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# QUANTUM TITAN-A

Board Replacement Format, Advanced **Mono/Stereo** DC/DCC Sound and Power Decoder!

## Diesel User Operations Manual: Titan-A

	<input type="checkbox"/> ALCO <input type="checkbox"/> Baldwin <input type="checkbox"/> EMD <input type="checkbox"/> FM <input type="checkbox"/> GE <input type="checkbox"/> Winton <input type="checkbox"/> Other						
					-		

Rev C 1/3/12

"U.S. Reissue Patent Number RE38,660



## Welcome to the Age of the Titans!

Thank you and congratulations; you have entered the age of the Quantum Titan, the most feature-packed, and technologically advanced sound decoder available. Never before has so much flexibility and so many features been combined in so small a package!

### Quick Start

*The Quantum Titan is programmed by default for 100% of volume and all sound channels to emanate from both speakers. Use of dual speakers is not necessary for the Titan to produce the complete sound spectrum because it is set up by default to do so for each speaker. Dual speakers are required for true stereo output.*

1. If before you familiarize yourself with the operations manual, you want to test, explore and appreciate the great sound and performance features offered in the QSI, Titan Decoder, then please review the information listed below!
2. Observe Anti-Static Precautions!
3. Insure your test area is clean, well lit, and free of metal debris.
4. Familiarize yourself with the decoders DC/DCC Inputs, motor outputs and lighting outputs. Connecting these incorrectly will most likely let the smoke out.
5. Test the decoder before installing, **DO NOT ATTEMPT TO PROGRAM NOW!**
6. Use a decoder tester if you have one, if not you can use alligator clips to make the necessary connections. This should be done with care to avoid possible inadvertent contact of the alligator clips to each other that may short the decoder. Use tape to keep the wires/connections from moving.
7. You can use a 12v-16v bulb to simulate the motor. Its intensity will vary according to your throttle speed setting. Make sure your test speaker(s) are 8 ohm.
8. After you are sure all your connections are correct and will not short connect your test set up to either an HO, (10v-14v), DC or DCC Power Unit.
10. In DC you will need to increase the throttle to about 7v to fire up the sounds, etc
11. In DCC, select ADD=3, the factory default, and advance the throttle and the decoder will function.
12. Test all lighting functions you may have connected.
13. After you verified the decoder is operating properly then program as you wish!

If you get into trouble you can reset the decoder by entering the following CV's in the order listed.

