

MRC Prodigy Advance DCC System

By Don Fiehmann

These hints are an evolving help sheet on operation of the Prodigy Advance DCC System from MRC. The source of these tips comes from customer questions, personal experience and MRC manuals and technical information.

Layout Wiring and System Setup

Layout Wire

The Prodigy Advance instructions recommend using wire size of 22 AWG or **heavier**. The 22 AWG wire may be OK for the program track, but may be too small for the main line. Wire has resistance and the longer the wire the higher the resistance. Smaller wire has more resistance per foot. Resistance can cause a loss of voltage. More current equals higher voltage loss resulting in a loss in train speed and dimming lights. It is best to keep the voltage loss to under one volt. To add to the loss in wiring, nickel-silver rail is not a good electrical conductor. Wire should be installed in parallel to the rails and a drop from the rails to the wiring at least every 10 feet. Here is a chart listing wire size, currents and lengths. A good source of wire is the *speaker wire* from Radio Shack. Be sure to get the stranded wire.

Length	Feet for 1/2 volt Drop			
Wire Size	1 Amp	2.5 Amps	5 Amp	8 Amp
8	796	318	159	100
10	501	200	100	63
12	314	126	63	39
14	198	79	40	25
16	124	50	25	16
18	78	31	16	10
20	50	20	10	6

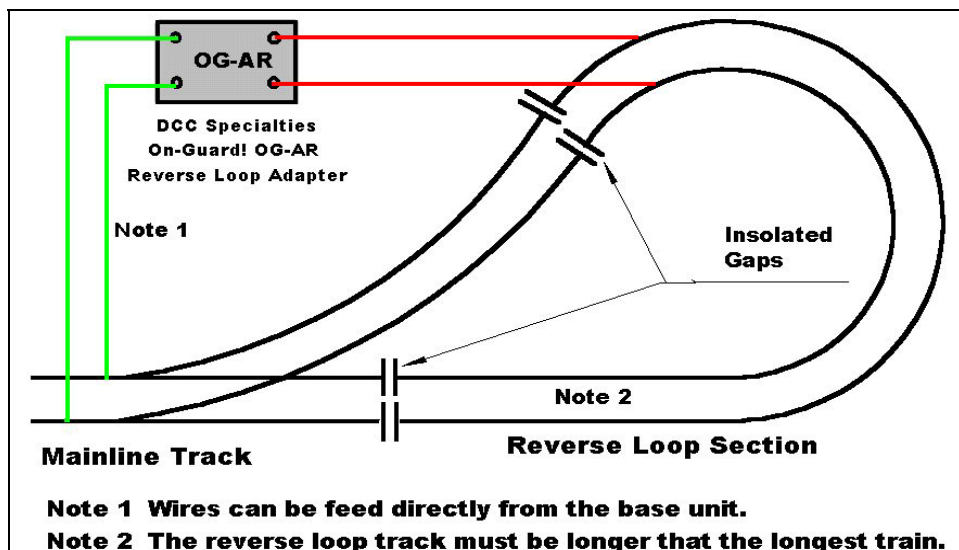
Chart for 1/2 volt drop. This would equal a one volt drop for a wire to the layout and back to the base unit.

Blocking the Layout

With only two wires connected to the main track connection a single short will shut down the layout. To allow more than one train to operate on with DCC the layout should be divided into blocks known as districts and subdistricts. A district is a section of the layout that is powered by a single power booster. A subdistrict is a section of track or block that has a separate circuit breaker. For the Prodigy Advance a district would be the output of the *Main Track* connection. Another type of block is a reversing loop or reversing section like a turning wye.

Reversing Loops

A reversing loop is a section of track that allow the train to turn around and reverse directions. Reverse loop wiring and operation is much simpler with DCC than dc. On dc the reverse loop was wired so the you could flip the polarity of the mainline while the train was in the loop. On DCC it is done in the opposite way. With DCC the polarity of the train can be reversed under the train while it is in the loop. Polarity can be automated with a reverse loop adapter. A Power Shield Reverse Loop Adapter is a solid state electronic device. Two wires are connected to the mainline or base unit and the other two wires to the isolated loop. When the metal wheels cause a short either entering or leaving the loop the adapter automatically switches the loop polarity. The On-Guard OG-AR can be used in this application.



