O SCALE DCC

A NEW ERA IN LARGE SCALE MODELING

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Clinic Overview

1. Considerations For O Scale DCC
2. Command Stations and Boosters
3. Mobile Decoders
4. Installation Products
5. Techniques for BIG Sound
6. Product Demonstrations
7. Q & A

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Considerations For O Scale DCC

This ain't your Grandpas O Scale…

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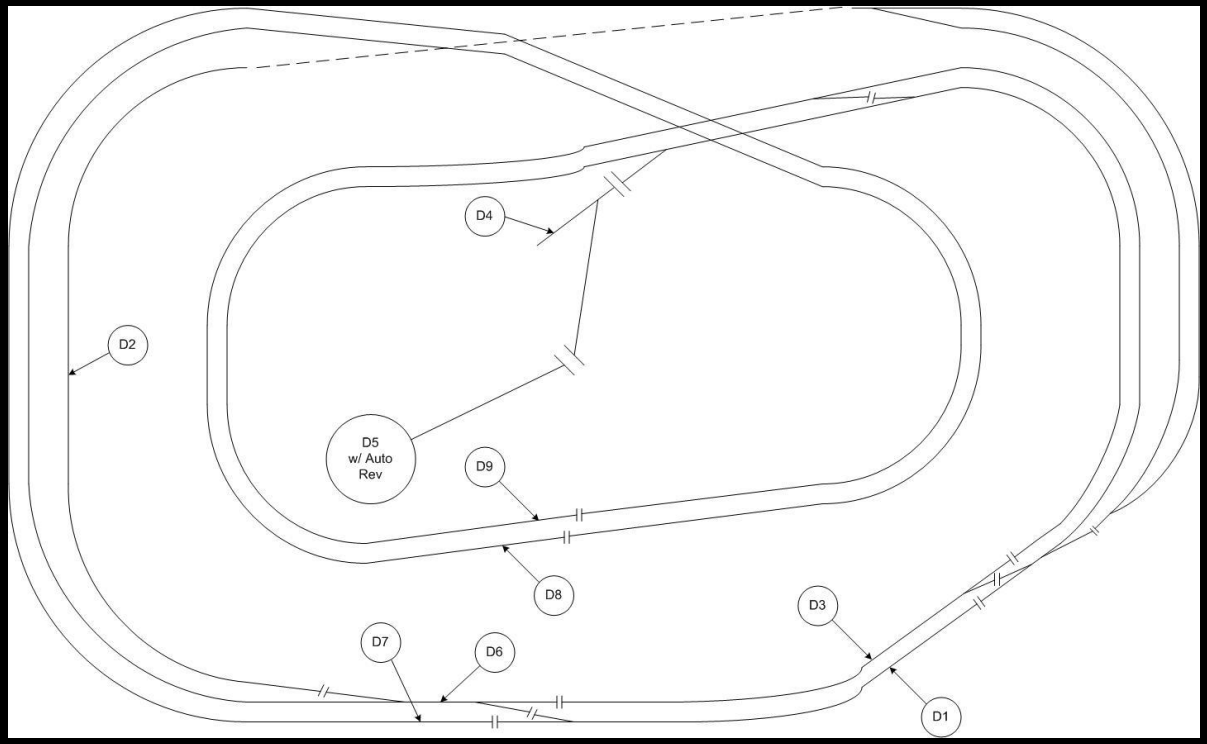
The Big Dogs Eat 1:48

- For DCC It's The In-between Scale
  - Too Big for "HO" decoders, too small for "G"
- Total Power Demand
  - Go Big or Go Home
  - Sample Power Calculation
- Motor Current Is Key
  - Running Current vs. Slip Current vs. Stall Current
  - Only way to size a Decoder in ANY scale
- Big Models Should Sound BIG!
  - Let's face it… Sound *IS* the rage
  - The SBS4DCC Sound Spiel
  - Plenty of room big speakers and bigger sound

Total Power Demand



Sample Track Plan

- Sub-divide into Logical Districts
- Estimate reasonable number of power demands per district
- Estimate power consumption per demand
- Don't sweat it… Just add MORE POWER!

