

DCC Decoder and Sound Installations



Tony's Decoder Installations

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Decoder basics

Before delving into decoder installation in detail, let's start with some general guidelines

- Use the proper tools. Invest in a good soldering iron and high-quality solder.
- A list of suggested tools and where you can get them has been included in this packet. Decoder installation is not a job for your old soldering gun!
- Insulate all connections. I recommend 1/16" or 3/64" diameter heat-shrink tubing. Plastic electrical tape is not an acceptable substitute since it has a habit of unwrapping itself. Kapton tape is the best option
- Use the proper size wire. Most decoders come equipped with 28 or 30AWG stranded wire. However, this may not be heavy enough to handle surge currents caused by a short between the locomotive trucks. Heavier wire, such as 24AWG, is a better choice for jumpers between truck pickups.

Disassemble locomotives carefully. Refer to the exploded parts diagram that comes with the locomotive when taking an engine apart. For complex models it's a good idea to label the parts and place them in a multi-compartment box.

- Isolate the motor. Before installing a decoder, the two motor terminals must be electrically isolated from the chassis or frame.
- Reliable track pickup is essential. Most of today's plastic diesels feature all-wheel pickup. With few exceptions, most brass locomotives (and some brass diesels) don't. They use the drivers (or lead truck in the case of brass diesels) to pick up from the right rail and the tender wheels (or rear diesel truck) to pick up from the left rail. This usually results in erratic operation. Consider adding wipers or other extra pickups before installing a decoder.
- Do not exceed the decoder's current rating. You can use a lower-rated motor with a decoder rated at a higher current, but not vice-versa. Also, provide adequate ventilation. Decoders heat up under load or when operated near the rated output current.
- Neatness counts. Don't allow any exposed wires or components to touch the metal chassis or weights. Use caution when wiring headlights. When headlights are wired to the decoder, be sure to add the total current of the headlights to the motor current. (See Lighting and Led Guide and Applicable Resistors)
- Equip each locomotive with its own decoder. A decoder in each locomotive provides better performance and lets you tune the performance of that particular locomotive. Economizing here will cost you more!
- Use decoder addresses that are easy to remember. You may recall that GP35-2 no. 266 has an address of "4," but Will your operators? We suggest using the last two digits of the 4 Digits of the locomotive number. It's also a good idea to place a self-adhesive label listing the decoder type and address on the underside of each locomotive. If you have two locos with the same numbers you can easily remove/ paint over the first or last digit to make a new number.

Basic decoder installation

All the major Manufacturers such as Atlas, Kato, Life-Like, and Stewart and others have made decoder installation a breeze in their newer locomotives by including a receptacle (See diagram in appendix) that's pre-wired for a DCC decoder.

You simply remove the factory-installed plug. Plug in the appropriate decoder, and you're ready to go. But before you can do this you need to determine which decoder is the best to use. All decoder installations include the following steps:

- (1) Select a decoder that fits inside the body shell and has the required current rating.
- (2) Tony's Decoder Comparison Matrix is a handy reference for selecting sizes and features.
- (3) Isolate the motor from the track pickups.
- (4) Install the decoder along with wiring for any extra effects, and
- (5) Test the completed installation.

With many Bachmann steam locomotives there are yellow capacitors that need to be removed in order for optimal operation. If they are not removed you may experience poor speed control.

Selecting a decoder

The decoder size will be dictated by the amount of room inside the engine or tender. You also need to select a decoder with a current rating higher than the stall current of the motor. It's best to measure the stall current on your particular locomotive. (See Figure 1)

Set the meter on the DC amps scale. Grasp the locomotive so it doesn't take off and turn the power pack to full.

Push down until the engine stalls and note the current. This is the "stall" current. One decoder can drive multiple motors, provided the sum of the stall currents doesn't exceed the decoder's current rating.

Isolating the motor

The motor must be completely isolated from all track pickup points. If the locomotive has its built-in command control socket the motor is already isolated. But an older model, or one without its built-in socket, means you need to find and eliminate all connections between the motor brushes and track pickups. This is usually the biggest problem people have when they first step into command control.

Diesel locomotives are fairly straightforward, but in brass steam locomotives the mechanical pickups can be quite ingenious and well hidden. Use a volt-ohm meter to verify electrical isolation. Set your meter on the ohms (resistance) scale and touch both probes together. The meter will indicate a short. You don't want to see this indication when you're checking for motor isolation! Place one of the probes on its brush and touch the other probe to the chassis or left rail pickup wire and then move it to the right rail pickup wire. If the motor is isolated you will read an open circuit. Move the probe to the other brush and repeat the tests. If both tests indicate an open circuit, the motor is isolated and you can safely proceed with decoder installation.

Athearn HO diesel installation (See Figure 2)

Since most HO railroads have at least one Athearn diesel, showing how to equip one with a decoder seemed an excellent start in place for us. Athearn motors aren't isolated from the frame, so the first step is to change that. Remove the shell from the frame and discard the metal connector clip. Don't remove the brush-retaining clips located underneath. Next pull up on the motor until the mounting pads pop out of the holes. The drive train will slip apart as the motor comes out. Set these components aside. Place a strip of nylon-reinforced strapping tape on the floor of the fuel tank. Completely cover the shiny metal area where the motor was sitting, but be sure to keep the tape clear of the motor mount holes. The brushes are held in place with clips, and we'll be soldering the motor connection wires directly to these. Pry off both clips, being careful not to let the brush springs and brushes fly across the room.

Cut the two small prongs from the underside of the bottom brush clip and file smooth. The decoder's color-coded wires should comply with the NMRA-recommended coding shown in table 1. Solder the gray motor - (minus) wire to the outside of the curved end of the lower brush clip. Replace the brush and spring and snap the clip back onto the motor, then solder the orange motor + (plus) wire to the center of the upper brush clip. Reinstall the brush and spring. Snap the clip back in place then set the motor aside for now. The track pickup wires connect with the chassis. Drill and tap a hole in the chassis for a 2-56 brass machine screw where it won't interfere with the body. Next, solder the left rail pickup wire (black) to the top of the bolt.

Carefully reinstall the motor by reseating the rubber pads and test the motor to ensure it's completely isolated. Now solder the red right rail pickup wire to the top of the metal tab on the truck. Jump the two trucks together using a short length of red wire. Mount the decoder using a piece of double-sided tape. Snap the body back onto the frame and your decoder is ready for programming. The extra wires on the decoder are for optional effects including headlights and other functions. Consult the decoder instruction booklet for suggestions and limitations. The diagram shows how we equipped our Athearn engines with directional lighting.

There is a special harness made by Digitrax that simplifies conventional Athearn installation, DHAT. This harness can be used on any decoder that has the JST connector. (See photos on Page 4)

IHC HO 2-6-0 installation (See Figure 3)

It's a little trickier to install decoders in steam locomotives, but it isn't difficult. Just keep in mind how most steamers pick up power from the rails and deliver it to the motor. Since brass locomotives need to be approached on a (almost) case-by case basis, we're going to describe steamer installation using International Hobby Corporation's 2-6-0 Mogul. The engine picks up power from the drivers on both sides. The front tender truck picks up power from the left rail and the rear truck picks up from the right rail. Two wires between the tender and locomotive transmit power from the tender to the motor.

To install the decoder, remove the boiler mounting screws and gently lift the boiler from the frame. Next, remove the screw securing the motor mounting bracket and carefully lift the motor until you see the wires between the motor wires

and the pickup strips. Cut these motor wires but don't cut the pickup wires from the tender. Unsolder the remains of the original motor wires and discard. Solder two new wires to the sides of the motor. Use the wires supplied with the decoder and be sure they are at least 6" long. Connect these to the decoder motor output. Route the two new motor wires back toward the tender following the same path as the power pickup wires. You may want to place a small plug between the locomotive and tender.

Remount the motor then slide the frame and motor assembly back into the boiler. Pull the wires back toward the tender and ensure the boiler fits properly. Install the pilot truck brass tensioner and mounting screw. Then install the screw underneath the cab. Finally, reattach the pilot truck. Modifications to the engine are complete. You should have the two original pickup wires and two additional wires extending from the back of the locomotive frame.

We'll be mounting the decoder inside the tender but first we need to insulate the tender pickups from the frame. Remove the tender shell. The two pickup wires are soldered to brass tabs on top of the truck screws. Leave these in place and solder two lengths of wire to connect each of the brass tabs with the two decoder input wires. Insulate the splice with heat-shrink tubing.

Solder the two motor wires to the motor wires of the decoder. If you're connecting the headlight or backup light to the decoder, make those connections now in accordance with the decoder manufacturer's instructions. Insulate the metal weight inside the tender using electrical tape and install the decoder with double-sided tape. Check for loose connections, bare wires, or metal in contact with the decoder. Test the locomotive to ensure proper operation. If the locomotive direction is reversed, simply swap the motor wires.

Special Application Specific decoders are available for the following locomotives:

TTX:

TTX/GP7: Proto 2000 GP7, 9, 20 30 38 60, SD 45,60 Integrated Direct Plug
TTX/RS2: KATO RS2 and most Intermountain and Atlas Diesels Integrated Direct Plug
TTX/Atlas1234: All Atlas S, Alco Switchers, circuit board replacement decoder.
TTX/SW900: All Proto 2000 SW Switchers, circuit board replacement decoder.