Unit Overload

The following is a copy of some of the information from an MRC document on system overload.

“A DCC power booster is not a power supply that powers the Base Unit. It is a unit that goes between the Base Unit and the Main Track layout that increases track power (voltage and current) and boosts the digital signal being sent to the mobile decoders installed in the locos or to the track side accessory decoders. Your Prodigy Advance DCC system can be used for all scales of trains. However, when operating scales larger than “S” (2-rail “O” and “G” scale), a DCC power booster should be used in combination with high-power mobile decoders.”

“Lighted passenger cars are the biggest power-robbing culprit on your layout. One lighted car probably uses more power than 2 or 3 of your modern can-motored powered locos. If you run long strings of lighted passenger cars in numerous trains, a DCC power booster should be used to avoid overload situations.”

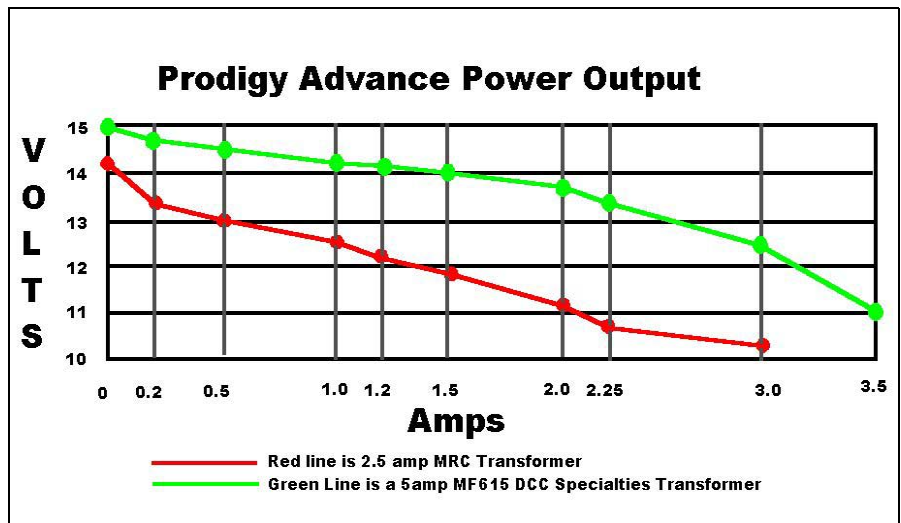
The Prodigy Advance system does not have a separate output to drive a booster(s). With the ability to operate 99 cabs there must be future plans to expand the system. Expansion beyond the 2 to 3 amps will be needed to power more engines. Rumor has it that there will be power boosters for this system in the future and use the “Factory Only” connection as an input to the booster.

Input Power Specs.

The Prodigy Advance base unit has an input limitation of 15 to 18 volts ac and 16 to 18 volts dc. **Exceeding this voltage can damage the base unit.**