Total Power Demand

Aggregate Power					PH10 Power Distribution			
					District 1, 2, 3			
Item	Qty	Amps	total		Engine	4	0.5	2
Engine	20	0.5	10		Pass cars	12	0.1	1.2
Pass cars	48	0.1	4.8		Loco Terminal	0	0.1	0
Loco Terminal	12	0.1	1.2		Pass Terminal	3	1.12	3.36
Pass Terminal	3	1.12	3.36		ACC Tort	28	0.05	1.4
ACC Tort	56	0.05	2.8		Sum			7.96
Sum			22.16		District 6, 7, 8, 9			
					Engine	12	0.5	6
					Pass cars	36	0.1	3.6
					Loco Terminal	0	0.1	0
					Pass Terminal	0	1.12	0
					ACC Tort	0	0.05	0
					Sum			9.6
					District 4, 5			
					Engine	4	0.5	2
					Pass cars	0	0.1	0
					Loco Terminal	12	0.1	1.2
					Pass Terminal	0	1.12	0
					ACC Tort	28	0.05	1.4
					Sum			4.6
					Net Sum			22.16

Sample Power Calculation

- Sub-divide into Logical Districts
- Estimate reasonable number of power demands per district
- Estimate power consumption per demand
- Include All Items On The Bus Including Accessories, Function Decoders and Passenger Car Lighting
- Don't sweat it… Just add MORE POWER!

Analyzing Motor Current

Tools

- RRAmpMeter
- Any VOM Meter
- Test Track

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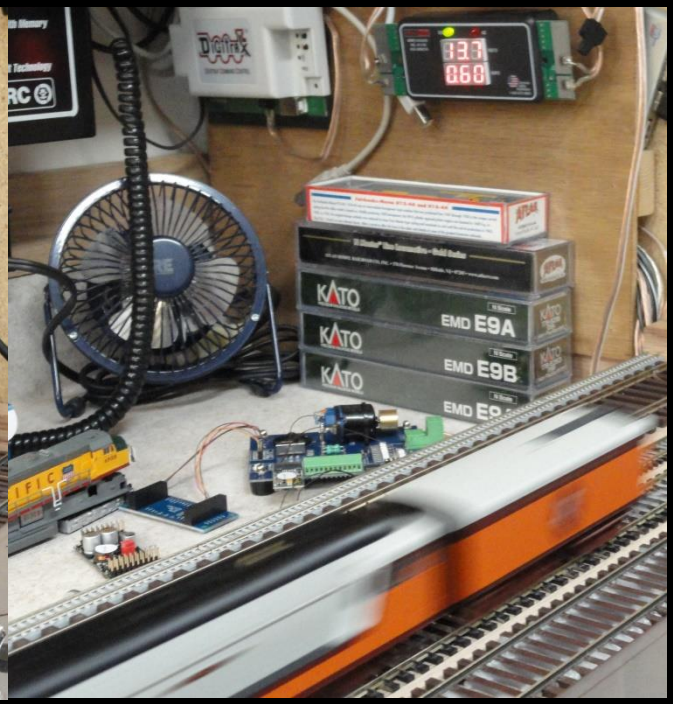
Analyzing Motor Current

Running Current

- Idle and Full Throttle
- Determines Normal Operating Current



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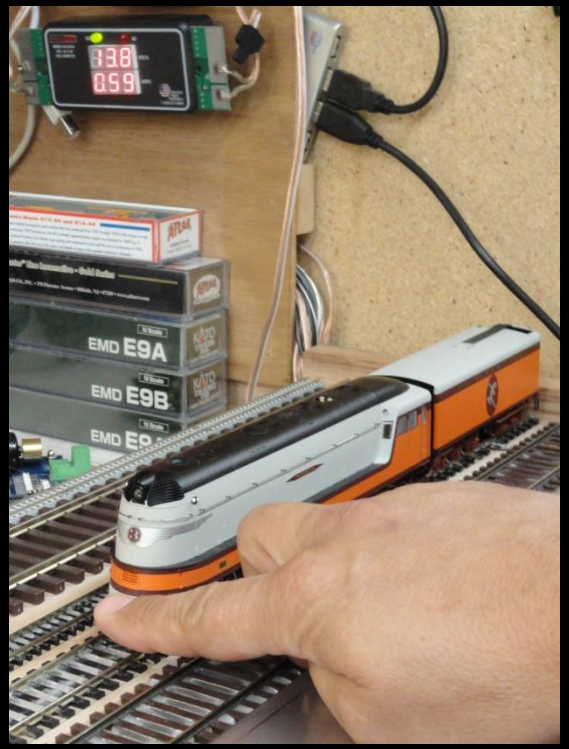
Analyzing Motor Current