**THIS WILL NOT AFFECT THE SOUNDS LOADED IN THE DECODER!**

CV 49 = 128

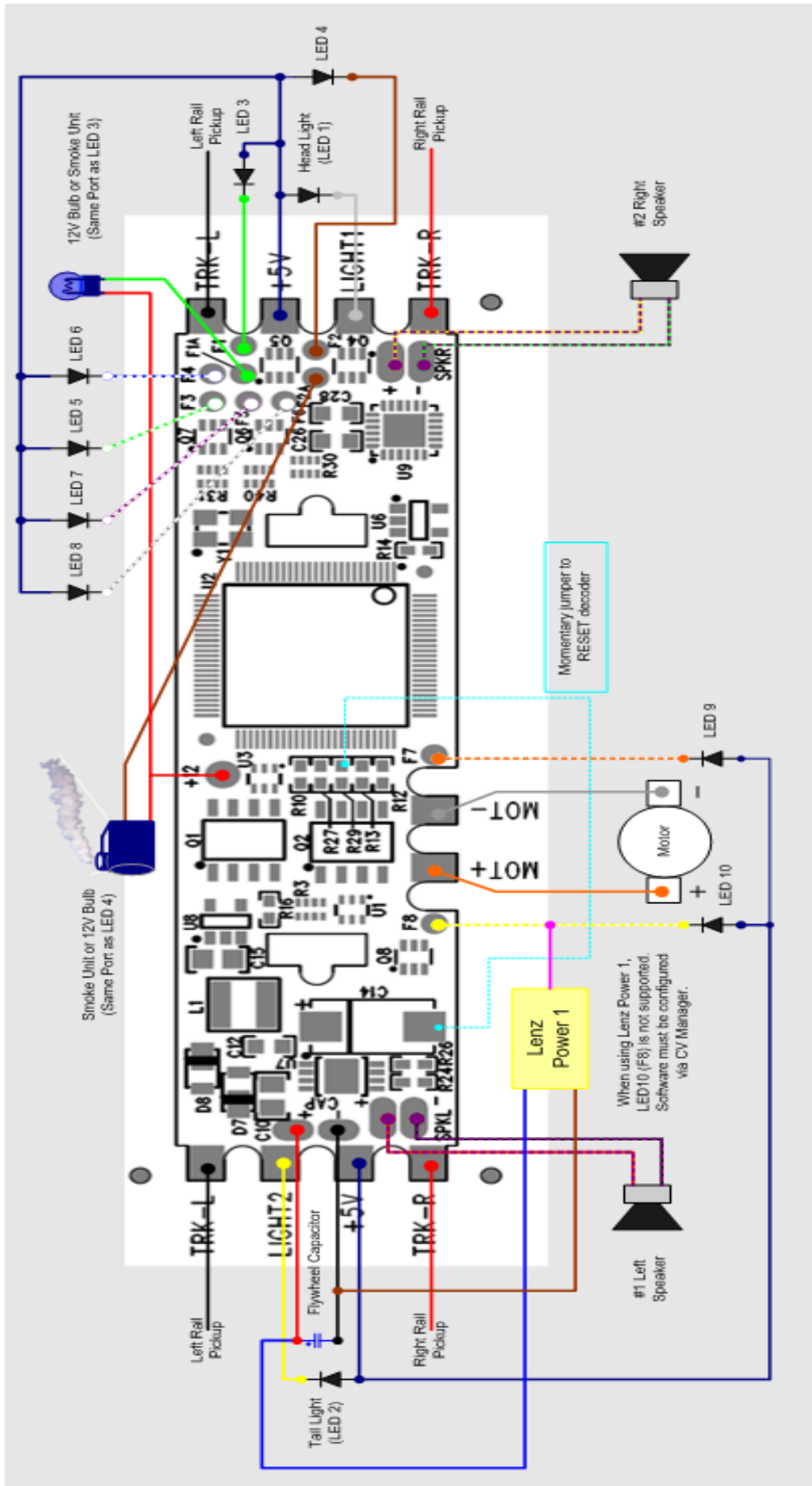
CV 50 = 255

CV 56 = 113

The decoder will speak the word "RESET" when the last CV is entered (if done on the mainline) OR when power is next applied (if done on the program track). You can also use the manual reset, see, Pg-4.

Please refer to the chart and diagram on the next two pages for further information.

# Titan A Wire Chart



## Titan Programming

### Basic Operational CV's

<u>CV#</u>	<u>CV NAME</u>	<u>DEFAULT</u>	<u>RANGE</u>
1	Primary Address	3	1-127
17	Extended Address Lower Byte	192	*
18	Extended Address Upper Byte	0	*
29	Configuration Data #1	6	0-55
2	Vstart (start voltage)	8	0-255
5	Vhigh (top speed)	1	0-255
6	Vmid (mid speed)	0	0-255
3	Acceleration Rate (momentum)	0	0-255
4	Deceleration Rate (momentum)	0	0-255
62	Verbal Announcement "Talk Back Feature"	1 (ON)	0-1 0(Off)

**\*= Special Range; See Below**

**CV: 1 Primary Address:** If you're going to use a short address (between 1 and 127) you can simply enter that address as the value of CV1.

**CV: 17/18 Extended Address:** CVs 17 and 18 are known as a "paired" CV, meaning that the two CVs *together* hold one piece of information. If your DCC system does not compute the values of CV17/18 for you, here is a way to compute the values, by using a different value in each CV to "build" the address you want. To determine the values that are placed into these CVs use the following equation.