Prodigy Power Output

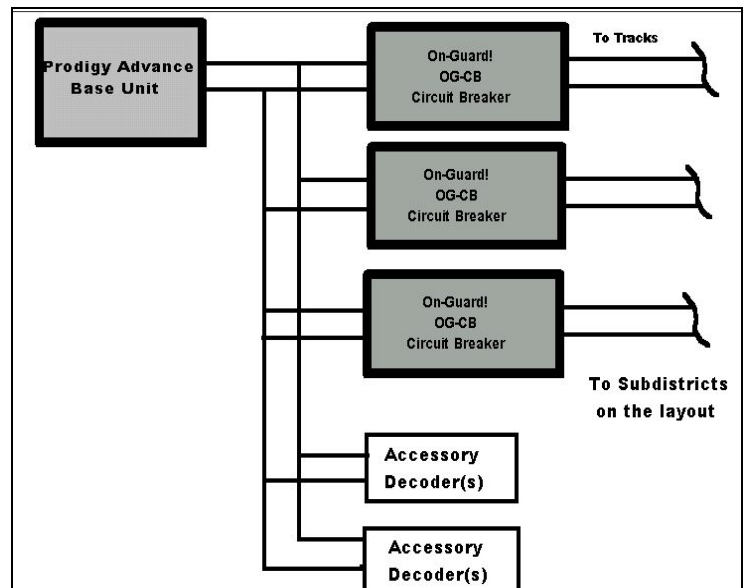
The base unit has an output rating of 3.5 amps. The problem is the transformer supplied with this unit is only rated at 2.5 amps. The result is a limited output power. This is adequate for running a few locomotives. Many of the new locomotives have much improved motors requiring less current. On the other hand many of the newer locomotive now include sound and more lighting features. These all require more current. One way to boost the output is to replacing the power transformer with a higher rated unit. The power chart shows a test with the MRC transformer and the MF615 five amp transformer. (See Prodigy Advance Power Output chart) The DCC Specialties **MF615-PRGY** (available from American Hobby Distributors ies thru your dealer) comes with the correct power connector. The base unit circuit breaker tripped at about 3.5 amps with either transformer.



Circuit Breakers and Accessory Decoder Wiring

One of the most common causes of short circuits is running into a turnout that is set the wrong way. If you power an Accessory Decoder from the rails the short will cut the power to the decoder and you can not throw the switch the clear the short. This situation can be avoided by wiring the power directly from the power booster to the Accessory Decoder. A short circuit will trip the circuit breaker while the accessory decoder continues to receive power via the base unit and allows you can throw the switch to clear the short.

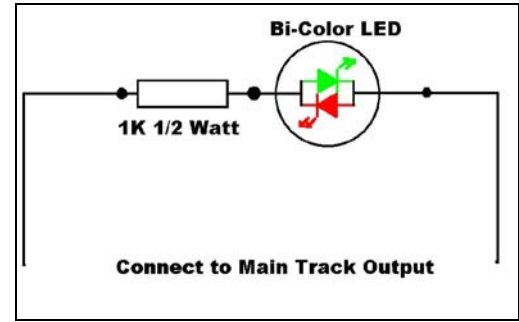
Even without Accessory Decoder(s) using circuit breakers will allow sections of the layout to continue to operate with a short circuit in one of the other subdistricts. The On-Guard circuit breaker OG-CB is



available to create power subdistricts. For reverse loops the On-Guard OG-AR is available that incorporates both the reverse loop control and circuit

Output Status Light.

You can use a bicolor LED to monitor the status of the track power. Here is a simple circuit that will give you the information. Normally it is a **yellow/amber**, a distinct **red** or **green** indicates a DC output bias and may be indication of a malfunction.

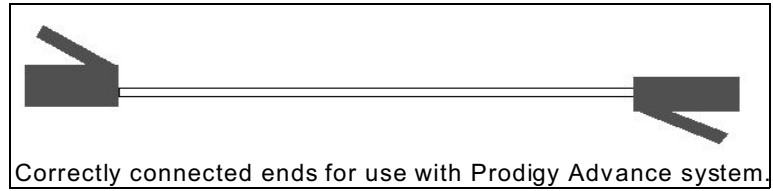


Fan Operation

The base unit has a quiet fan that operates on an as-required-mode. You may hear it turn on with current over 1 amp or when the unit is warm. Be sure not to put anything on top the base unit that will interfere with the air flow as this could cause it to overheat.

System Cab Cables

If you need to make or buy cab cables to run from the base unit to remote locations on the layout they should be correctly wired. Correct wiring has the same wire connected to the same pin on both ends of the cable. The connector are **8 pin** phone type connectors and the supplied cables have all 8 wires connected. If you buy cables be sure they are the 8 Pin type! If you make your own be sure to use a good quality crimper that will handle 8 pin connectors. Some of the cheap crimpers don't apply enough pressure to adequately connect the wires to the pins.



For remote cab connection locations MRC has two Extension Plates available. One is a passive Extension Plate (MRC 0015001) for use with up to 6 Cabs. The base unit only has power for up to 6 Cabs. With more than 6 Cabs the active Extension Plate (MRC 0015002) is needed. Each active panel can power an additional 5 Cabs.