Slip Current

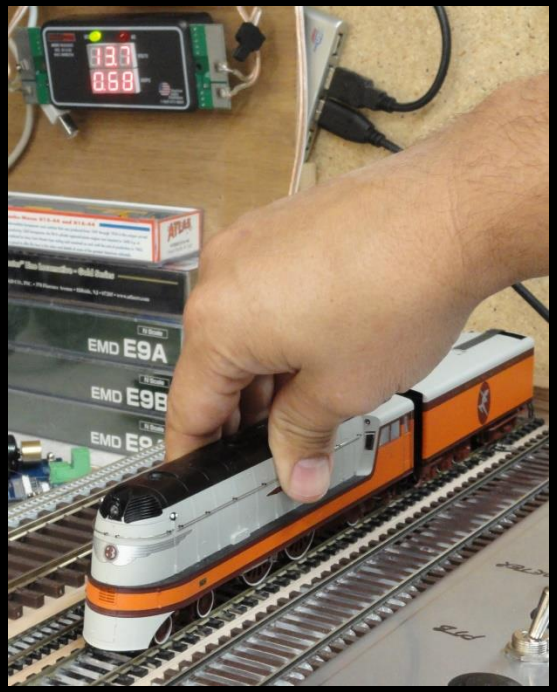
- Most likely scenario, best test for sizing decoder
- Determines "TYPICAL" Maximum Current Limit



Analyzing Motor Current

Stall Current
(Locked Rotor Current)

- Worst case scenario, the "will never exceed" value
- Determines "ABSOLUTE" Maximum Current Limit



Command Stations and Boosters

What do we need? . . . MORE POWER!!!

Command Stations and Boosters

- Best System Is The System You Decide Is Best
- Must Perform 3 Basic Tasks
  - Operate A Train
  - Program An Address And Consist
  - Program A CV
- Must Have Enough Power For The Job
- Consider The Ergonomics Of The Throttle
  - Knob vs. Thumb Wheel vs. Slider
- Additional Features Like Wireless and Automation
- What Do Your Buddies Use

Command Stations and Boosters

Digitrax - DCS

- 5 and 8 amp CS and Boosters
- DT402 w/ Dual Dial Encoder
- Operator Throttles To Control Cost
- Integrated Product Line With Broad Range Of Solutions
- Loconet Comm Bus
- Transponding Bi-Directional Communication

Command Stations and Boosters

ESU ECoS

- 4 amp CS, 4 and 8 amp Boosters
- Mobile Control II – State Of The Art Throttles With Speed Knob and PED-style Touch Screen Interface
- RailComm II Bi-Directional Communication

Command Stations and Boosters

MRC Prodigy Elite

- 8 amp CS and Booster
- Backlit Throttles With Speed Knob
- Wireless Throttle Option
- IMHO Ease Of Use Winner

Command Stations and Boosters

NCE Power House Pro

- 5 and 10 amp CS and Booster
- Throttles With Speed Knob or Thumb Wheel
- Wireless Throttle Option
- Easy To Use
- Mini-Panel For Easy Automation

Command Stations and Boosters

Roco Z21

- 4 amp CS
- State Of The DCC
- Integrated Wi-Fi (PED App) and Multimaus w/ Dial Encoder
- Throttle App Is Killer
- Advanced Comm Bus Options
- RailComm Bi-Directional Communication

Command Stations and Boosters

Zimo MX10

- 10 amp CS
- State Of The DCC
- Advanced Throttle with Speed Control Slider
- Advanced Comm Bus Options
- RailComm Bi-Directional Communication