- |   |                                 |
|---|---------------------------------|
| A. Start with the locomotive address; divide it by 256  | Sample $4449 \div 256 = 17.379$ |
| B. Take the whole number (17) and add 192.  | Sample $17 + 192 = 209$         |
| C. Program the value (209) in step B is into CV17.  |                                 |
| D. Multiply the whole number (17) from step A by 256.   | Sample $17 \times 256 = 4352$   |
| E. Subtract the loco address from the computed value in step D.   | Sample $4449 - 4352 = 97$       |
| F. Program the value (97) in step E is into CV18. (Some system may require a 0 to be placed in front of numbers less than 100. That would make the 97 a 097.) |                                 |
| G. To activate 4 digit addressing a value of 32 (bit 5) needs to be added to CV-29.   |                                 |

**CV: 29, Configuration Data 1:** CV29 controls 4 things at one time. First, it controls which speed table is accessible in the decoder (i.e., 14, or 28/128 speed steps). Second, it determines whether or not your locomotive will still run in analog mode (analog mode conv.). Third, it tells the locomotive which direction is its "normal" travel direction. Lastly, it determines whether your loco will accept a 2 or 4 digit address. For the specific value to enter use the reference chart below. For simplification this table is abridged to include only the most commonly used values.

<u>CV Value for CV29</u>	<u>Speed Table</u>	<u>Analog</u>	<u>Normal Direction</u>	<u>2/4 Digit Add.</u>
2 or 18	28/128	Off	Forward	2
3 or 19	28/128	Off	Reverse	2
6 or 22	28/128	On	Forward	2
7 or 23	28/128	On	Reverse	2
34 or 50	28/128	Off	Forward	4
35 or 51	28/128	Off	Reverse	4
38 or 54	28/128	On	Forward	4
39 or 55	28/128	On	Reverse	4

## Programming Indexed QSI CV's

Below are the indexed CV's for the various volume controls in the Titan as well as important system CV's. Take a moment to study the chart below and then read the information below for the explanation of how indexed CV's are programmed. The programming of the values listed needs to be done in a specific order using CV's 49 and 50. When you see an indexed value like CV56.18.1 you actually need to change up to three CV's to modify the information contained within the CV. If there are 3 decimal places (like in the example above) then you must program CV50 first, then CV49 second and then whichever Master CV you're trying to change third. For simplicity this has been color coded in this manual. You will program the **GREEN VALUE FIRST**, where applicable the **RED VALUE SECOND**, and the **BLUE VALUE LAST**.

### Volume Control CV's

Master Volume	CV	CV50	CV49	CV51	Effect
Master System Volume	51.0	X	0	0-127	0=Minimum Volume. 127 = Maximum Volume
Individual Sound Vol. CV's	CV	CV50	CV49	CV52	Effect
Horn Volume	52.0	X	0	0-15	0= Minimum Volume. 15= Maximum Volume
Bell Volume	52.8	X	8	0-15	0= Minimum Volume, 15= Maximum Volume
Motor Volume	52.10	X	10	0-15	0= Minimum Volume, 15= Maximum Volume
Motor 2 Volume	52.11	X	11	0-15	0= Minimum Volume, 15= Maximum Volume
Air Pump Volume	52.16	X	16	0-15	0= Minimum Volume, 15= Maximum Volume
Cooling Fans Volume	52.19	X	19	0-15	0= Minimum Volume, 15= Maximum Volume
Long Air Let-off Volume	52.21	X	21	0-15	0= Minimum Volume, 15= Maximum Volume
Short Air Let-off Volume	52.22	X	22	0-15	0= Minimum Volume, 15= Maximum Volume
Squealing Brakes Volume	52.24	X	24	0-15	0= Minimum Volume, 15= Maximum Volume
Generator Volume	52.26	X	26	0-15	0= Minimum Volume, 15= Maximum Volume
Dynamic Brakes Fan Volume	52.28	X	28	0-15	0= Minimum Volume, 15= Maximum Volume
Spitter Valve Volume	52.29	X	29	0-15	0= Minimum Volume, 15= Maximum Volume
Coupler Volume	52.34	X	34	0-15	0= Minimum Volume, 15= Maximum Volume
Air Brakes Volume	52.37	X	37	0-15	0= Minimum Volume, 15= Maximum Volume
Alternate Horn Volume	52.40	X	40	0-15	0= Minimum Volume, 15= Maximum Volume
User Sound Effect Volume	52.46	X	46	0-15	0= Minimum Volume, 15= Maximum Volume
Crew Talk Volume	52.52	X	52	0-15	0= Minimum Volume, 15= Maximum Volume
Water Loading Volume	52.53	X	53	0-15	0= Minimum Volume, 15= Maximum Volume
Water Scoop Volume	52.54	X	54	0-15	0= Minimum Volume, 15= Maximum Volume
Fuel Loading Volume	52.55	X	55	0-15	0= Minimum Volume, 15= Maximum Volume
Maintenance Volume	52.56	X	56	0-15	0= Minimum Volume, 15= Maximum Volume
Quantum Configuration CV's	CV	CV50	CV49	CV56	Effect
System Configuration	56.0.0	0	0	0-1	0= Sound Off at Powerup 1= Sound on at Powerup
Throttle Mode (STC and RTC)	56.4.0	0	4	0-1	0= Stand.Throttle Control 1= Regul. Throttle Control
R.T.C Minimum BEMF	56.5.0	0	5	0-31	0= NO BEMF for RTC, 31=ALL BEMF for RTC

