROL & PERFORMANCE

- **Improved performance**
  - DCC electrical format provides smoother performance
  - Back Electromagnetic Feedback (BEMF)
  - Proportional/Integral/Differential Gain (PID)
  - Dither – smooth running at low speeds

LOCOMOTIVE CONTROL & PERFORMANCE

Speed Curves

Note that in order for the selected curve to be active, bit 4 of CV 29 must also be set to 1. If CV 29, bit 4 is 0, the throttle response will be linear (straight line).



The speed curves can be used in 14, 28 and 128 speed step modes.

Bit 7 is defined by the NMRA RPs as the Mid Range Speed Step select bit. The DSD does not implement this feature and will ignore commands that attempt to program this bit with a 1 (i.e., data values between 128-255).

LOCOMOTIVE CONTROL & PERFORMANCE

- **Voltage controls**
  - Start voltage
  - Maximum Hi Speed, Maximum Medium speed
  - Forward/Rear Trim
  - Voltage +/-

LOCOMOTIVE CONTROL & PERFORMANCE
Acceleration and Deceleration (Momentum)

- **Loco and heavy load**
  - Simulates realistic load of train and its affect on reaching speed and stopping

- **Diesel** –
  - Notching out, and notching down
  - Wind down of prime mover

- **Steam**
  - Throttle Control vs. Chuff Control (Progressive Chuff)
    Controls water and coal/oil consumption

- **Braking**.
  - Stops train at adjustable distance.
  - Provides stopping control for maximum momentum
  - Mobile non sound decoders

LOCOMOTIVE CONTROL & PERFORMANCE

Multiple Lighting Functions

- Automatic or Independent
- Head light/Rear light
- Cab Lights
- Marker Lights
- Ditch Lights
- MARS lights
- Strobe lights
- Maintenance lights

LOCOMOTIVE CONTROL & PERFORMANCE

- **Multiple sound functions**
  - Automatic or Independent

- **Function Mapping**
  - Which functions are controlled by each function key

LOCOMOTIVE CONTROL & PERFORMANCE

Multiple Lighting Functions

Function Mapping Table

Function Key	Control CV	HL	BL	WH	BEL	FX5	FX6	DYN	SHW	STM	WS	DIM	MUT	INJ	BRK	CPL
F0 (f)	33	**1**	2	4	8	16	32	**64**	128							
F0 (r)	34	1	**2**	4	8	16	32	**64**	128							
F1	35	1	2	4	**8**	16	32	64	128							
F2	36	1	2	**4**	8	16	32	64	128							
F3	37				1	2	4	8	**16**	32	64	128				
F4	38				1	2	4	8	16	**32**	64	128				
F5	39				1	**2**	4	8	16	32	64	128				
F6	40				1	2	**4**	8	16	32	64	128				
F7	41							1	2	4	8	**16**	32	64	128	
F8	42							1	2	4	8	16	**32**	64	128	
F9	43							1	2	4	**8**	16	32	64	128	
F10	44								1	2	4	8	16	**32**	64	128
F11	45								1	2	4	8	16	32	**64**	128
F12	46								1	2	4	8	16	32	64	**128**

Bold Numbers indicate default settings.

LOCOMOTIVE CONTROL & PERFORMANCE

Consisting

Each unit in the consist simultaneously receives the same signals as the lead loco

- **Multiple power units** to run smoothly together
  - Head end / Mid train helper / End of train helper
- **Function Control**
  - Provides for control of which functions are operable on rear loco and mid consist locos
- **Speed Matching**
  - Adjusting speed curves, and /or voltage (start, mid, and hi).
  - Some decoders will tend to self adjust when each unit is using same decoder (QSI Revolution)

LAYOUT CONTROL

- **Command Station**
  - Amperage, number/type of throttles, etc.
  - Boosters
  - Cab Boosters
- **Power Districts**
  - Power Shields and Boosters with circuit breakers
  - Isolates parts of railroad by location and usage
  - Shorts confined to a power district, allowing continued operation in other power districts

LAYOUT CONTROL

- **Power Shields and Boosters**
  - Protects against start up power surge, usually related to multiple locomotives with sound decoders
  - Adjustable trip sensitivity
  - Auto Reverser Power Shields
  - Can manually turn power district on or off

LAYOUT CONTROL

- **Detection Circuits - Block Detection**
  - Shows block occupancy in hidden trackage
  - Can turn off power to detected block
  - Can control Signal Systems
  - Grade Crossings