Digitrax

DH163A0: Athearn F3-7, Atlas B40-8, GP7, GP38, GP40, RS1, RS3, RSD4/5, RS11, RSD4, RSD5, RSD12, SD35, U33C, U36C, circuit board replacement decoder.
DN122K2: Kato N RDC circuit board replacement decoder.
DN163A0: Atlas N B23-7, B30-7, B36-7, C-628, Dash 8-40B, Dash 8-32BWH, GP30, GP35, GP38, GP40, GP40-2, H15-44, H16-44, SD-7, SD-9, SD-24, SD35, Trainmaster, U25B, circuit board replacement decoder.
DN163A1: Atlas N SD50, SD60, SD60M, circuit board replacement decoder.
DN163I0: Intermountain N SD40T Tunnel motor circuit board replacement decoder.
DN163I1A/B: Intermountain N FT A/B
DN163K0A: Kato N E-8, PA-1, P42 Genesis, circuit board replacement decoder.
DN163K0B: Kato N F3 A&B circuit board replacement decoder.
DN163K1B: Kato N AC4400CW, C44-9, SD40
DN163K2: Kato N RS2, RSC2, SD80/90MAC
DN163M0: MicroTrains FT circuit board replacement decoder.

NCE

DASR: same as DH163A0
N12A0: same as DN163A0
N12A0e: same as DN163I0
N12A1: Same as DN163A1
NIMFTA/B: same as DN163I1A/B

Lenz

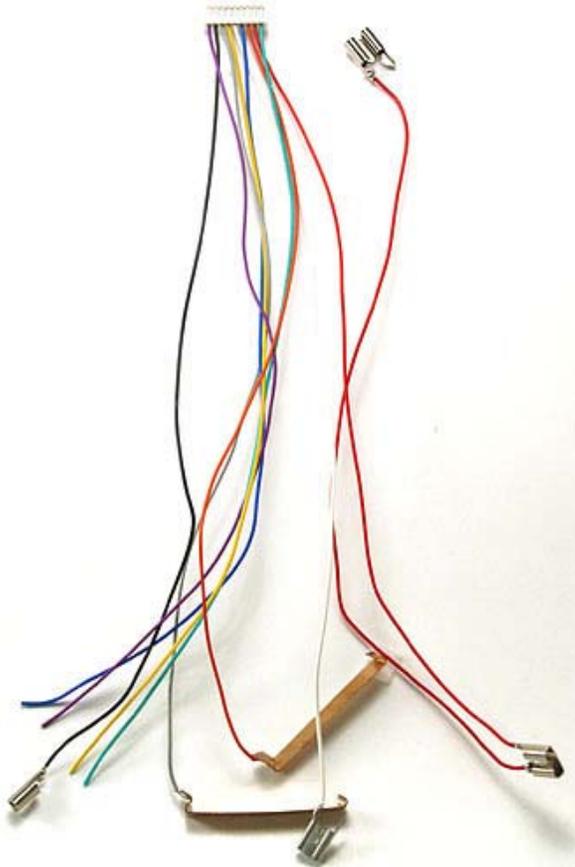
Lenz Gold Mini D: all European steam locos with a 6-pin socket

TCS

A4X: Same as DH163A0
A6X: Same as DH163A0 with built-in 1.5V power supply for lights

Hints And Tips

- **Make sure loco runs on DC FIRST**
- **Make sure decoder can handle current draw of the motor**
- **When mounting decoder insulate all metal from touching the decoder**
- **Make sure motor brushes are insulated from frame and pick-up**
- **Make sure wheels and track are clean**
- **After install check the loco on the program track for any shorts**
- **Make sure you have a clean tip on your soldering iron**
- **Solder all electrical connections**
- **Don't rely on the draw bar for tender pick-up**
- **Never use glue to hold things in place (you may need to move it in the future)**



Tony's Decoder Installations

N scale Decoder Selection Chart Courtesy of Digitrax

Manufacturer	Locomotive Model	Recommended Digitrax Decoder
Arnold	S-2	DZ143, DZ123
Atlas	2 6 0	DZ143, DZ123
	2 Truck Shay	DZ143, DZ123
	Baldwin V0-1000	DZ143, DZ123
	B23-7	DN163A0
	B30-7, B36-7	DN163A0
	C-628	DN163A0
	Dash 8-40B	DN163A0
	Dash 8-32BWH	DN163A0
	GP-7 Pre 1995	DZ143, DZ123 with frame modification
	GP30 & GP35	DN163A0
	GP38	DN163A0
	GP40, GP40-2	DN163A0
	H 15-44, H16-44	DN163A0
	RS-1	DZ143, DZ123 (Frame Modification Required)
	RS-3	DZ143, DZ123
	SD-7	DN163A0
	SD-9	DN163A0
	SD-24	DN163A0
	SD35	DN163A0
	SD50	DN163A1
	SD60, SD60M & SD50	DN163A1
	Trainmaster	DN163A0
	U25B	DN163A0
Athearn	P59PHI	DZ143, DZ123
Bachmann	Doodlebug	DZ143, DZ123
	Spectrum 2-8-0	DZ143, DZ123
	F7 A&B	DZ143, DZ123
ConCor	Northern 4-8-4	DZ143PS, DZ123PS
Kato	C44-9W	DN163K1B
	E-8	DN163K0A
	F3 A&B	DN163K0B
	Mikado	DZ143, DZ123 (Tender Install with Frame Mod)
	PA-1	DN163K0A
	P42 Genesis	DN163K0A
	RDC	DN122K2
	RS2 & RSC2	DN163K2
	SD40, SD40-2	DN163K1B
	SD70 MAC	DN163K1B
	SD80/90MAC Series	DN163K2
ER Models	Sharknose	DN141E2
Intermountain	FT	DZ143 with frame modification
	SD40T	DN163I0
LifeLike	Alco S-1 Switcher	DZ143, DZ123
	2-8-8-2 Mallet	DZ143, DZ123 Mount in cab, motor is isolated
	FA1/FB1	DZ143, DZ123
	F7	DZ143, DZ123
	F40PH	DZ143, DZ123
	GP18	DZ143, DZ123
	GP20	DZ143, DZ123
	GP38-2	DZ143, DZ123
	SD7	DZ143, DZ123
	SW1200 Installation Instructions	DZ143, DZ123
Micro Trains	FT	DN163M0xx
Roundhouse-MDC	2 8 0	DZ143, DZ123
Steam Locomotives		
Most N scale Steam		DZ143, DZ123 (Tender Install)
Other N scale Locos		DZ143, DZ123 with Replacement Frame* or Frame Modification

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HO Scale Selection Chart Courtesy of Digitrax

Manufacturer	Loco Model	Premium Decoder Recommended	Basic Decoder Recommended
Athearn	Genesis F3-7	DH163A0	DH123D
	Genesis 2-8-2	DH163D	DH123D
	Genesis 4-6-2	DH163D	DH123D
	Genesis SD70-75	DH163A0, DH163D	DH123D
	GP60M RTR Plus AND all other RTR Plus	DH163D	DH123D
	Regular Diesels	DH163AT	DH123AT
Atlas	AEM7	DZ143	DZ123
	B40-8	DH163A0	
	C30-7	DH163IP	DH123P, DZ123PS
	C424, C425	DH163K0, DH163IP	DH123PS, DZ123PS
	DASH 8-40B	DH163PS	DH123PS
	DASH 8-40C	DH163PS	DH123PS
	GP7 (Pre 2003)	DH163A0, DH163D	DH123D
	GP7 (2003 and later)	DH163IP, DH163PS	DH123PS, DZ123PS
	GP38 (Decoder Upgrade)	DH163A0	
	GP40 (Decoder Upgrade)	DH163A0	
	H-15-44	DH163PS	DH123PS
	RS1 & RS3	DH163A0, DH163K0	
	RS3	DH163A0, DH163K0	
	RSD4/5	DH163A0, DH163K0	
	RS-11	DH163A0, DH163K0	DH123D
	RSD4, RSD5, RSD12	DH163A0, DH163K0	
	S-2, S-4	DZ143	DZ123
	SD24	DH163PS	DH123PS
	SD35 (Decoder Upgrade)	DH163A0	
	U23B	DH163IP	DH123P, DZ123PS
U33C & U36C	DH163A0, DH163P	DH123P, DZ123PS	
Bachmann	Spectrum 2-10-0	DH163IP	DH123P, DZ123PS
	Spectrum 3 Truck Shay	DZ143	DZ123
	Spectrum Steam Engines	DZ143	DZ123
	Spectrum 4-6-0	DH163PS	DH123PS
	GE E-33 Electric	DH163PS	DH123PS
	Hogwart's Express (Installation Instructions)	DH163D	DH123D
	Thomas the Tank (Installation Notes)	DH163D	DH123D
ER Models	Baldwin Sharknose	DH163D	DH123D
	FP7	DH163D	DH123D
Bowser locos with Pittman Motors		DH163D	DH123D
InterMountain	F3-F9	DZ143PS	DZ123PS
	F7	DH163IP	
Kato	C44-9W	DH163IP	DZ123PS
	Dash 8	DH163IP	
	C424 C1425 ATAS	DH163K0	
	GP35	DH163K0	DH123D
	NW-2	DH163D with Replacement Frame, DZ143	DH123D
	RS2/RSC-2	DH163IP or DZ143PS	DZ123PS
	SD40-2	DH163K0, DN142, DH163D, DH163IP w/frame mod	DH123D
	SD45	DH163K0, DH163IP	
	SD70	DH163IP	
	SD80/90	DH163P	DH123P
LifeLike	Heritage 0-6-0	DH163L0	DH123D
	Heritage 0-8-0	DH163L0	DH123D
	Heritage 2-8-4	DH163L0	DH123D
	Heritage 2-8-8-2	DH163IP	DZ123PS
	BL2	DH163D	DH123D
	BUDD Units (RDC)	DH163D	DH123D
	DL109	DH163D	DH123D
	FA1/FB1	DH163P	DH123P, DH123D
	FA2/FB2	DH163D	DH123D
	E6/E7 (Proto 2000) Mars Light Installation Note	DH163P	DH123P

