



User's Manual

Part I: For Precision Craft Models locomotives equipped with the LokSound Operation and Sound System

Part II: For Precision Craft Models DCC Ready locomotives without sound

PART I

Quick Start Guide for Your Locomotive.....3
General Maintenance.....4
Frequently Asked Questions.....4

The Details of the Sound System, Electronics and Operation

1. Introduction.....5
2. Set-up and Installation.....5
2.1.1 Supported Operating Modes.....5
2.1.1 Analog Operation.....6
2.1.2 Digital Operation.....6
3. Programming of Parameters for Digital Operation.....7
3.1 Programming with DCC-Systems (Lenz, ZIMO, Intellibox).....7
3.1.1 Which Settings may be changed?.....7
3.1.2 How to set parameters.....7
3.1.3 Decoder Reset.....9
3.2 Programming with Märklin® 6021.....9
3.2.1 How to program using the 6021.....9
4. Additional Information.....10
5. Service - Support and Assistance.....10

PART II (For owners of DC Only, DCC Ready Locomotives)

1. Operating your Conventional DC locomotive.....11
2. Upgrading your Conventional DC locomotive to DCC.....11

Congratulations on your new purchase of a superior quality model railroading product from Precision Craft Models! Your new locomotive has been designed to exacting standards and utilizes the latest electronics available today, giving you the maximum value for your model railroading dollar.

Your locomotive is ready to use right out of the box, but please take a moment to peruse this User's Manual for maximum enjoyment of your new locomotive. Thank you for choosing Precision Craft Models!

Copyright 2006 Precision Craft Models, Inc. Electrical characteristics and dimensions are subject to change without prior notice. All rights reserved. Precision Craft Models, Inc. may not be held responsible for any damage or consequential loss or damage caused by inappropriate use of the product, abnormal operating conditions, unauthorized modifications to the product, etc.

Not suitable for children under 3 years of age. Inappropriate use may result in injury due to sharp points and edges.

Märklin® is a registered trademark of the company Gebr. Märklin® und Cie. GmbH, Göppingen, Germany.

Steam Locomotives:

To operate your new steam locomotive, you must connect the locomotive to the tender in two places—first the multi-wire tether and then the draw bar.

1. First, connect the multi-wire tether:

At the rear of your locomotive, you will find a receptacle for the multi-wire tether. On some models the receptacle is directly underneath the deck plate. On others, the receptacle is on the underside of the locomotive altogether.

Once you have located the receptacle, take the multi-wire tether from the head of the tender and plug it into the receptacle on the locomotive. **The tether is keyed to insert in one way only. Do not apply excessive force.** If the tether does not seem to fit when inserted one way, flip it over and then reinsert.

Excess tether wire can be pushed back into the opening in the tender from which it feeds.

2. Then, connect the draw bar:

Your steam locomotive will have either a metal drawbar with multiple holes or a plastic draw bar.

•Metal draw bar connection to tender:

Locate the draw bar pin on the underside of the tender and insert into the desired hole in the locomotive draw bar.

NOTE:When running your locomotives, you should always use the outer most hole on the draw bar (furthest from the locomotive). This will allow maximum locomotive-to-tender clearance and prevent derailing on curves.

Many modelers prefer the inner most position when static displaying due to the more prototypical look the closer hole position allows.

•Plastic draw bar connection to tender:

Locate the opening at the head of the tender. Position the locomotive draw bar so it is centered inside the opening. Press the draw bar into the opening until you feel open end of the draw bar click around the anchor post inside the tender.

Gently tug the locomotive and tender away from each other (do not apply too much force as it will disconnect them) to confirm the draw bar is properly connected to the tender anchor post.

3. Finally, place your locomotive and tender on the track!

Your locomotive and tender are now ready to be placed on your DC or DCC layout and run!

DCC Users:

The locomotive is addressed from the factory to address 03 by default.

Diesel Locomotives:

Single unit diesel locomotives may be placed on track right out of the box without any preparation.