## Stereo Control CV's

QSI's addition of stereo to a mobile sound decoder is an industry first! The user has very finite control over the stereo through the master system Balance CV and *individual* sound balance control CV's for every different sound the loco creates.


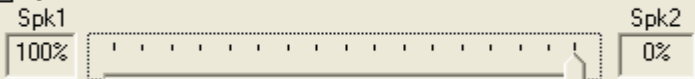



An example is, if your loco has a horn mounted specifically on the front of the locomotive, you can get that sound *only* from the *front* of the loco! Through mixing some sounds between the two speakers you can create dramatic effects where motors sound like they're coming from the middle of the loco and the horn only comes from the rear of the engine.

<u>Quantum Sound Control CV</u>	<u>CV</u>	<u>CV49</u>	<u>CV51</u>	<u>Effect</u>	<u>Default Value.</u>
<b>System Volume Bal.</b>	51.14	14	0-255*	0= Spkr 1: 100% Spkr 2: 100%. 127= Spkr 1: 100% Spkr 2: 0% 255= spkr 2: 100% Spkr 1: 0%	0
<u>Individual Sound Balance CV's</u>	<u>CV</u>	<u>CV49</u>	<u>CV116</u>	<u>Effect</u>	<u>Default Value</u>
<b>Horn Bal.</b>	116.0	0	0-255*	=	0
<b>Bell Bal.</b>	116.8	8	0-255*	=	0
<b>Motor 1 Bal.</b>	116.10	10	0-255*	=	0
<b>Motor 2 Bal.</b>	116.11	11	0-255*	=	0
<b>Turbo Bal.</b>	116.14	14	0-255*	=	0
<b>Air Pump Bal.</b>	116.16	16	0-255*	=	0
<b>Long Air Let-Off Bal.</b>	116.21	21	0-255*	=	0
<b>Short Air Let-Off Bal.</b>	116.22	22	0-255*	=	0
<b>Squealing Brakes Bal.</b>	116.24	24	0-255*	=	0
<b>Generator Bal.</b>	116.26	26	0-255*	=	0
<b>Dynamic Brakes Bal.</b>	116.28	28	0-255*	=	0
<b>Coupler Bal.</b>	116.34	34	0-255*	=	0
<b>Air Brakes Bal.</b>	116.37	37	0-255*	=	0
<b>Alternate Horn Bal.</b>	116.40	40	0-255*	=	0
<b>User Sound Effect Bal.</b>	116.46	46	0-255*	=	0
<b>Crew Talk Bal.</b>	116.52	52	0-255*	=	0
<b>Water Loading Bal.</b>	116.53	53	0-255*	=	0
<b>Fuel Loading Bal.</b>	116.55	55	0-255*	=	0
<b>Maintenance Bal.</b>	116.56	56	0-255*	=	0

See Next Page for more information on programming stereo balance.

**The stereo balance CV's program in the following manner.**

Values 1-127 Remove signal from Speaker 2 proportionally, the higher the value between 1 and 127 the lower the volume % coming from speaker 2. Values between 128-255 remove signal from Speaker 1 proportionally, the higher the value between 128 and 255 the lower the volume % coming from speaker 1. See illustrations on the next page.