Programing with Prodigy Advance

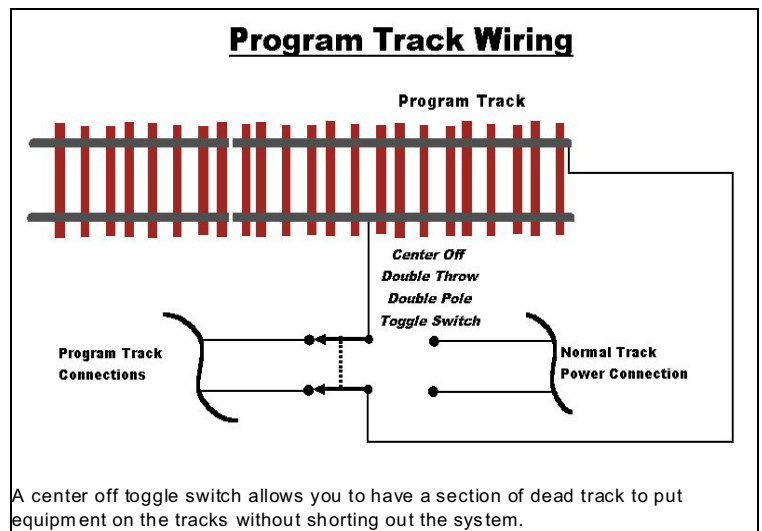
Program Track?

The MRC Prodigy Advance Programing Decoder document differentiates between a Program Track and a Test Track . In the document it states as follows–

“Do not confuse the Program Track with the Test Track.

A Test Track uses an in-line resistor to limit current to a section of track to check decoder installation in a loco. This prevents a poorly installed decoder from being burnt out. If the loco does not respond properly on a Test Track, remove it and recheck decoder installation. A Program Track is a separate track section for programming a decoder with data pertinent to the loco it is installed in. Even if your decoder supports Programming on the Main Track, it is easier to set up all parameters for a new decoder on a Program Track. Newer sound decoders require maximum current for programming, so in-line resistor cannot be used on a Program Track. Consult your decoder's instruction sheet for the minimum and maximum values that the decoder will accept to function properly.”

The base unit program track output appears to have a limited output and is only on when “working”. The problem is there is no indication of a short circuit when attempting to read a CV. The only read out is an **ERR** in the display for error. When using the program track be sure no wheels bridge the rail gap as the main track power is still on when using the program track. The program track can be a piece of isolated



track on the layout. (See program track wiring drawing) A temporary way to wire the program track is to use a piece of track that is not connected to the layout. Simply run two wires from the track to the Program Track output of the base unit.

Decimal Only ?

The *Prodigy Advance Users Manual* states that you don't need to know about hexadecimal numbering to program decoders with this system. The system may work in decimal only, **but** not all of the decoders manuals you read are going to be in decimal only. A knowledge of the hex, (hexadecimal) binary and decimal numbering system is a big help when you start setting up some of the special lighting or sound settings CVs. The values stored in a CV runs from 0 to 255. There are conversion charts available to convert from one numbering system to any of the other number systems.

DCC or dc Settings

Bit 2 of CV-29 permits some decoders operate when d.c. in on the rails. This bit should be left *off* unless you have a real need to operate between DCC and dc. Leaving this bit off can reduce the possible runaways. Some decoder do not support dc operation.

There is a feature on some DCC systems that allow the operation of one non-decoder equipped locomotive to operate on the DCC system. The Prodigy Advance does not support this feature.

CV-29 Settings

Here is a chart showing the standard function of CV-29.