DCC Users:

The locomotive is addressed from the factory to address 03 by default.

Multi-Unit diesel lash-ups require tether connections between the lead A unit and the second unit. Connect the included tether between the first two units and then connect the draw bar between the units.

Lash-ups with third units should be set up as described above. The third unit is a stand alone unit and needs only to be coupled to the first two units (without draw bar or tether).

Steam Locomotive Maintenance

Your PCM steam locomotive is internally lubricated from the factory. This means that the internal gearing has been properly greased for operation. However, the exterior moving parts of this locomotive have not been oiled.

Prior to use, we recommend that you use a light plastic compatible oil and lubricate all friction points in the drive train. This includes drive rods, eccentric screw, valve gear and all other areas where parts rub together during normal operation. Please be sure NOT to lubricate wheel surfaces as this will greatly reduce traction and contribute to quick accumulation of debris on both the track and wheel surfaces.

Proper lubrication will contribute to longer life of your locomotive as well as smoother and quieter operation.

Additional internal greasing will only be necessary after significant run times. If your locomotive runs roughly or with excessive noise, please place a small amount of plastic compatible hobby grease inside the gear tower and on the main drive gear. Please refer to the exploded diagram for disassembly guidance.

Diesel Locomotive Maintenance

Your PCM steam locomotive is internally lubricated from the factory. This means that the internal gearing has been properly greased for operation.

Proper lubrication will contribute to longer life of your locomotive as well as smoother and quieter operation.

Additional internal greasing will only be necessary after significant run times. If your locomotive runs roughly or with excessive noise, please place a small amount of plastic compatible hobby grease inside each truck assembly on the gears of your diesel locomotive. Do not over lubricate. Please refer to the exploded diagram for disassembly guidance.

FAQ's:

Q: How do I reset my locomotive's settings back to factory defaults?

A: *In the event that your locomotive misbehaves or other wise needs to be reset to factory defaults, you may do so by setting CV 8 to a value of 8. DC users may do this by using the programming mode in the DCMaster Analog Control Module (sold separately).*

Q: Does my new PCM locomotive require break-in?

A: *Although your PCM locomotive has been designed to exacting standards, a break in period of an hour or so will often enhance operation. Run your locomotive in the forward direction for 30 minutes at three-quarter throttle and then in the reverse direction at three quarter throttle before regular service.*

Q: I hear sound from my locomotive, but it will not move. What should I do?

A: *Usually if you get no movement, but have sound, this is an indication that the tether between units is not firmly connected. Please check all tether connections first. If this does not remedy the issue, please perform a factory reset on the unit by writing value 8 to CV 8.*

Q: Does my new PCM locomotive have Regulated Throttle Control or equivalent?

A: *All powered PCM locomotives (not dummies) are equipped with speed control and speed regulation. This is also known as Regulated Throttle Control in other manufacturer's products.*

Q: How do I know if my DCC command station or DC powerpack will work with my PCM locomotive?

A: *PCM locomotives are compatible with all NMRA compliant DCC systems. DC users require a DCMaster unit (sold by PCM) to activate user-activated sounds. PCM recommends a powerpack with a maximum voltage of at least 18 volts.*

1. Introduction to LokSound

The LokSound V3.5 decoder represents a key component of your newly acquired locomotive. The LokSound V3.5 circuitry is responsible for all drive control functions as well as sound functions of your new Precision Craft Models locomotive:

- Motor control forwards and reverse
- Control of all lighting functions
- Smoke Unit Functions (only if applicable)
- Sound and special sound functions

The LokSound V3.5 decoder supports the most commonly used control systems: Analog operation with DC or AC, digital operation with Märklin® digital (Motorola-Format) or DCC-Systems (i.e. Lenz, NCE, Digitrax, etc.)

The locomotive is preset at the factory for immediate operation (the LokSound V3.5 decoder recognizes the required operating mode automatically). Nevertheless we kindly ask you to first read these instructions before you set this locomotive onto a powered track.