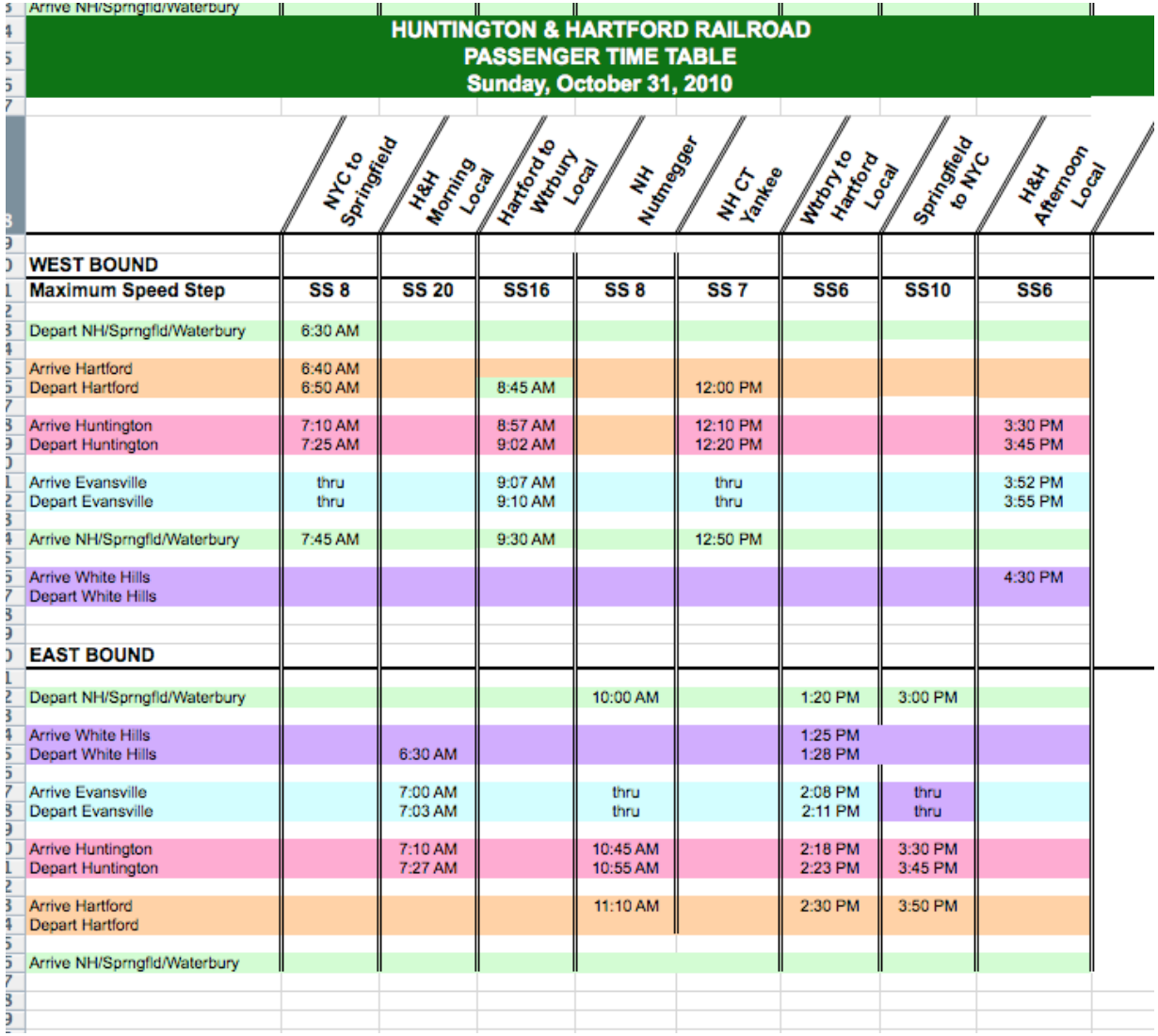
- **Integrated Fast Clock** (Logitech/NCE)
  - Integrated with fast clock on throttle
  - Wall mounted fast clock (LED or traditional)
  - Passenger and/or freight service