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	E8/E9 (Proto 2000) App Note	DH163D	DH123D
	F3A/B (Proto 1000)	DH163D	DH123D
	GP7 (Proto 2000)	DH163L0	DH123D
	GP9 (Proto 2000)	DH163L0	DH123D
	GP18	DH163L0	DH123D
	GP20	DH163L0	DH123D
	GP30	DH163L0	DH123D
	GP38-2	DH163L0	DH123D
	GP60 (Proto 2000) See app note	DH163L0	DH123D
	PA/PB	DH163D	DH123P, DH123D
	P1K C Liners	DH163D	DH123D
	P1K Erie Builts	DH163D	DH123D
	S-1 See application note	DH163PS	DH123PS or DZ123PS
	S-3 Alco (Proto 2000)	DZ143PS	DZ123PS (Change Bulbs to 12V)
	SD7	DH163D	DH123D
	SD9	DH163IP	DH123D
	SD45	DH163L0	DH123D
	SD60/SD60M See app note	DH163L0	DH123D
	SW8/900/600	DZ143	DZ123
	Life Like Diesels with DCC Medium Socket	DH163PS	DH123PS or DZ123PS
MDC	Four Truck Shay	DZ143PS	DZ123PS
Rivarossi	Allegheny	DH163PS	DH123PS or DZ123PS
	Heisler	DZ143PS	
Stewart	Baldwin AS16 (Kato drive)	DH163K0, DH163D	DH123D
	C628	DH163D, DH163P	DH123P, DH123D
	C630	DH163D, DH163P	DH123P, DH123D
	F3-7, F9 A&B	DH163K0	DH123D
	FT	DH163P	DH123P
	U25B	DZ143PS	DZ123PS
	U25C (Kato drive)	DH163K0, DH142	DH123D
	Baldwin AS16 (Kato drive)	DH163K0, DH142	DH123D
	VO1000	DZ143PS	DZ123PS
Trix	Big Boy	DH163PS	DH123PS or DZ123PS
Walthers	All Locos	DH163D, DZ143	DH123D
HO Locos with DCC Medium Socket		DH163P	DH123P
Most HO Locos Not Listed Above		DH163D	DH123D

Links to Install Examples

- http://www.tcsdcc.com/installation_pictures_and_inform_index.htm
- <http://www.digitrax.com/decsol.php>
- http://www.dcc-mueller.de/decoder/decode_e.htm
- <http://www.trainweb.org/nrmrc/dcc/conversions.html>
- <http://www.mainerailroads.org/dcccorner.html>
- <http://www.wiringfordcc.com>

Retroframes for N Scale

Locomotive frames must be precisely manufactured to give the correct orientation and tolerances for drive train components, and alignment of the motor and electrical pickups, etc. to produce a smooth-running and quiet locomotive. Aztec and Southern Digital follow different approaches in the way they produce their retroframes.

Aztec uses OEM frames from the locomotive manufacturer or the customer and mills them on precise computer-controlled milling machines to create wiring channels and space for the decoder. These frames do not void the manufacturer's warranty, and most manufacturers will accept locomotives with Aztec frames for repair.

Southern Digital creates a copy of the die cast original frame modified with the wiring channels and space for the decoder. These are then copy cast in rubber molds in lower temperature, but more dense, alloys than the original.

Each approach achieves its purpose of converting an analog locomotive into a digital locomotive. The following table indicates some of the differences between the approaches and the companies:

Aztec TrackMaster Frame	Southern Digital Digi-Frame
Milled OEM frame	New cast frame
Less weight than original frame	More weight than OEM frame
No filing of frame or adjustments required	Hardened frame but brittle, touchup filing only required
Individual, detailed instructions per frame	Individual, detailed instructions per frame
Decoder wire lengths specified	Decoder wire lengths specified
Shell mounting "nubs" retained	Shell mounting "nubs" retained
Strong, straight frame	Strong, straight frame

Currently, frames are, or have been, available for the following diesel locomotives:

Locomotive	Aztec TrackMaster Frame	Southern Digital Digi-Frame
Atlas RS-1, RS-3, RS-11, RSD-4/5, RSD-12	√	√
Atlas GP7, GP9, GP30, GP35, GP40	√	√
Atlas SD7, SD9	√	√
Atlas U25B	√	√
Con-Cor S2 4-8-4		√
Con-Cor E7/8 A/B, PA/PB-1, DL-109/110, FM	√	

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Kato F3/7 A/B	√	√
Kato GP38-2, GP50	√	√
Kato SD40, SD45	√	√
Kato U30C, C30-7	√	√
Life-Like C-Liner A and B units	√	√
Life-Like C424	√	
Life-Like E6/7		√
Life-Like FA1/FB1	√	√
Life-Like FA2/FB2	√	
Life-Like F7		√
Life-Like GP20	√	
Life-Like GP60	√	
Life-Like SD7		√

Notes:

Due to short supply of some OEM frames, Aztec may require your existing frame as a trade-in. Check at their web site: <http://www.aztctrains.com>. Aztec also posts the instructions sheets for installing decoders in the frames they produce. Check their web site.

Southern Digital Digi-Frames are fairly brittle, and have been known to break from incorrect handling or dropping of either the frame alone or the frame in a locomotive. Southern Digital also had, at one time, some problems with frame dimensions; watch out for these if purchasing on the used market or over the Internet.

New frames are added by the manufacturers from time to time, and some are discontinued, so check with the manufacturer or dealer for availability.