Chapter 2 provides an overview of the supported operating modes and which functions may be activated in which mode (some functions can only be utilized in digital operation).

If you intend to change the factory settings (i.e. the address, or the sound volume), we strongly recommend you study chapter 3 first. There you will find out about all parameters of the LokSound V3.5 decoder and how to set them with the commonly available digital command stations. You will also find instructions on how to reprogram the factory settings.

Chapter 4 is written for expert users who want to know more about the LokSound V3.5 decoder and its technology.

Should you still have questions please study Chapter 5, which tells you how to obtain support and assistance.

We wish you lots of fun and enjoyment with your new Precision Craft Models locomotive!

Important Warning:

- This LokSound V3.5 decoder is designed for use in this Precision Craft Models locomotive only.
- Do not expose to wet and humid conditions.
- Always disconnect the circuit when servicing the decoder. Please install the body shell before applying voltage.
- Make sure that no blank wire ends come into contact with the locomotive.
- Make sure that no wires are squeezed or cut by the model's transmission parts when reassembling the locomotive.
- Handle the speaker(s) with extreme care: Do not touch the membrane or apply pressure!

2. Set-up and Installation

The locomotive can be operated straight out of the box. The selection of the appropriate operating mode happens automatically. You do not have to change any parameters .

2.1 Supported Operating Modes

The locomotive may be operated on conventional (analog) as well as on digital layouts. The number of available functions varies depending upon the mode:

Analog Operation

Motor control, forwards-stop-reverse, directional lighting & Steam/Diesel sound (can be disabled using CV 13, Bit 0), Whistle/Horn, Bell, Doppler Effect, Squealing Brakes and an auxiliary sound or operation can be controlled using the DCMaster Analog Control Module in conjunction with your analog power pack.

Digital Operation

Motor control forwards-stop-reverse

Digital address: "03" (DCC and Märklin Motorola)

For a list of DCC functions, please refer to the DCC function guide sheet that was included with your locomotive.

2.1.1 Analog Operation

Any DC power pack (i.e. from MRC, ROCO, etc) or AC controller (i.e. from Märklin®, Titan) is suitable for analog operation.

Please note, that not all electronic controllers which supply pulsed DC (PWM Operation) guarantee 100% reliable operation. Since there are so many different products commercially available we can only recommend to carry out your own tests.

DC Operation

DC Operation is possible without any difficulties, however, there is one difference compared to operating DC locomotives without decoder: the voltage required to start movement is notably higher.

To operate your locomotive in conventional DC mode, simply apply power using the rheostat and change directions using the direction switch. DC users should acquire and install the Precision Craft Models *DCMaster* Analog Control Module to gain access to sound features like the whistle/horn, bell, Doppler effect, Auxiliary Sound and Operation functions as well as DC programming and volume adjustment with just a touch of a button.

AC Operation (Märklin®)

This works in the same way as you know it from other models: Speed control is achieved through turning the control knob.

Change of direction is achieved by pushing the control knob beyond the stop position towards the left.

The locomotive must have come to a complete standstill before you may activate the change of direction command. Never try to change direction while the locomotive is still moving.

2.1.2. Digital Operation

For prototypical operation we recommend the use of a digital command control system. Besides the fact that special functions are only available in digital mode, the LokSound

V3.5 decoder offers silent, load compensated motor control.

The LokSound decoder “understands” commands from the Märklin® 6021 command station based on the widely used Motorola-Protocol as well as from DCC-systems from Digitrax, NCE, CVP, MRC, Lenz, ZIMO and Uhlenbrock, which are based on the NMRA-DCC-Protocol. Therefore it does not matter which commercially available system you use since LokSound V3.5 decoders auto-detect the protocol and then operate accordingly.

Nevertheless, there are considerable differences between the various commercially available digital systems. Therefore the remainder of chapter 2 focuses purely on driving the locomotive with different systems and also highlights typical problems and limitations.

Please read Chapter 3 if you intend to change the factory settings of the LokSound V3.5 decoder.