	<p>CV51.14 = 0 In this picture so the volume is balanced evenly between the two speakers.</p>
	<p>CV51.14 = 127 In this picture so the volume is set to 100% of Speaker 1 and 0% of Speaker 2.</p>
	<p>CV51.14 = 255 In this picture so the volume is set to 0% of speaker 1 and 100% of speaker 2.</p>
	<p>CV51.14 = 31 In this picture so the volume is set to 100% of speaker 1 and 75% of speaker 2.</p>
	<p>CV51.14 = 159 In this picture so the volume is set to 75% of speaker 1 and 100% of speaker 2.</p>

All individual sound balance CV's function in the same manner. So utilizing the table on the previous page you can fully customize your sound system by balancing the sounds to where you want to hear them come from!

### **Onboard Library CV's**

The Quantum Titan comes equipped with a huge variety of sounds stored immediately on the decoder. Allowing the user to customize his sound right from their DCC handheld instead of having to reload the entire sound set using the Quantum Programmer. All library CV's are handled by CV 117. These are indexed CV's like the volume and stereo controls.

<b><u>Library</u></b>	<b><u>CV</u></b>	<b><u>CV50</u></b>	<b><u>CV49</u></b>	<b><u>CV117</u></b>	<b><u>Effect</u></b>
Horn Index	117.0.1	1	0	1-30	Special See Table
Bell Index	117.8.1	1	8	1-22	Special See Table
Motor Index	117.10.1	1	10	1-18	Special See Table
Air Pump Index	117.16.1	1	16	1-7	Special See Table
Cooling Fan Index	117.19.1	1	19	1-5	Special See Table
Dynamic Brake Index	117.28.1	1	28	1-6	Special See Table
Alternate Whistle Index	117.40.1	1	40	1-30	Special See Table

The table on the inside rear cover shows what sounds are tied to what CV value. Any reference to "native" sound refers to the sound that is loaded as the default with your particular sound set.

### **"Ready To Move" Automatic Sounds Scenarios**

The Quantum Titan can provide automatic whistle, bell and lighting changes based on the state of the locomotive. There are two different types of Ready To Move Scenarios; Automatic Horn Blasts, and a Bell Triggered Scenario. Either one of these can be selected to trigger when going from neutral to moving, moving to neutral or both. The activation of these is handled by CV51.20 "Motive State Change Warning Signals"

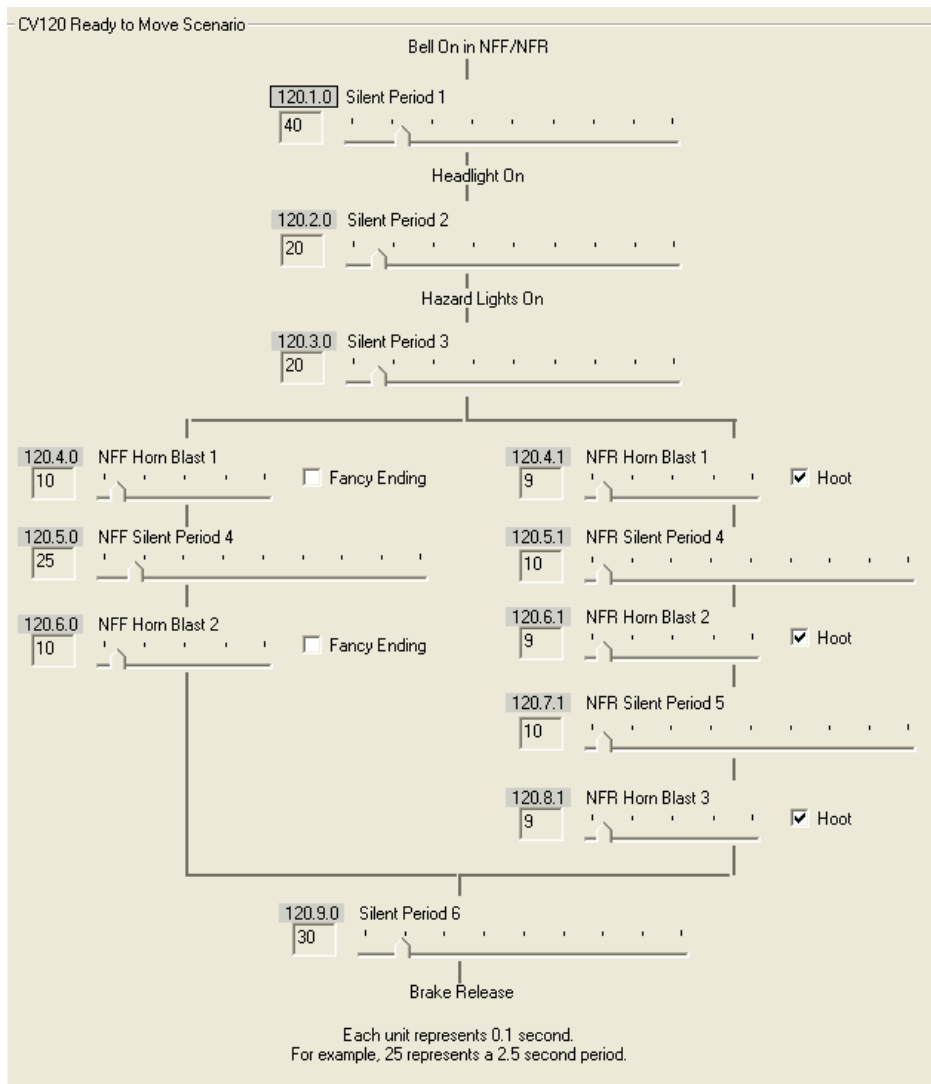
The timing of EVERY portion of these scenarios is customizable. Using CV120 (see next page)