Purpose	Function	Bit#	"Weight"	Sample
To correct direction problems so forward is forward. A 1 equals reverse direction	Normal Direction of Travel	0	1	
Sets use of 14 or 28/128 Speed Steps. Should be on unless you have an old decoder(14 speed step is rarely used)	14 or 28/128 speed steps	1	2	2
Allows the decoder to operate on dc. Not supported by all decoders. Best left off.	Power Source Conversion	2	4	
This is a feature in some newer decoders Leave this bit off unless you have the function	Advance Decoder Acknowledgment	3	8	
Used for speed matching. Leave off unless you set up the speed table at CV66 to CV95.	Use Speed Table	4	16	
Sets 2 or 4 digit addressing. 2 Digit in CV-3 and 4 digit in CV-17 & 18. The Prodigy system set this bit when setting addresses.	2 or 4 Digit Address	5	32	32
Not used at the present time	Reserved for Future use	6	64	
On if an accessory decoder/Off for mobile	Defines Accessory Decoders	7	128	
Value to write to CV-29	28 speed & 4 digit address			34

Addressing VS. Other systems. The following is from the Prodigy Advance manual.

Note A word about Prodigy Advance and 4-digit addresses:

"Some loco road numbers preceed with zero(s), such as "0003", "0043", "0123". Prodigy Advance does not recognize these preceeding zeros as part of the number. If you program an address with preceeding zeros, Prodigy Advance will see them as either a 2-digit address (1-127) or a lower value 4-digit address (128-999)."

What the preceding paragraph means is that the Prodigy Advance system disregards any leading zeros in an address. A 0037 becomes just 37. The system setups any address from 1 to 127 as a short (2 digit) addresses and any

address from 128 to 9999 as a long (4 digit) address. When you set up an address the system takes care bit 5 in CV-29 to set 2 or 4 digit addressing. The 2 digit address is stored in CV-1 and the 4 digit address is stored in CV-17 & 18.

There are a couple of ways that addresses can be incompatible between DCC systems. Some systems limit the long addressing to the top address of 9983. If you address a locomotive above the 9983 it may not work on some systems, but is OK on the Prodigy Advance system. Another problem is on the low end of addressing. Some DCC systems use the range of 0001 to 0127 with leading zeros as four digit addresses. If you get a locomotive from another system with one of these addresses the Prodigy Advance system is not able to address this four digit address range. The solution is to reprogram the decoder to a 2 digit address.

You may wonder why addresses 100 to 127 are called 2 digit addresses when they are actually 3 digits. The decimal range of 2 digit address is 1 to 127 the same range in hex (hexadecimal) is 01 to FF. This is 2 digits in **hex**.

Programming on the Main Track

Programming on the Main Track is sometimes referred to as "OPS Mode Programming". This allows you to change the value in a CV while out on the mainline. Functions like lighting, sound levels, acceleration/deceleration rates can be changed on-the-fly while operating a locomotive. The change will only apply to the address shown in the display. With a little practice you will appreciate what this feature can do for you and the operation of a train. The value in a CV can not be read back in OPS mode.

Operation with the Prodigy Advance

Instructions

There are two sources of operation instructions, the manual that came with the system and an mini set of references on the back of the cab. I found it best to use the manual the first time then use the back of the cab as a reminder.

The cab seems to fit well in either the left or right hand and can be operated with one hand. Handy when the other hand is needed for important things like re-railing, uncoupling or holding a cup of coffee.

Recall Function

The cab can remember five previously used locomotive numbers. The first five numbers stay with the cab and any more are lost if the cab is unplugged. When you first use the cab there may be residual numbers in the cab, just delete them so the first five are your numbers.

Power ON/OFF

Some of the information like time and recall numbers are stored when the power is turned off. There is one catch and that is you must turn power off with the switch on the **base unit** for the data to be stored. If you simply pull the plug or turn power off at the transformer with the MF615 the information entered is lost. This can be used to an advantage! If during operation you get the recall data goofed up, simply pull the plug and when you power up the old information will come up. You could setup a set of recalls and a start time that you want to start with each session. Turning the power off at the plug is a way to startup with the same recalls and time.

While on the subject of typing errors, if you start to put in a locomotive number and make an error just keep typing the new number and the old number will just shift off to the left.

Yard Mode.

The Prodigy Advance cab can be setup in one of two modes. One of these is the *Yard Mode*. This mode lets you use the knob for both speed and direction control. This is a very handy mode when switching as you can control an engine's direction without using the direction key. To set the yard mode press **SYS** key then the **3** key.