Fig. 1

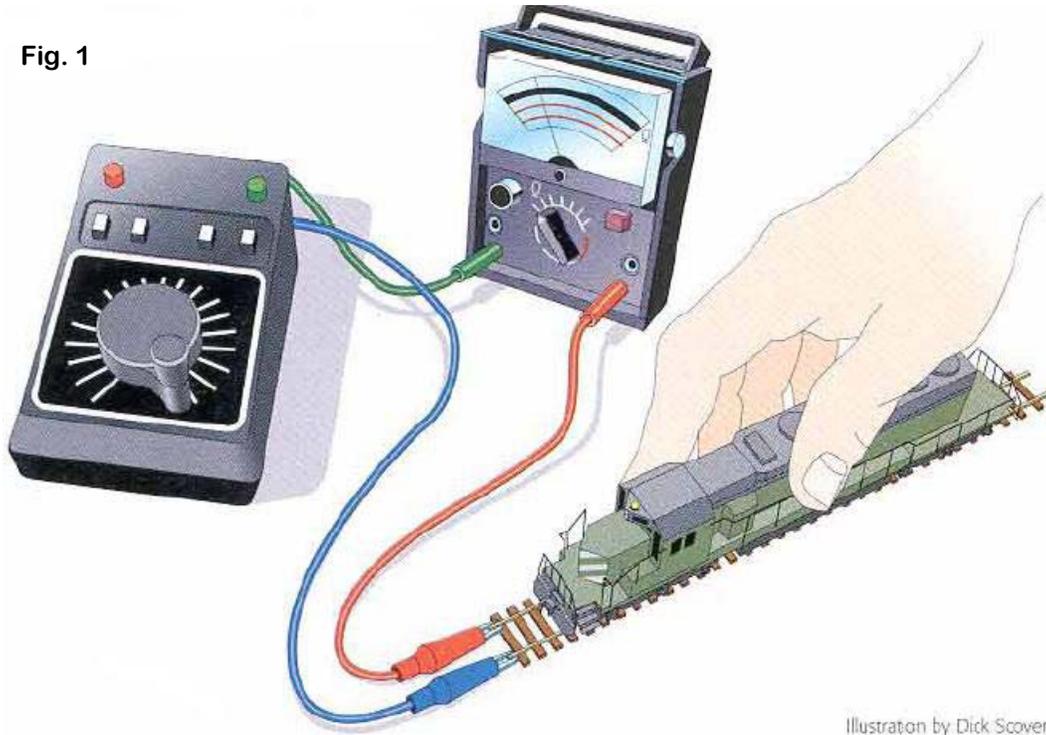


Illustration by Dick Scover

Illustration by Rick Johnson

Fig. 2

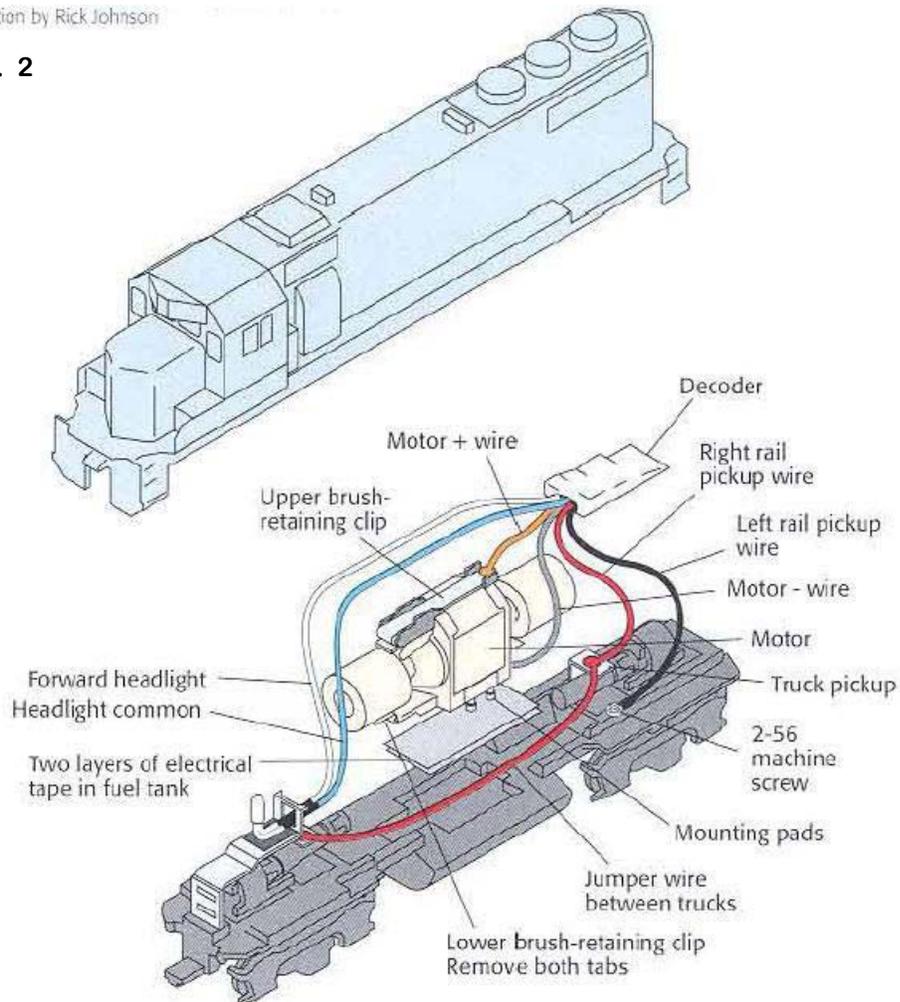


Fig. 3

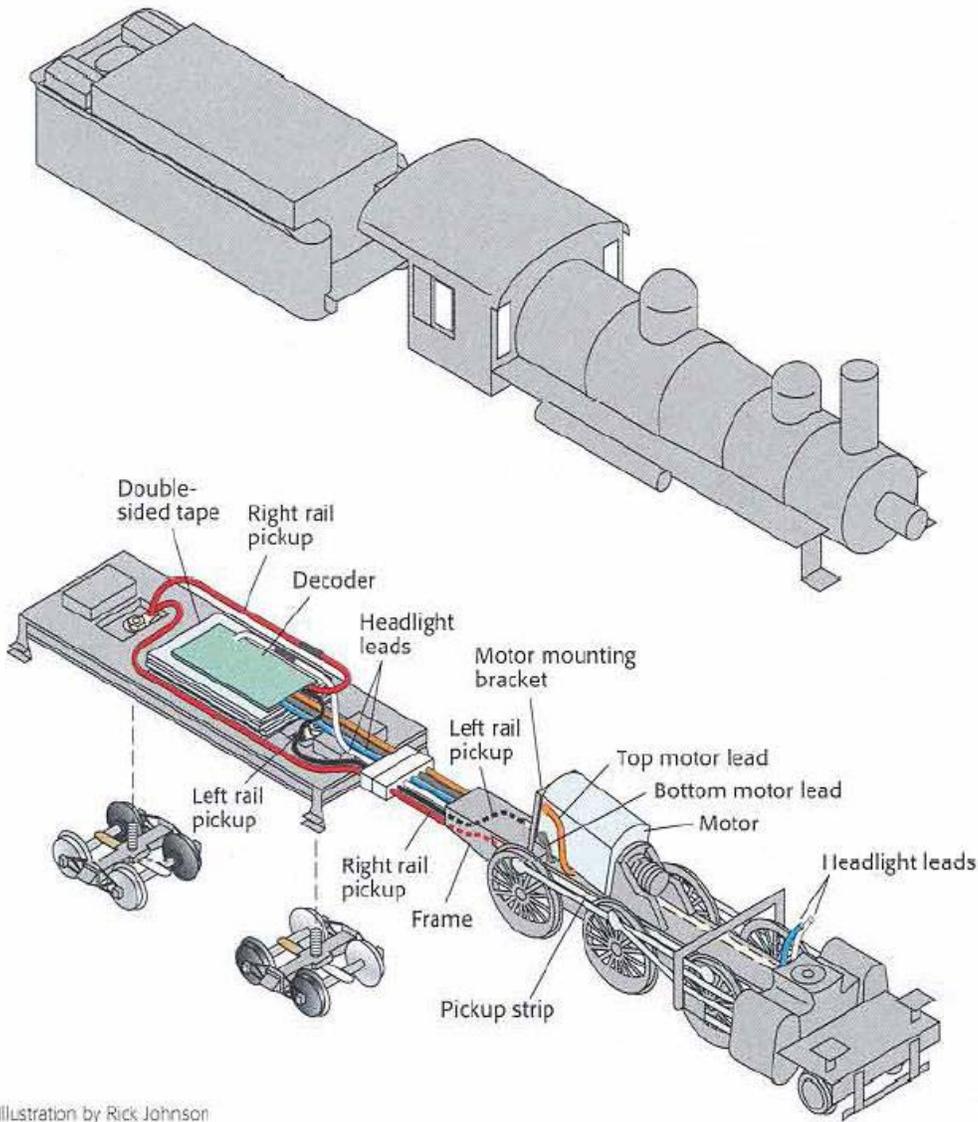


Illustration by Rick Johnson

Fig. 4

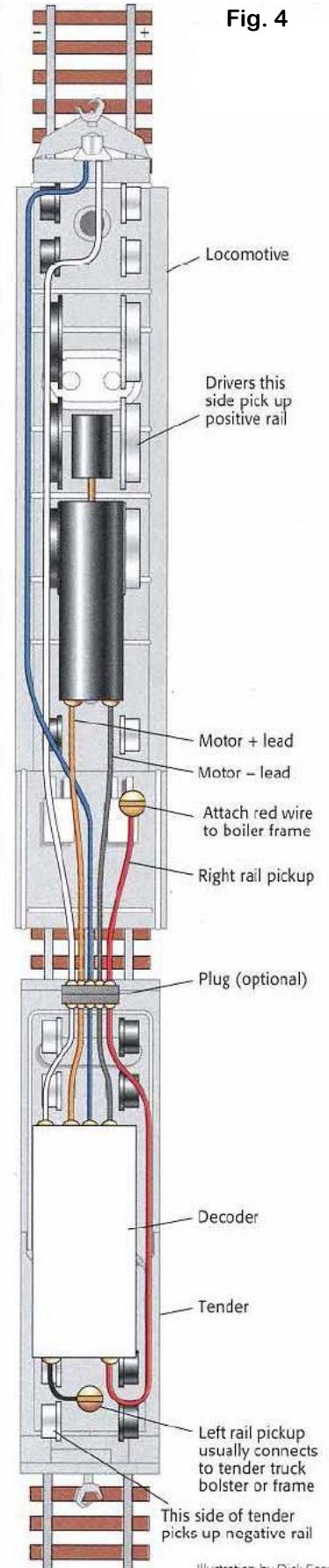
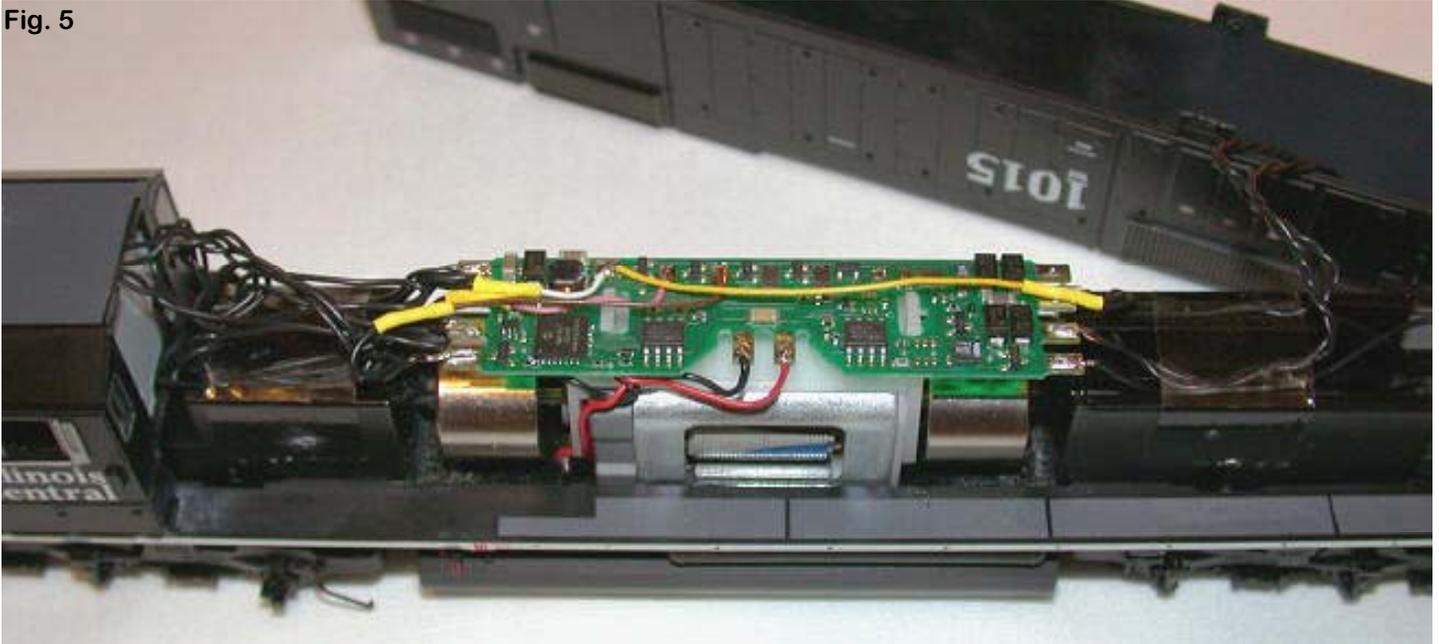