**Automatic Horn Blasts:** This scenario is fairly simplistic, the decoder measures the BEMF of the motor to determine what the loco is doing and blows the appropriate whistle signal accordingly. 2 whistles blasts for FWD, 3 whistle hoots for REV and 1 whistle blast when coming to a stop.

**Bell Triggered Scenario:** If you do a lot of switching the automatic horn blasts can get a little annoying so we give you a more useable method of triggering the automatic blasts. Using the bell as an indicator of what the locomotive is about to do. Below are the CV's to activate the two scenarios.

Action	CV	CV49	CV51
None	51.20	20	0
Automatic Horn Blast	51.20	20	17
Bell Triggered Scenario	51.20	20	34

Below is the way this scenario will act when the bell is activated by default. (automatic horn blast skips the first 3 actions)



For further information on customizing these scenarios please either consult the full DCC Reference manual or contact QSI Solutions

## Function List

Please keep in mind that the following applies exclusively to DCC users.

**F0:** Toggles Light Functions in the group “

**F1:** Toggles Bell On or Off

**F2:** Toggles Horn On or Off (also toggles alternate horn after triggered using F11)

**F3:** Plays Coupler sounds.

**F4:** Toggles Steam Blower On or Off

**F5:** While moving toggles “drift mode” chuff sound will drop and rod clank sound will increase.

**F6:** When in neutral it plays start-up sounds. When moving in forward or reverse triggers the Doppler effects causing the all locomotive sounds to “Doppler down”. This can be especially fun at the end of a grade crossing, or when used in conjunction with other sound effects.

**F7:** While moving drop the throttle to zero and while the loco is coasting, push F7 to *actually engage the brakes!* This is far more realistic than any other decoder based braking methods because an engineer would never engage the brakes with the throttle open at main line speed.

**F8:** Mute.

**F9:** In neutral puts loco in standby/disconnect mode. When moving activates the Sound Of Power function, when sound of power is activated you'll hear the whistle hoot once. As you throttle up the loco will sound as though it's under a very heavy load. Concisely, if you throttle down you'll hear the chuff drop down like it's coasting. Neither of these functions will affect speed until **F9** is pressed again when you will hear a double whistle hoot indicating that Sound Of Power has been turned off.

**F10:** Status Report. In neutral the loco will read back the address and any mode that it may be in (e.g., standby/disconnect). When moving, **F10** acts as a speedometer giving a verbal read back of the scale miles per hour.

**F11:** Toggles between the primary and secondary horn. After pressing **F11** once **F2** will control the secondary horn normally.