Time Table 10/30

HUNTINGTON & HARTFORD RAILROAD
PASSENGER TIME TABLE
Saturday, October 30, 2010

	NYC to Springfield	H&H Morning Local	Hartford to Wtrbury Local	NH Nutmegger	NH CT Yankee	Wtrbry to Hartford Local	Springfield to NYC	H&H Afternoon Local	
WEST BOUND									
Maximum Speed Step	**SS 8**	**SS 20**	**SS16**	**SS 8**	**SS 7**	**SS6**	**SS10**	**SS6**	
Depart NH/Sprngfld/Waterbury	6:30 AM								
Arrive Hartford	6:40 AM								
Depart Hartford	6:50 AM		8:45 AM		12:00 PM				
Arrive Huntington	7:10 AM		8:57 AM		12:10 PM			3:30 PM	
Depart Huntington	7:25 AM		9:02 AM		12:20 PM			3:45 PM	
Arrive Evansville	thru		9:07 AM		thru			3:52 PM	
Depart Evansville	thru		9:10 AM		thru			3:55 PM	
Arrive NH/Sprngfld/Waterbury	7:45 AM		9:30 AM		12:50 PM				
Arrive White Hills								4:30 PM	
Depart White Hills									
EAST BOUND									
Depart NH/Sprngfld/Waterbury				10:00 AM		1:20 PM	3:00 PM		
Arrive White Hills						1:25 PM			
Depart White Hills		6:30 AM				1:28 PM			
Arrive Evansville		7:00 AM		thru		2:08 PM	thru		
Depart Evansville		7:03 AM		thru		2:11 PM	thru		
Arrive Huntington		7:10 AM		10:45 AM		2:18 PM	3:30 PM		
Depart Huntington		7:27 AM		10:55 AM		2:23 PM	3:45 PM		
Arrive Hartford				11:10 AM		2:30 PM	3:50 PM		
Depart Hartford									
Arrive NH/Sprngfld/Waterbury									

Time Table 10/31



HUNTINGTON & HARTFORD RAILROAD
PASSENGER TIME TABLE
Sunday, October 31, 2010

	NYC to Springfield	H&H Morning Local	Hartford to Wtrbury Local	NH Nutmegger	NH CT Yankee	Wtrbry to Hartford Local	Springfield to NYC	H&H Afternoon Local
WEST BOUND								
Maximum Speed Step	**SS 8**	**SS 20**	**SS16**	**SS 8**	**SS 7**	**SS6**	**SS10**	**SS6**
Depart NH/Sprngfld/Waterbury	6:30 AM							
Arrive Hartford	6:40 AM							
Depart Hartford	6:50 AM		8:45 AM		12:00 PM			
Arrive Huntington	7:10 AM		8:57 AM		12:10 PM			3:30 PM
Depart Huntington	7:25 AM		9:02 AM		12:20 PM			3:45 PM
Arrive Evansville	thru		9:07 AM		thru			3:52 PM
Depart Evansville	thru		9:10 AM		thru			3:55 PM
Arrive NH/Sprngfld/Waterbury	7:45 AM		9:30 AM		12:50 PM			
Arrive White Hills								4:30 PM
Depart White Hills								
EAST BOUND								
Depart NH/Sprngfld/Waterbury				10:00 AM		1:20 PM	3:00 PM	
Arrive White Hills						1:25 PM		
Depart White Hills		6:30 AM				1:28 PM		
Arrive Evansville		7:00 AM		thru		2:08 PM	thru	
Depart Evansville		7:03 AM		thru		2:11 PM	thru	
Arrive Huntington		7:10 AM		10:45 AM		2:18 PM	3:30 PM	
Depart Huntington		7:27 AM		10:55 AM		2:23 PM	3:45 PM	
Arrive Hartford				11:10 AM		2:30 PM	3:50 PM	
Depart Hartford								
Arrive NH/Sprngfld/Waterbury								

LAYOUT CONTROL

- **Turnout Control**
- **Auto Reversing Units**
- **Mini Panels**

FUNCTION ONLY DECODERS

HARES/WABBITS, ETC.

- **Turnout controls**
  - Slow motion and solenoid switch machines
  - Throttle and/or panel controlled
  - Panel lighting and switch signal LEDs
  - Macros, Smart Routes
  - Dispatcher Override
  - Lock Block Protection
  - Power Up defaults
  - Auto Throw Timer – controls timing to prevent two
  - trains from colliding
  - Auto Return Timer – returns to normal setting after
  - predetermined time
  - Auto Reverse Loop turnouts

FUNCTION ONLY DECODERS

HARES/WABBITS, ETC.

- **Auxiliary Input Unit**
  - provides feedback on turnout positions

- **Auto Reverser** Power Shield w/Auto Reverser
  - Detects short and reverses polarity
  - Reverse Loops, Wyes, etc.

FUNCTION ONLY DECODERS

- ANIMATION CONTROL
  - Acts as on/off switch
  - Semaphore Signals
  - Crossing Gates
  - Overhead Doors
  - Lighting
  - Non Mobile Sound Only decoders

    sawmills, creeks, factories, wildlife, etc.

Publications of Interest

- **DCC Guide** by Don Fiehmann
- Kalmbach Publishing
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- **DCC Projects & Applications** by Mike Polsgrove
- Kalmbach Publishing
-
- **The comprehensive guide to DCC** by Stan Ames, Rutger Friberg &
- Ed Loizeaux. (out of print)
-
- **The Practical Guide to Digital Command Control** by Larry Pucket
- Carstens Publishing