Illustration by Dick Scover

Athearn SD70 MAC

The on board 1.5 volt regulated power supply on the A6X decoder was used to power all six light bulbs on this loco! No voltage dropping resistors are needed! The blinking ditch lights were hooked up to function 3 and 4 and programmed for alternately blinking operation.

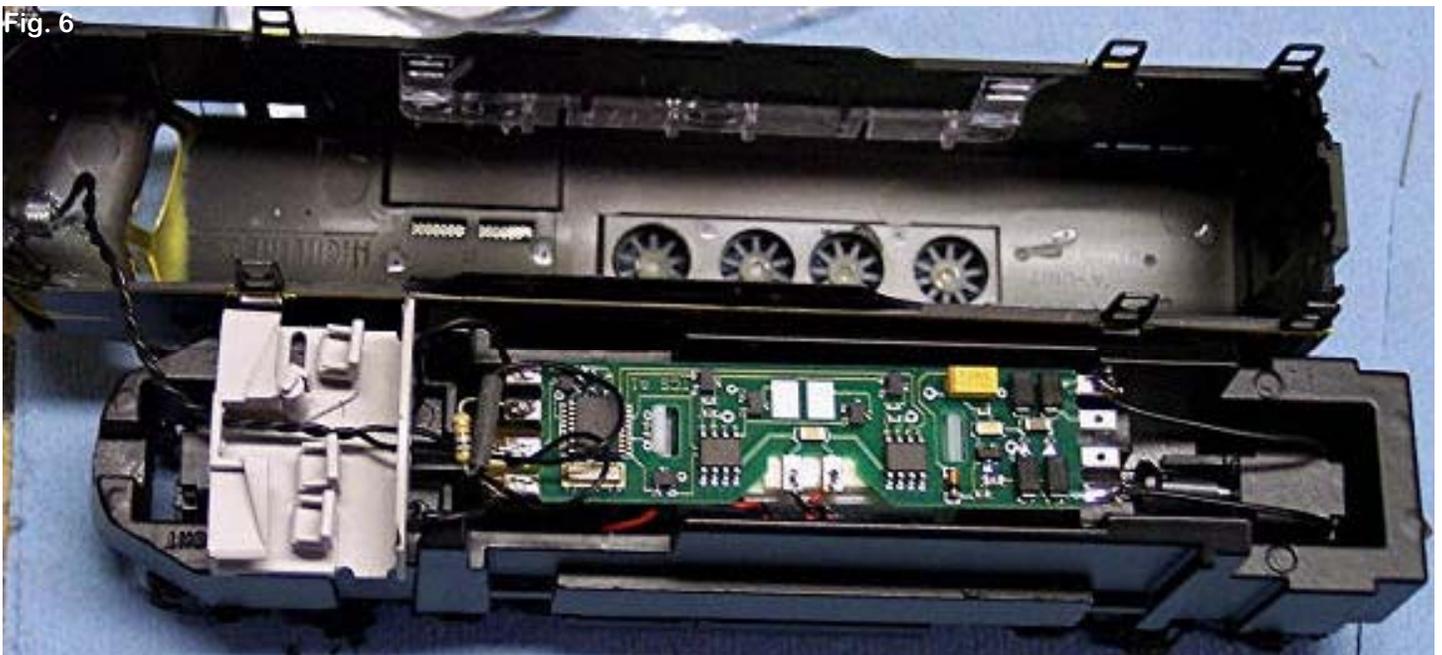
Fig. 5



Athearn F3

This is a photo of the installation of an A4X decoder in an Athearn Genesis F3A. The installation is very simple. The decoder installation in a B-unit is the same except no lighting to deal with. Solder all connections to the board, the plastic retaining clips do not ensure solid contact. With Athearn locos you need to use 750-ohm resistors in series with the 1.5-volt bulbs.

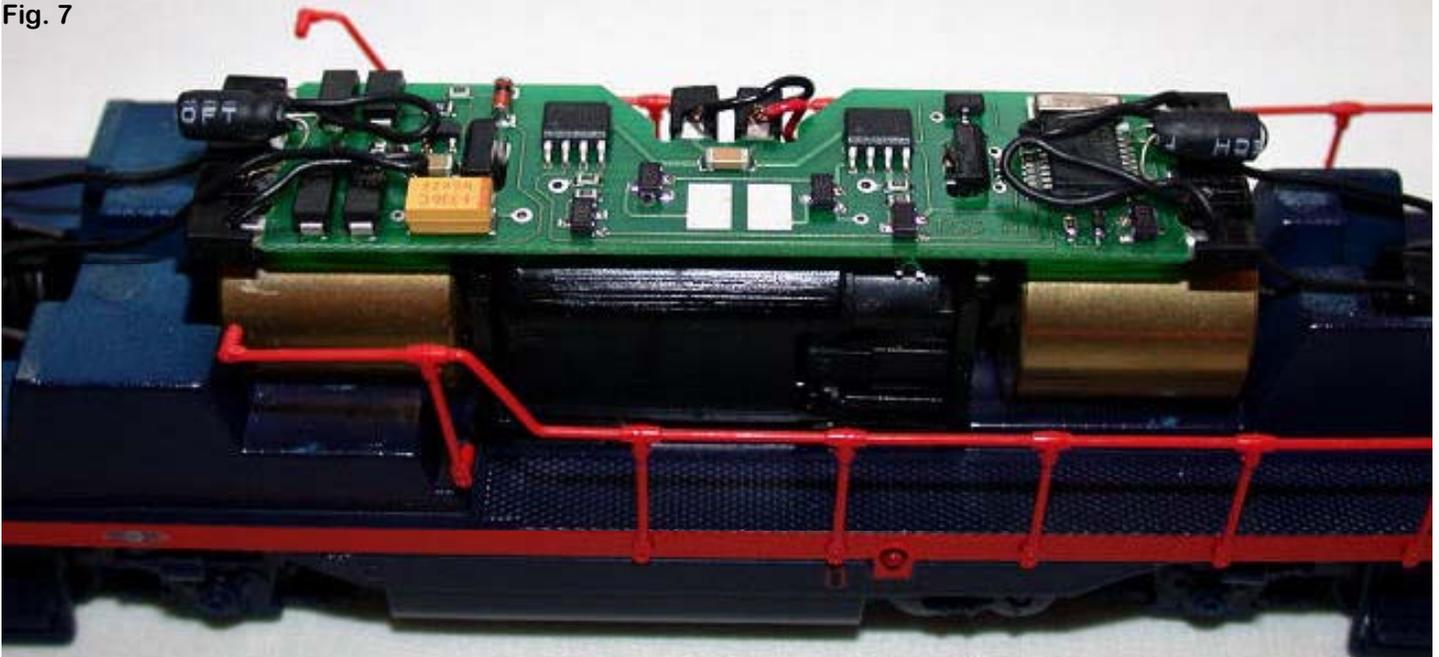
Fig. 6



Atlas GP7

The A4X drop in decoder replaces the original light board. Important note. Be very careful when installing the original bulbs on the decoder. The bulb leads are not insulated and can short against components on the decoder and damage it. Use care to align the bulbs so that when body shell is installed the light pipes do not move against the bulbs and cause a short circuit on the decoder! A piece of electrical tape placed under the light bulb leads is also a good idea to protect against short circuits.