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Mobile Decoders

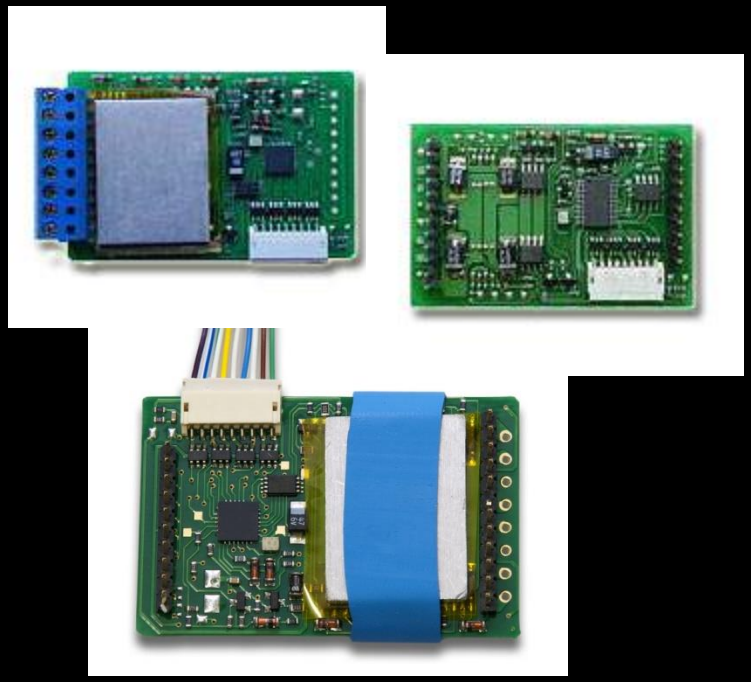
2015… The year of O Scale Sound!

No more piggybacking decoders.

Mobile Decoders

Digitrax DG-Series Motor Decoders

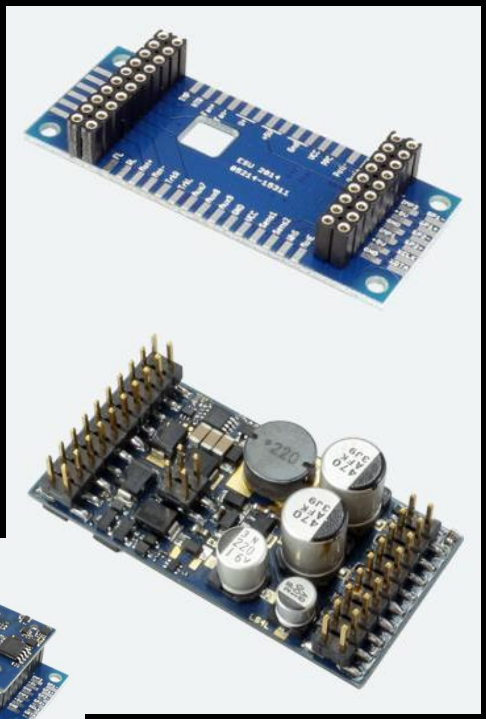
- 5 Amp Motor Circuit
- (8) 500ma Function Outputs
- NMRA Function Mapping
- 3 Point and Speed Table Speed
- BEMF
- Motor Isolation Protection
- Digitrax Transponding
- SFX Piggyback Sound Options
- 4 Channel, 16 Bit, 1 Watt Amp