**F12:** Toggles extra light functions in the group “Multiple Lights 3” on or off.

**F13:** System Volume Decrease by 2db

**F14:** System Volume Increase by 2db

**F15:** While stopped plays a short air let off, while moving plays the Grade Crossing whistle sequence

**F16-25:** Reserved for user assignment

**F26:** Fuel Loading Scenario

**F27:** Maintenance Scenario

**F28:** Water Loading Scenario, While moving engages the water scoop

For a full explanation of all of these functions and features please consult the full manual at [www.qsisolutions.com](http://www.qsisolutions.com)

The Quantum Titan allows for changes in the “mapping” of these functions.

Mapping is the ability to change which button on your handheld controls what function.

See the complete DCC Reference manual at [www.qsisolutions.com](http://www.qsisolutions.com)

## Lighting Functions:

As we mentioned before, this decoder has more lighting functions and more CV's to customize those lights than any other decoder, even function only decoders! There are so many CV's that we strongly recommend that you look at the complete DCC users manual posted at [WWW.QSISOLUTIONS.COM](http://WWW.QSISOLUTIONS.COM) Some of the things you can change in the lights are:

- Initial control, QSI lights are set by default to work with LED's and to give prototypical response based on the action of the locomotive. This can be disabled and all the lights are mappable to individual function buttons.  
\*If not using LED's the intensity settings may need to be changed to provide proper light response.
- Intensity settings, you can adjust the intensity (brightness) of the light in any potential state so for a headlight you have control over how bright the brightest state is, and how dim the dimmest state is. With these controls you can get Mars lights that oscillate perfectly (using also the "mid intensity control") and ditchlights that wink instead of blink
- Ramp time controls, want the light to come on instantaneously? Set these controls to 0. On the flipside, is your steam engine in need of a new dynamo? Set the control to 255 for a whopping 2.55 second fade from off to on, or dim to bright.
- 4 qualifying states, when using automatic control the lights will respond to the action of the locomotive. You can have different behavior for all four of the following states
  - Neutral From Forward (NFF)
  - Neutral From Reverse (NFR)
  - Forward (FWD)
  - Reverse (REV)

All of these features and more are customizable using basic CV changes. Please consult the DCC reference manual, for the exact CV's as there are simply too many to list in this manual.

### CV Selectable Lighting:

<u>Light Behavior</u>	<u>CV</u>	<u>CV50</u>	<u>CV49</u>	<u>CV115</u>	<u>Default</u>
Front Headlight	115.70.0	0	70	L# See Page 3	1
Front Headlight 2	115.70.1	1	70	L# See Page 3	0
Rear Headlight	115.73.0	0	73	L# See Page 3	2
Rear Headlight 2	115.73.1	1	73	L# See Page 3	0
Front Mars Light	115.76.0	0	76	L# See Page 3	3
Rear Mars Light	115.80.0	0	80	L# See Page 3	4
Front Left Ditch Light	115.84.0	0	84	L# See Page 3	5
Front Right Ditch Light	115.84.1	1	84	L# See Page 3	6
Rear Left Ditch Light	115.88.0	0	88	L# See Page 3	7
Rear Right Ditch Light	115.88.1	1	88	L# See Page 3	8
Front OHBL	115.92.0	0	92	L# See Page 3	9
Front OHBL2	115.92.1	1	92	L# See Page 3	0
Front OHBL3	115.92.2	2	92	L# See Page 3	0
Front OHBL4	115.92.3	3	92	L# See Page 3	0
Rear OHBL	115.96.0	0	96	L# See Page 3	10
Rear OHBL1	115.96.1	1	96	L# See Page 3	0
Rear OHBL2	115.96.2	2	96	L# See Page 3	0
Rear OHBL3	115.96.3	3	96	L# See Page 3	0
Front Number Boards	115.100.0	0	100	L# See Page 3	8
Rear Number Boards	115.102.0	0	102	L# See Page 3	5
Front Marker Lights	115.104.0	0	104	L# See Page 3	4
Rear Marker Lights	115.106.0	0	106	L# See Page 3	6
Front Cab Light	115.116.0	0	116	L# See Page 3	7
Rear Cab Light	115.118.0	0	118	L# See Page 3	8