Fig. 7

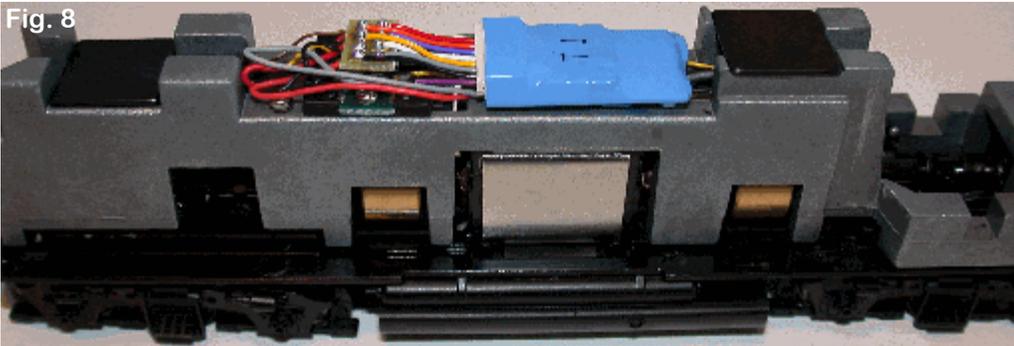


Lifelike Proto 2000 SD60

1. Unplug DCC socket board and remove two screws securing light board. Remove light board from locomotive; it is not needed.
2. Turn DCC socket board over so that sockets face up. Use one of screws removed from the light board to secure DCC Socket to frame. See below.
3. Either replace the stock 6-volt light bulbs with 12-volt bulbs or solder a 240-ohm resistor in line with the bulbs.
4. Plug decoder into 9-pin plug. Next, plug the harness with the decoder into the 8-pin NMRA DCC socket. Notice how a screw is used to secure DCC socket board with sockets facing up.

Installation of decoder and P2K harness is now complete!

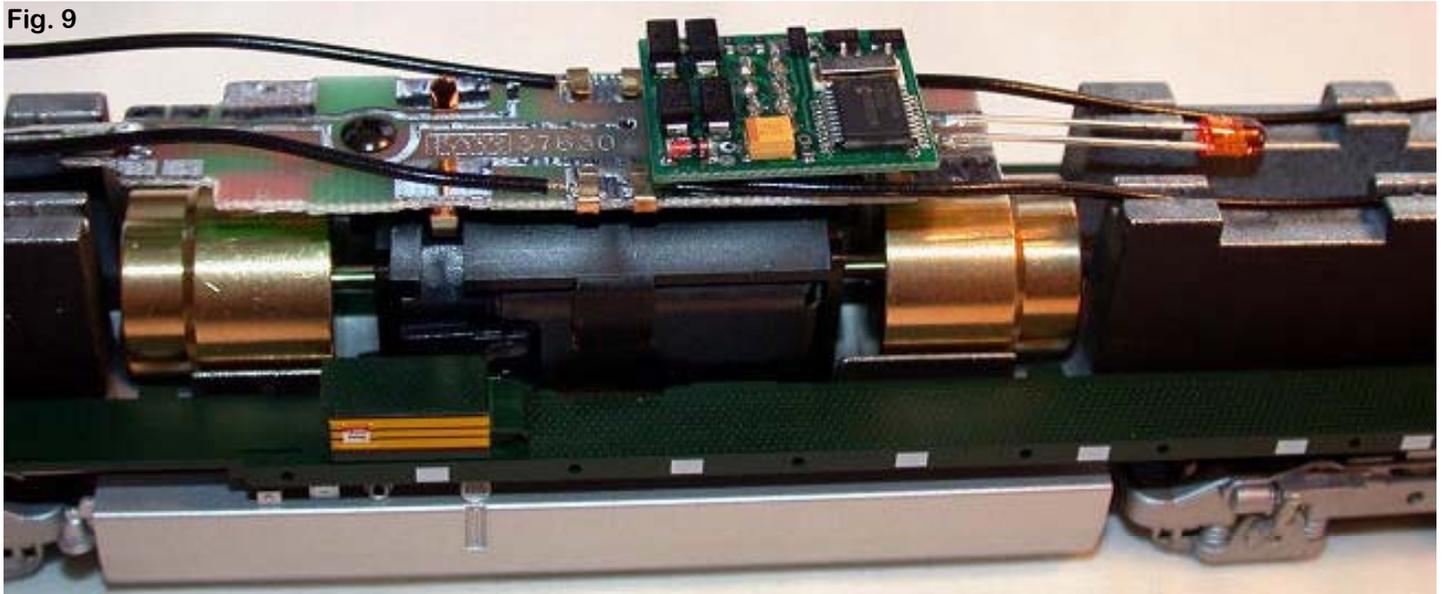
Fig. 8



Kato AC4400

There are several choices of Plug N Play decoders that will fit in the DCC socket provided on the lighting board. Shown below is the DP5X. The T1 with a short harness could also be used.

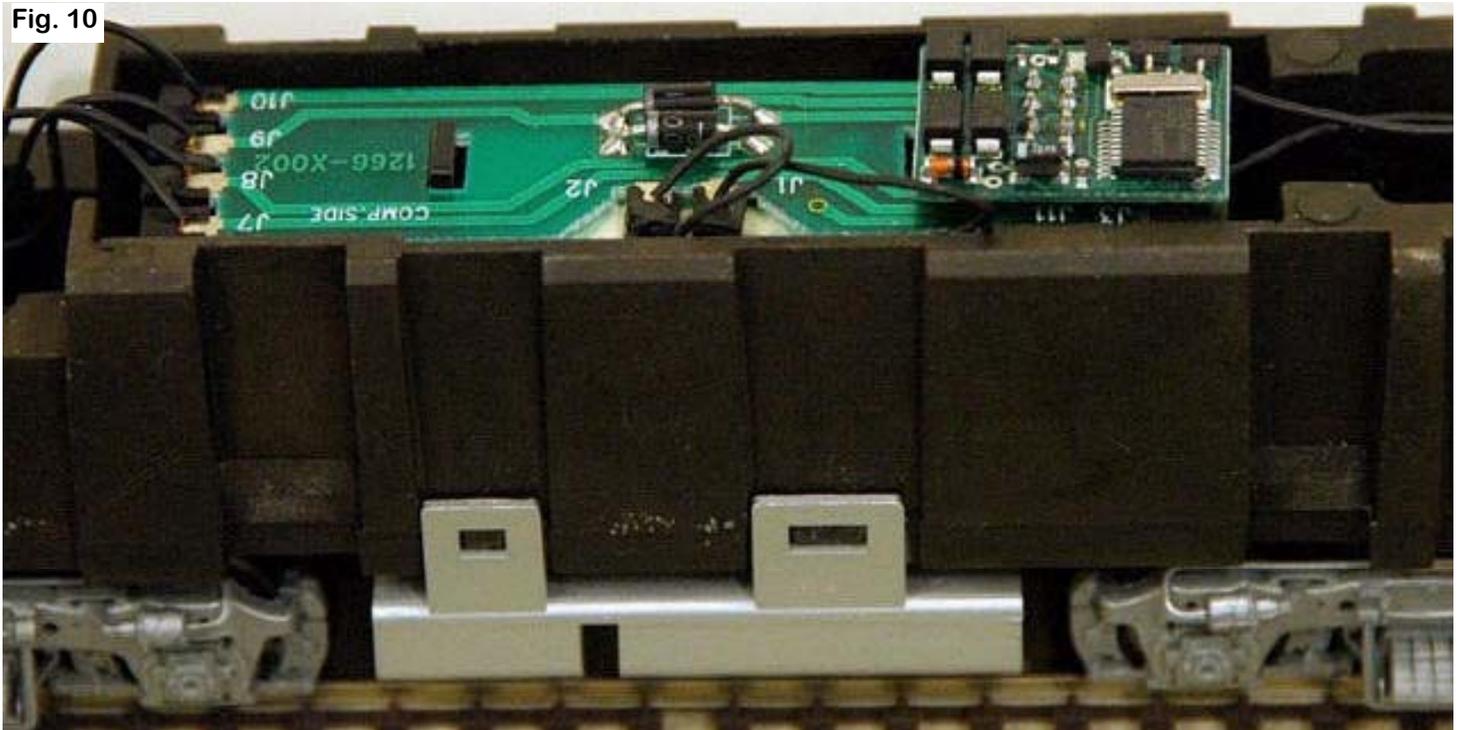
Fig. 9



Intermountain F-Units

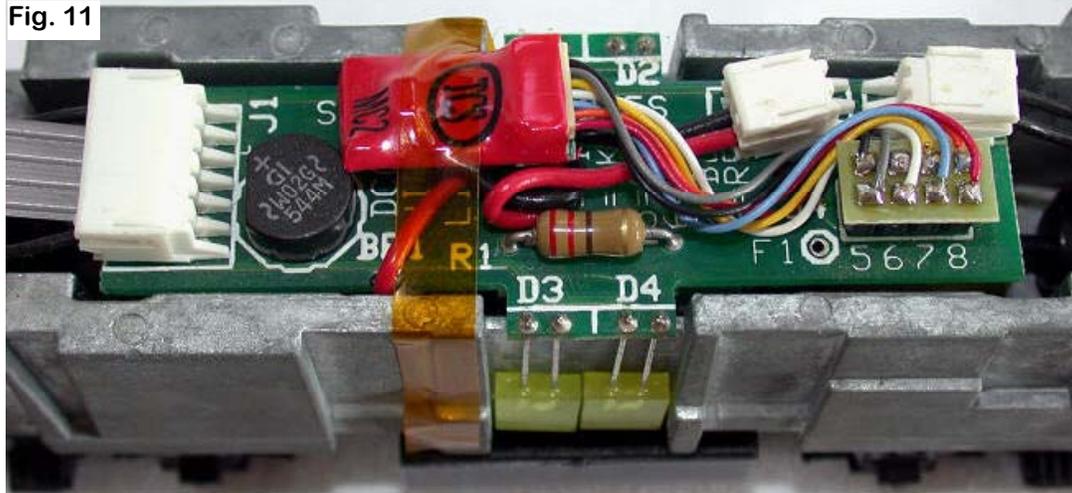
We recommend wiring the number board lights to a separate function, as the current draw of all four bulbs on one function output can potentially blow that output. A TCS DP5X is shown in the photo.