Mobile Decoders

ESU L-Series Sound Decoders

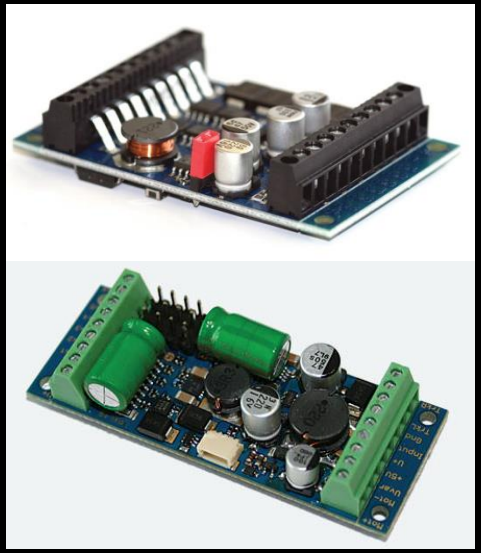
- 3 Amp Motor Circuit, Dual Motor Outputs
- (9) 500ma Function Outputs
- Free-mapping Function Control
- Function Control Logic Operator
- Function-activated brake and Switching Mode
- BEMF w/ Autotune
- Motor and Function Isolation Protection
- Low Voltage, Servo, SUSI, Smoke Unit, DCC Coupler
- DC, ABC and HLU Braking
- Powerpack Connections w/ Timer CV
- RailCom Plus Bi-Di Communications
- 8 Channel, 16 Bit Processor, 3 Watt Amp



Mobile Decoders

ESU XL-Series Motor and Sound Decoders

- 4 Amp Motor Circuit, Dual Motor Outputs
- (12) 500ma Function Outputs
- Free-mapping Function Control
- Function Control Logic Operators
- Function-activated brake and Switching Mode
- BEMF w/ Autotune
- Motor and Function Isolation Protection
- Low Voltage, Servo, SUSI, Smoke Unit, DCC Coupler
- DC, ABC and HLU Braking
- Built-in Powerpack w/ Timer CV
- RailCom Plus Bi-Di Communications
- 8 Channel, 16 Bit Processor, 11 Watt Amp



Mobile Decoders

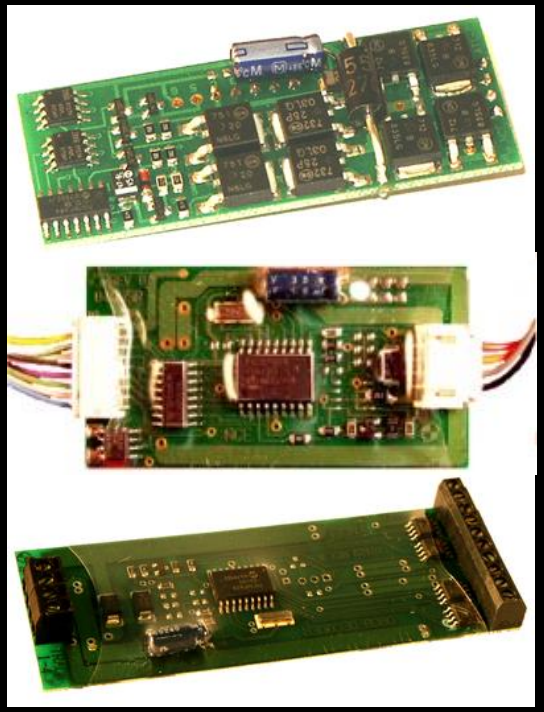
NCE ATL-O Motor Decoders

- 4 Amp Motor Circuit
- (6) 500ma Function Outputs
- Atlas/Weaver Drop-In Replacement