I found that setting a slow speed and just using the **DIRECTION** key also works well for switching.

STOP Key

If you tap the STOP key the locomotive you are operating will stop instantly. If you hold it for 2 seconds the main track power is cut off stopping all locomotives, handy in an emergency.

Accessory Control and Routes

The system allows you to control either separate accessory decoder or the setup routes. Accessory decoder are controlled with the **ACCY** key and the 0-9 keys for address. The 1 key sets a normal position and a 2 sets a reverse path thru the switch. You can also set up routes by pressing the **SYS** then **5** key. This allows up to 31 routes with a maximum of 8 accessory addresses. The direction key sets normal with FWD or REV for reverse. Once you set up a route and you select a route you will be prompted to enter 1 or 2. Enter a 1 and the turnouts will operate as programmed. Enter a 2 and all the turnout will move to the reverse of the direction programmed or the complement.

Function Keys

The cab has function keys F0 to F9 that can be entered directly. In addition using the shift key these become F10 to F19. With the explosion of newer sound equipped locomotive these extra function keys become very useful! The new SoundTraxx Tsunami and QSI sound decoder use the function keys higher than F8. For the first time I was able to hear many of sounds that could not activate with my other system. Below is a sample of the function keys and actions.

Function Key	Typical Function	Tsunami Steam*	Tsunami Diesel*	QSI Steam*	QSI Diesel*
F0	Head/Backup Light	Head/Backup Light	Head/Backup Light	Head/Backup Light	Head/Backup Light
F1	Bell	Bell	Bell	Bell	Bell
F2	Horn /Whistle	Whistle	Horn	Whistle	Horn
F3		Short Whistle	Short Horn	Coupler Sound	Coupler Sound
F4		Steam Release	Dynamic Brake	Steam Blower	Fans
F5		Function F5	Function F5		Dynamic Brake
F6		Function F6	Function F6	Doppler/Startup	Doppler/Startup
F7		Light Dimmer	Light Dimmer	Brake Squeal	Brake Squeal
F8	Sound Mute	Sound Mute	Sound Mute	Sound Mute	Sound Mute
F9		Water Stop Sound	RPM +	Cruise/Shutdown	Cruise/Shutdown
F10		Dynamo	RPM --	Short Air Let Off/ Pop Off	Speed Read out
F11		Brake Squeal	Brake Squeal	Short Air Let Off/ Boiler Blow Down	Number Board
F12		Coupler Sound	Coupler Sound	Short Air Let off	Hazard/Cab Light

* **Note--** The above chart is subject to change depending on the type of locomotive or decoder.

Consisting

Consisting or MUing (multiple unit)is the ability to run more than one locomotive together as a single unit. Two methods are available, *Advance* and *Old* . With the old way the base unit keeps track of the locomotives in a consist. The advance consisting is a newer way and uses CVs in the decoders to control the consist. The Prodigy Advance can setup either type of consist.

With the **Old** type of consist the base unit can only run one consist with up to four locomotives. Any functions are controlled by entering the locomotives number and using the function keys. The lead locomotive number is used for the consist number. With the old type of consisting the base unit sends out a separate commands to each locomotive for each change in speed or direction. When you enter a locomotive number and the locomotive is headed in the reverse direction from the other units push the direction key after entering the address . This tell the system to send this locomotive commands that are in reverse of the other units.

The **Advance** method uses CV-19 of each locomotive of the consist to hold the consist number. Any value in CV-19 other than zero tell the decoder it is in a consist. Advance consists use the 1 to 127 address range. This is the same as the two digit addressing range. When in a consist the decoder will not respond to any speed or direction at its normal address. A value of 128 is added to CV-19 when a locomotive is reversed in the consist. In a consist with the an address of 10 in CV-19 a locomotive in reverse would have a value of 138 in CV-19. There is a group of CVs that allow even more control of features while in an Advance consist. CV-21 to 24 are used for these controls.

The Prodigy Advance system can set up an Advance consist. Once an Advance consist is setup the only way to control sound and light features is with by using the locomotives normal address.

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