Fig. 10



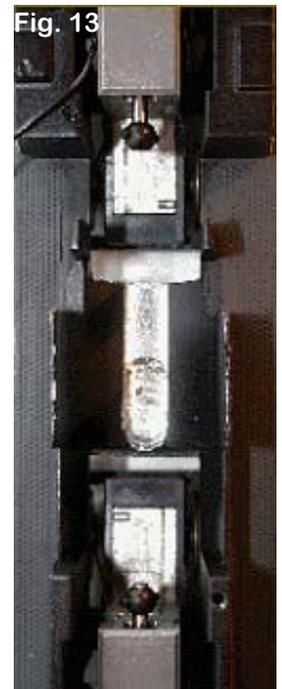
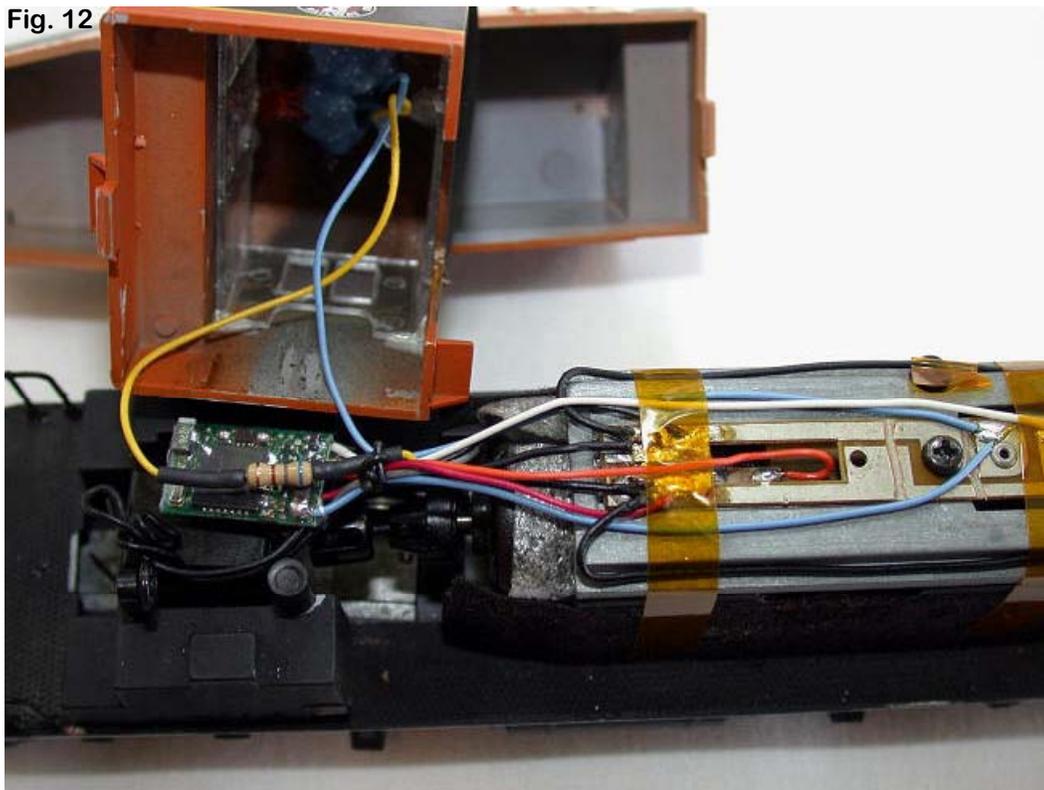
Stewart F-Units

Most any decoder with a wired plug should be able to fit, such as the T1 from TCS, DH123D from Digitrax, or the D15SRP from NCE.



Walthers SW-1

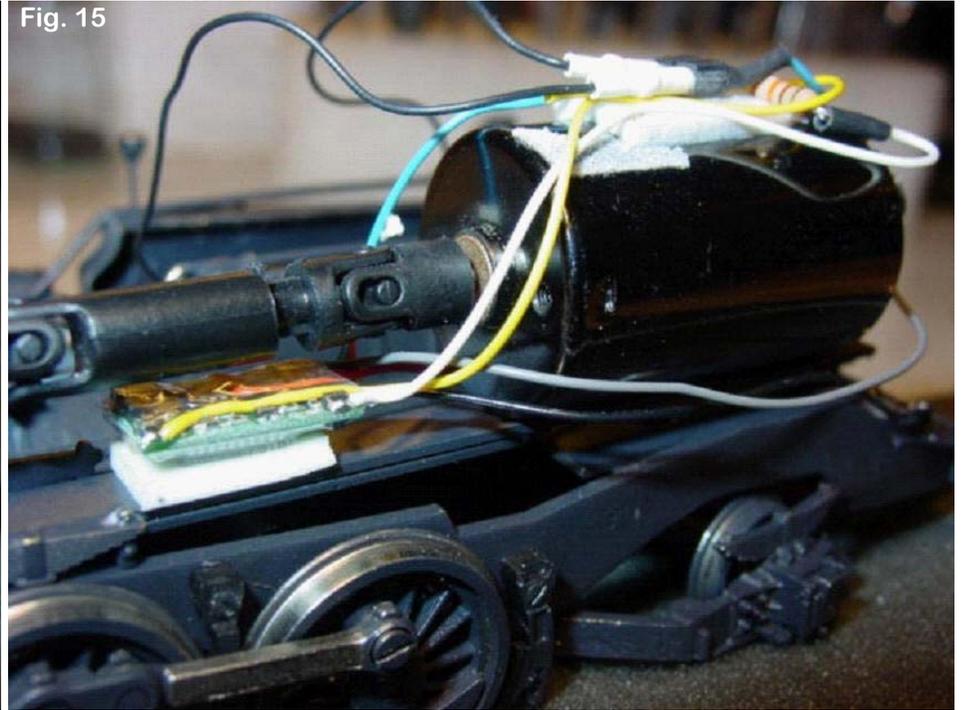
This photo shows a M1 decoder installation in a Walthers EMD SW1 diesel switcher. The decoder fits nicely in the cab area of the loco. Some minor changes are needed. The original light board is used and must have traces cut in several places. Milling of the loco frame is also needed to provide routing for the gray motor wire and clearance for the bottom motor brush.



Brass Steam

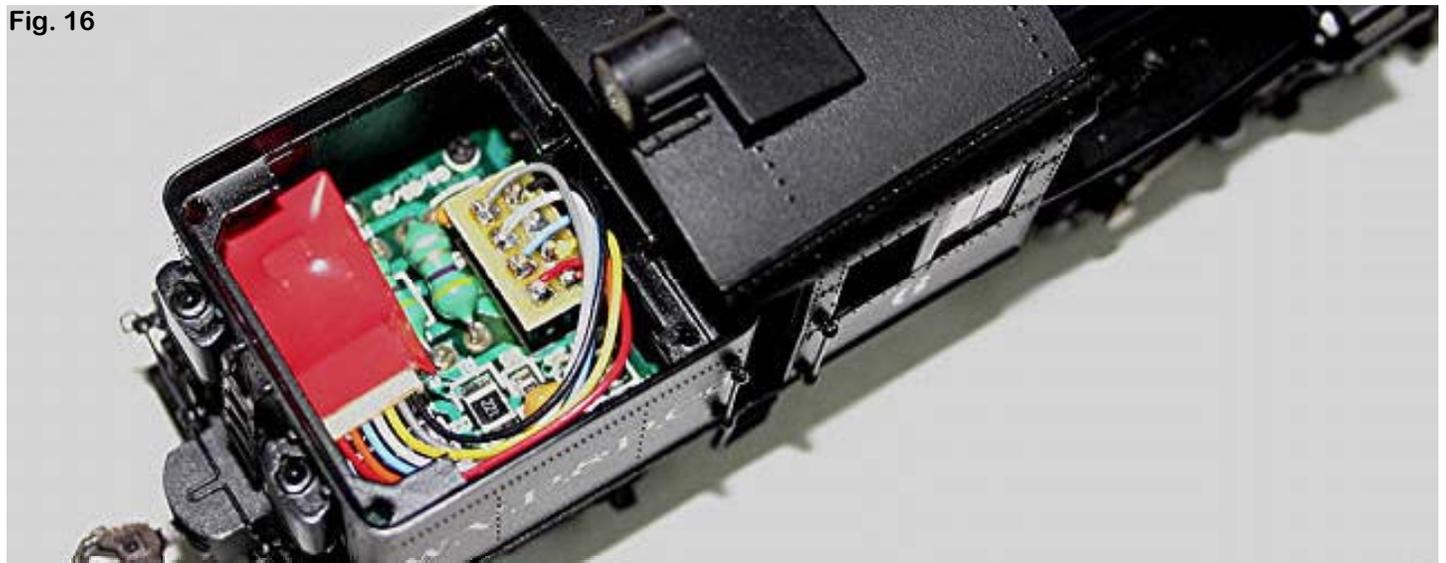
The decoder leads were connected as follows: Red to engine frame (right) Orange to motor lead (right) Black to draw bar (left) Grey to motor lead (left)

The locomotive runs great with excellent slow speed. I hope this little case study helps alleviate fears of installation of your decoders on brass steam locomotives. It's really a snap if you just follow some simple rules and do it the same way every time. Photo on the right shows the decoder mounted with double stick tape foam tape to the brass motor mounting bracket underneath the drive shaft.