NCE D408/D808 Motor Decoders

- 4/8 Amp Motor Circuit
- (7/8) 500ma Function Outputs

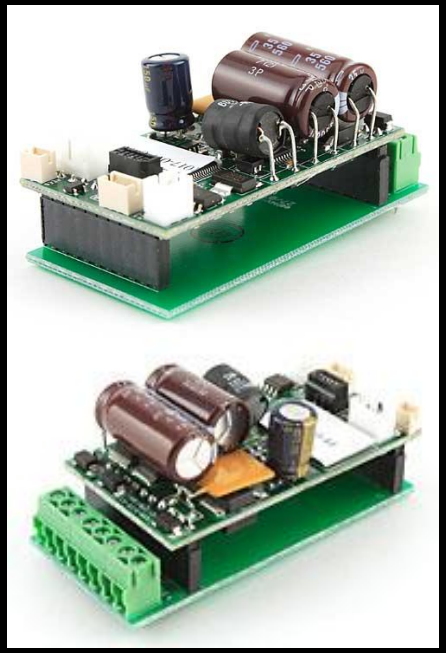
- 3 Point and Speed Table Speed
- BEMF



Mobile Decoders

QSI Solutions Titan Magnum Sound Decoders

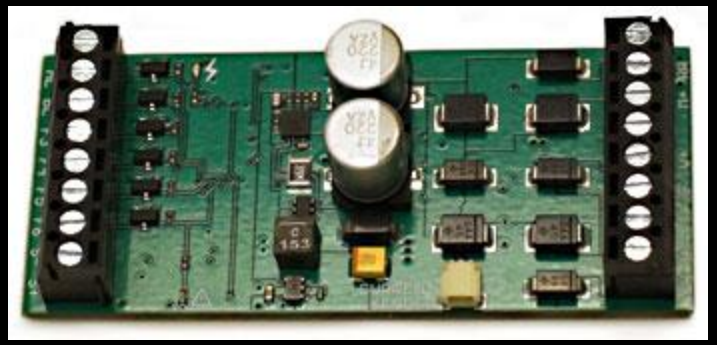
- 6 or 10 Amp Motor Circuit
- (14) 500ma Function Outputs
- Free-mapping Function Control
- Emulator Technology
- Motor Isolation Protection
- Built-in QSI "Super-Cap"
- Dual Speaker Output For Stereo Sound
- 64 Channel, 32 Bit Processor, 12 Watt Amp



Mobile Decoders

Soundtraxx Econami ECO-400 Sound Decoders

- 4 Amp Motor Circuit
- (6) 500ma Function Outputs
- Flex-map Function Mapping
- Function-activated brake and Switching Mode
- Current-Keeper Connections
- Supports Digitrax Transponding
- 7-band Equalizer, Reverb
- 12 Channel, 16 Bit Processor, 1 Watt Amp



Mobile Decoders

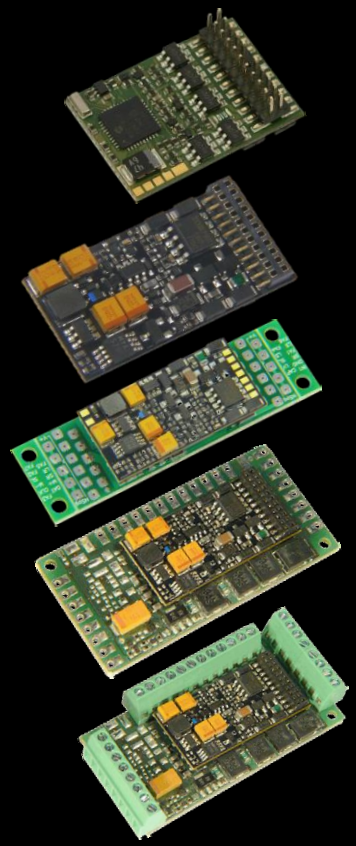
TCS G8 Motor Decoders and
TCS WOW-Sound 501 Sound Decoders

- 5 Amp Motor Circuit
- (8) 500ma Function Outputs
- Advanced Function Mapping
- "Slot Car" and "Prototype" Operation
- Keep-Alive Connections
- RailCom Plus Bi-Di Communication
- Dual Speaker Outputs
- 44.1 kHz Sample Rate, 16 Bit Processor, ?? Watt Amp

Mobile Decoders

Zimo Small-scale Motor and Sound Decoders
(Models Shown: MX632, MX644C, ADAMKL, ADAMTC, ADAPLU)