## Titan Diesel Library Contents

117.0.1 Value	Horn	117.8.1 Value	Bell
1	Native Whistle	1	Native Bell
2	Nathan K3L	2-7	Diesel Bell, Air, Fast 1-6
3	Unknown Aus 2 Chime	8-15	Diesel Bell, Air, Mid 1-6
4	Leslie S3	16	Diesel Bell, Air, Very Fast
5	Nathan P3 (American)	17	Diesel Bell, Elec, Mid
6	Leslie Typhon A-200 Single	18	Diesel Bell, Hand Pull, Slow
7	WABCo E2 #1	19	Diesel Bell, Air, Random
8	WABCo E2 #2	20	Diesel Bell, Elec, Mid
9	WABCo E2 #3	21	Diesel Bell, air, Mid
10	WABCo E2 #4	117.10.1 Value	Motor
11	Leslie S2m	1	Native Motor
12	WABCo A2 #2	2	ALCo 244-12
13	Nathan K5LL	3	M&S 531-6
14	Nathan K5La (low pressure)	4	ALCo 539-6
15	Nathan K3 (American)	5	ALCo 539T-6
16	Leslie S5-T	6	Baldwin 608NA
17	Nathan M5	7	Baldwin 608A
18	WABCo D5	8	EMD 567B-16 #2
19	Nathan H5	9	EMD 567B-16 #6
20	Nathan M3	10	EMD 645-16 NA #1
21	Nathan P3 (Canadian)	11	EMD 645E3-16 #1
22	Nathan P5	12	EMD 710-16
23	Budd Co. Single Chime	13	FM 38D-8
24	WABCo A2 #1	14	FM 38D-12
25	Leslie S3 (low pressure)	15	GE FDL-16
26	WABCo E1	16	GE FDL-12
27	Leslie S3J	17	Winton 201A
28	WABCo EA2	18	GE FDL-8
29	Nathan P5 (long)	117.16.1	Pump
30	Nathan K5La (Amtrak)	1	Native Pump
117.26.1 Value	Cooling Fans	2	ALCo/Baldwin Pump
1	Native Cooling Fans	3	Centurion Pump
2	Fan 1	4	EMD Pump
3	Fan 2	5	Fairbanks Morse Pump
4	Fan 3	6	GE Rotary Pump
5	GG1 Fan	7	GE Standard Pump
117.28.1 Value	Dynamic Brakes	117.40.1	Alternate Horn
1	Native Dynamic Brake	Value =	Same as Horn Index
2	Dynamic 1		
3	Baldwin Dynamics		
4	Dynamic 2		
5	EMD E9 Dynamics		
6	GE Dynamics		

## DECODER FEATURES:

- Compatible with NMRA DCC Standards & RP's
- Full Compatibility on Analog DC Railroads
- Supports either 2 or 4 digit addresses
- 14,28 or 128 Speed Steps
- Customizable Speed Tables
- High Frequency, Silent Running, Advanced P.I.D. motor drive
- Exclusive Regulated Throttle Control [RTC] for ultra realistic movement
- Supports advanced consisting and *enhanced* consisting when used with other QSI decoders thanks to RTC, which self adjusts in consisted trains!
- Supports Lenz USP "dirty track" technology for non-stop operations on marginal track
- True Stereo Sound Capable
- 16 Bit Audio Processor
- 64 Audio Channels in stereo, 128 in mono
- Huge CV Selectable Libraries *On Board!*
  - Over 30 Horns
  - Over 20 bells
  - More than 15 motors, with pitch control for *thousands* of possibilities
- 30 Different Sound Effects. Each with Volume and Stereo Pan Controls
- Automatic Sounds via "Ready To Move" scenarios
- BEMF driven sound engine, so sound is tied to locomotive action
- "Sound of Power" for simulation of load
- 28 User Assignable Functions
- 10 PWM Lighting outputs each with 256 intensity levels for ultimate customization
- Automatic, directional Rule 17 lighting by default
- Supports Software upgrades via Quantum Programmer (sold separately)

## DECODER RATINGS

- Dimensions: Titan-U, 1.81"L x 0.68"Wx0.26"H
- Maximum Peak Voltage: 25v
- Steady State Current: 1.8-2.0 Amps
- Stall Current : 2+ Amps
- Speaker Load: 8 ohms x 2
- Audio Amplifier: Stereo, D Style Format (2 watts)
- Light Outputs: 10 with 256 Intensity levels ea.
- Function Current: 100ma



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