Bachmann Climax

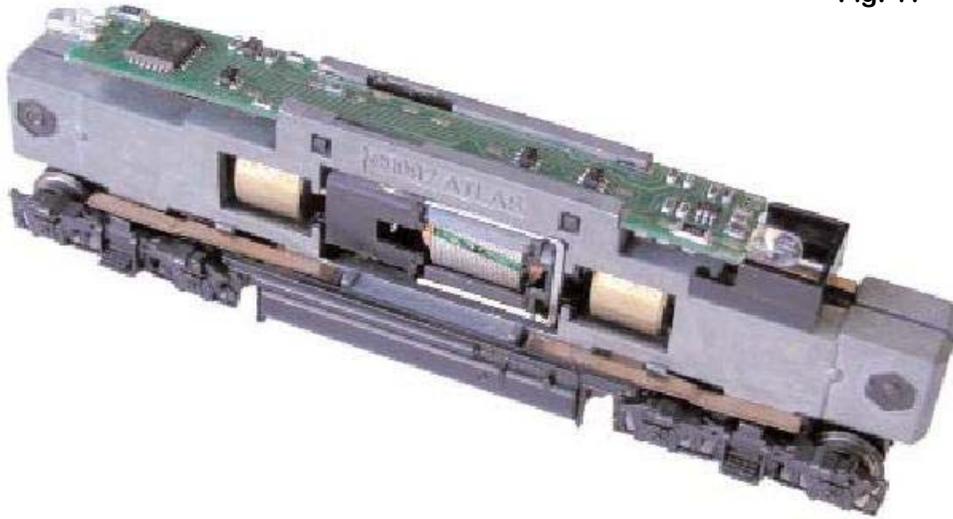
An MC2 decoder with short harness was used to make this an easy and clean installation! Top photo shows before installation bottom photo shows decoder installed. The yellow capacitor closest to the 8 pin NMRA plug should be clipped before decoder installation.



Atlas N GP40-2

The atlas N scale locos use a few different replacement board type decoders that make installations much easier, especially since there is no need to worry about the lighting. This is an installation using the DH163A0 decoder, which fits a wide range of Atlas N scale diesel locomotives.

Fig. 17



Micro-Trains FT

Like the above installation this is a board replacement decoder, but it requires that the frame be isolated from the underside of the decoder with kapton tape. Without N scale board replacement decoders most N scale diesels would require extensive milling in order to fit a decoder inside.

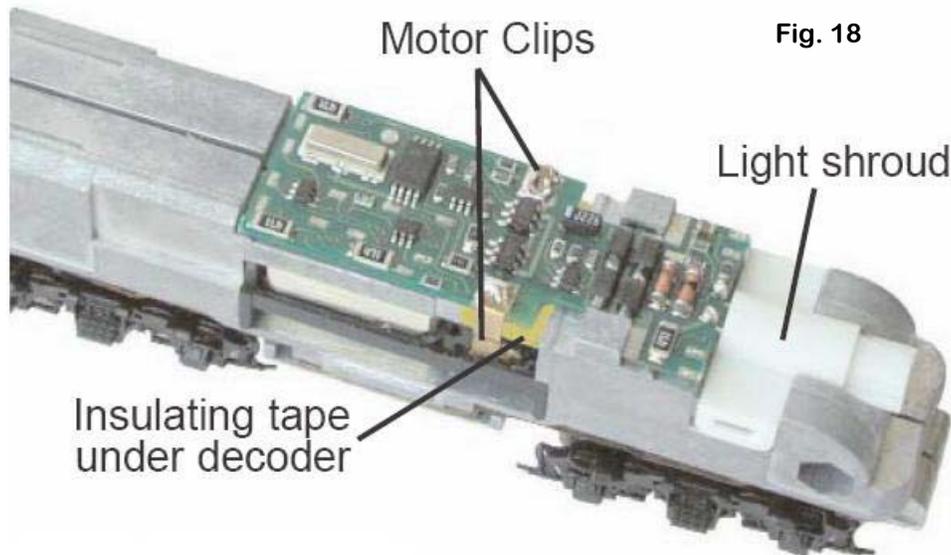


Fig. 18

Fix for Rear LED Leakage on SoundTraxx LC Decoders



This series of tech notes is designed to help modelers with DCC decoder installation. Much of the information comes from questions asked by modelers and ideas we have found. This note covers a possible fix for the rear light LED leakage problem when using an LED for the rear light on some SoundTraxx LC decoders.

THE PROBLEM

There have been a number of modelers using the SoundTraxx LC decoder that have installed white LEDs as backup lights. SoundTraxx recommends using lamps instead of LEDs for this application. There is no problem with the headlight using LEDs, but the rear light has a leakage problem that causes the LED to glow or blink when the air pump, bell or whistle is running. It does not come on at full brightness, just enough of a glow to be noticed.

The LC problem comes from a series of small pulses that occur on the rear light function output, the yellow lead. These short pulse are too short for a lamp to respond. The LED will respond to very low power and microsecond pulses. **Lamps** are slow to respond and take a lot power. **LEDs** take very little power and turn on instantly.

Finding a Fix

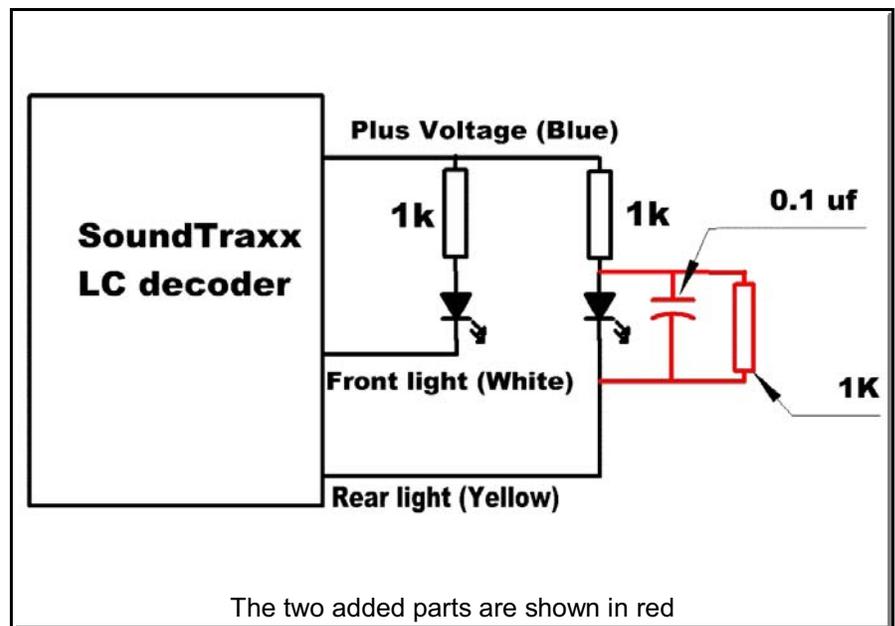
A number for local modeler have asked me to look into this blinking problem. One modeler gave up and final just turned off the air pump. Then Tony forwarded an E-mail to me from Roger Smith who had the leakage problem. Roger came up a solution that used a micro relay to cut off the power to the rear LED when the front LED is on. This circuit works by cutting off the power to the rear LED when the front LED is on. This is OK if the front light is on. If you turn the front light off, the problem returns to the rear light. We felt a better solution would be to fix the rear light so it would be totally off unless turned on.

Roger and I went back a forth a couple of times with a number of other suggestions. The final solution had to be simple and use a minimum of small parts.

The Fix

An LED acts like an open circuit until it has enough voltage to turn on. Putting a capacitor in parallel with the LED would absorb the pulses. But was a problem because there was no way to discharge the capacitor and it would simple pick up a charge until the LED turned on. Putting a 1K resistor in parallel solved this by allowing the capacitor to discharge between the short pulses. This would keep it off but turn on when the rear light was selected.

The final version only uses two small parts. A 0.1uf capacitor and a 1K resistor. The added 1K resistor can be a 1/8 watt or 1/4 watt resistor. The 0.1uf capacitor like Radio Shack 272-135 (2 in a package) is rated at 50 volts and is in small size. This capacitor is not polarized.



My thanks to Roger for his help in finally getting this fix done!

LEDs Available at Tony's

We stock a variety of LEDs in different sizes and colors. Check our website for a list of available LEDs at discount prices. (www.tonystrains.com) or call us at 1-800-978-3472.