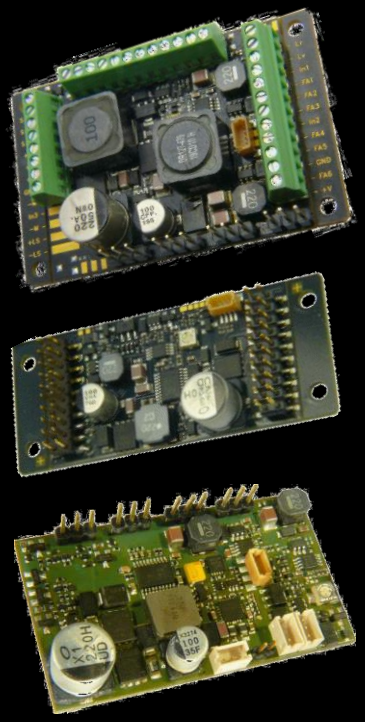
- 1.2 Amp Motor Circuit (MX632 1.6A)
- (8) 500ma Function Outputs
- NMRA and Swiss Function Mapping
- Switching Mode
- Motor and Function Isolation Protection
- Low Voltage, Servo, SUSI, Smoke Unit, DCC Coupler
- RailCom Plus Bi-Di Communication
- 22 kHz Sample Rate, 6 Channel, 3 Watt Amp
- Adapter Boards Boost Rating To 1.8A



Mobile Decoders

Zimo Large-scale Motor and Sound Decoders
(Models Shown: MX695, MX696, MX697)

- 4-6 Amp Motor Circuit
- (8-14) 500ma Function Outputs
- NMRA and Swiss Function Mapping
- Switching Mode
- Motor and Function Isolation Protection
- Low Voltage, Servo, SUSI, Smoke Unit, DCC Coupler
- RailCom Plus Bi-Di Communication
- 22 kHz Sample Rate, 6 Channel, 3 Watt Amp



Installation Products

Get the most of every 1:48 scale inch…

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Big Models Need Big Parts

- Consider 5 and 10mm LEDs
- Optional 3014 and 5630 Surface Mount LEDs
- Use 28ga Or Larger Wire
  - Track Power and Motor Leads
- Use Sound Cams And Smoke Units On Smokers
- Use Quick Connectors For Easily Disassembly
- Use A Keep-Alive For Rock-Solid Performance
- Use The Biggest Speaker Possible

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Techniques for BIG Sound

Bring on the "Boom", Baby…

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Would You Like Sound With That?

- Motor and Light Decoders - Digitrax, ESU, NCE, TCS, Zimo
- Sound Motor and Light Decoders - ESU, QSI, Soundtraxx, TCS, Zimo
- Sound adds cost
- Sound adds complexity
- Sound is addicting
- Sound is a super detail
- Good sound adds plausibility, bad sound validates the “toy” factor

The SBS4DCC Sound Spiel

- There isn't $5 difference in the cost of a brand X vs. brand Y decoder. It's silica and circuit board.
- What you are buying is the engineering of the design features and firmware AND the quality of the sound file.
- Key features include physical size, motor current rating, updateable firmware and sound, editable sound files, additional sound file cost, and the author of the file. What matters to YOU?
- Sound is VERY SUBJECTIVE and VERY PERSONAL. My tastes are not the same as yours.

	Large Scale Model	Update Firmware	Update Sound File	Sound File Types	Edit Sound File	Author
Digitrax	No	No	Yes	Free	Yes	User Base
ESU	Yes	Yes	Yes	Free	Yes	OEM
				Preloaded w/ Fee	No	Professional Developer
MRC	Yes	No	No	Preloaded	No	OEM
NCE	Yes	No	NA	NA	NA	NA
QSI	Yes	Yes	Yes	Free	Config Options	OEM
Soundtraxx	Yes	No	No	Preloaded	Config Options	OEM
TCS	Yes	No	No	Preloaded	Config Options	OEM
Zimo	Yes	Yes	Yes	Free - User Base	Yes	User Base
				Coded w/ Fee	No	Professional Developer
				Preloaded	No	OEM

Big Speakers, Big Sound

Size really does matter

- Sound is created by air movement
- A BIG speaker moves more air

Speaker rating matters too

- Speaker Impedance vs. Amp Impedance
- Speaker Wattage vs. Amp Wattage
- Frequency Response Range

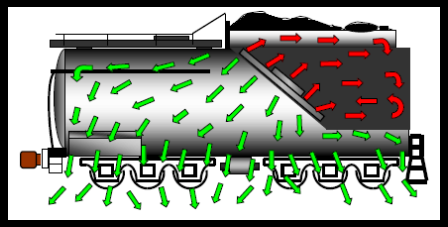
Is that really a Hi-Bass Speaker?

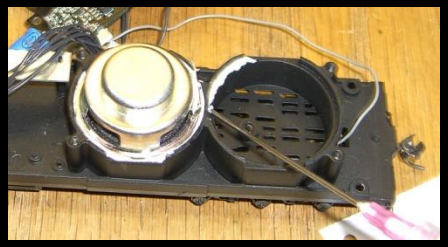
You Gotta Have A Baffle

- Isolates front sound wave from back wave
- Seal it up tight

  (glue vs. caulk vs. tape)
- Creates back pressure for better volume
- Maybe material matters

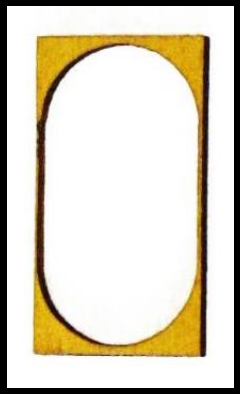
  (plastic vs. wood vs. brass)
- Use the model shell if possible

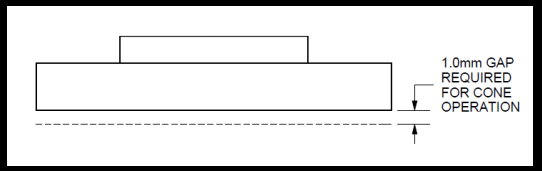


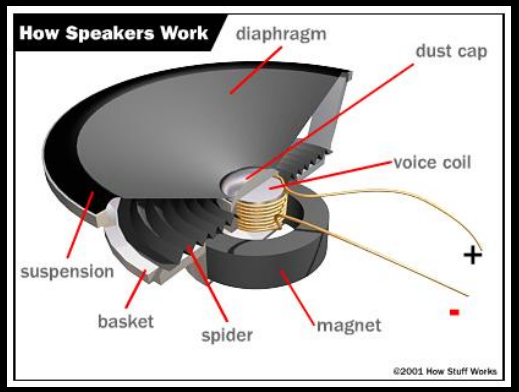


Flex Your Diaphragm

- Speaker manufactures specify max deflection
- Use a spacer so the diaphragm can flex freely
- Most frames are too shallow
- Poor spacing results in rattle and distortion
- Rigid mounting prevents rattle

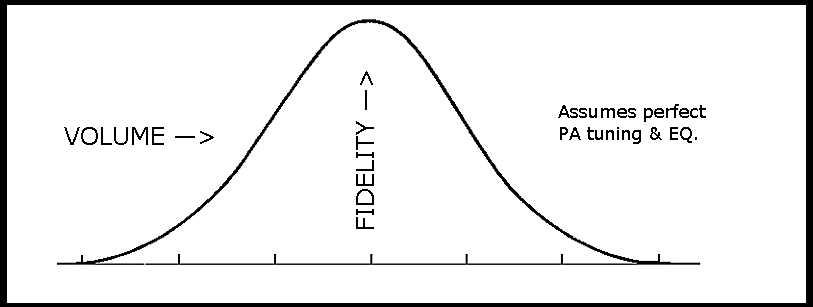






Turn It Down Dude

- Quality of sound is bell curve
  * Volume vs. Fidelity *
- Sweet spot is adequate volume at the midpoint of the hardware capability
- Use multiple speakers to move more air
- Use good installation techniques to maximize speaker performance



Product Demonstrations

- The Roco Z21 Command Station
- The New ESL LokSound L-Series
- The New Soundtraxx Econami ECO-400
- The New TCS WOW-Sound 501
- Zimo MX696S

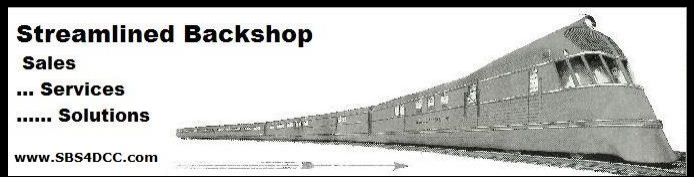
Q & A

Hello… You awake?

Are you still with me?

Thanks for riding with us today.

We hope you had a pleasant trip.



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