Digital Operation with DCC-Systems

The LokSound V3.5 Digital Decoder can be run with any system that conforms to DCC. The automatic speed step detection has been tested with the following appliances: NCE, Digitrax, ROCO Lokmaus 2, Uhlenbrock Intellibox, Lenz Digital plus, ZIMO MX1.

The detection does not function when operated with Lenz Digital plus V3.0 if you wish to run 14 speed steps. Use 28/128 speed steps instead.

Each time that the LokSound V3.5 Digital Decoder receives current (i.e. after the system is switched on) and the light is switched on it tries to detect the speed steps settings. If you switch over the speed steps settings during operation you must briefly switch off the current supply to the locomotive so that the automatic mode functions as desired. The detection takes up to 30 seconds.

Functions F1 to F8 allow you to activate the various sound effects when using DCC-systems.

Digital Operation with Märklin® Digital (6021)

The locomotive will operate reliably with the Märklin® 6021 command station. However, the LokSound V3.5 decoder offers a special feature: Besides the normal locomotive address (factory default: 03) the decoder „listens“ also for the next address. If you use this address with your 6021, you can activate the functions F5 to F8 by pressing F1 to F4. To enable the second Motorola address, you may change CV49, Bit 3 (see chapter 3). Please write a value of „27“ in CV49.

3. Programming Parameters for Digital Operation

Even though the LokSound V3.5 decoder has been adapted optimally to the locomotive you may adapt many of the characteristics to suit your own preferences. All parameters are internally stored as numbers (values) in the LokSound V3.5 decoder. According to the NMRA-DCC Standards all parameters are stored in memory cells called CV's (Configuration Variable). Whenever you change a CV the decoder will adjust its behavior accordingly.

All CV's may be changed by programming with the aid of a digital command control station (or in DC with the *DCMaster*). Depending on which type of command station you have the procedure may vary:

- If you use a DCC command station i.e. Lenz Digital plus, ZIMO MX1 or Uhlenbrock Intellibox, please refer to Chapter 3.1.
- Users of the Märklin® 6021 find relevant information in Chapter 3.2.
- If you prefer to change the settings of the locomotive by using the LokProgrammer by ESU we recommend to first study Chapter 5. There you will find out many important details.

3.1 Programming with DCC-Systems (Lenz, ZIMO, Intellibox)

Any digital command station, which offers the programming features according to the NMRA-DCC specification, can be used to program the LokSound V3.5 decoder.

Depending on the type and features of your command station you may be able to read and write CV's (Lenz LH100, Uhlenbrock Intellibox, ZIMO MX1, Arnold digital) or you may only be able to write CV's (Lenz digital compact, Lenz LH200, ROCO LokMaus II).

3.1.1 Which Settings may be changed?

Figure 1 on the following pages shows the adjustable parameters.

CV's 29, 49, 50 and 51 are different to other CV's: Generally you would write a value into a CV whereas for CV29, 49, 50 or 51 the actual value has to be calculated. This depends on the desired settings:

First you decide which option should be switched on or off. In the column value you find two numbers for each option. If the option is switched off the value is zero otherwise the value is any number between 1-32. Add all the values for each option to get the total which has to be written into the CV.

Example: You want to activate the Märklin® brake section while load compensation remains active. Therefore you write (1) in CV51. Now you have to deactivate the analog recognition CV29 since it is not advisable to activate the Märklin® brake section and analog operation at the same time. Therefore you write $0 + 0 + 0 + 0 = 0$ in CV29.

3.1.2 How to set parameters

We cannot provide general instructions for programming with all DCC-systems since there are so many differences in the way they operate. You should always try to use the DCC direct mode if possible (byte-wise CV-programming with Uhlenbrock) or the DCC paged mode.

The relevant information for users of the Intellibox are found in Chapter 9 "programming" of the technical manual. You should take particular notice of Chapter 9.5 "Programming of DCC-decoders". Programming should always be done in "CV-programming byte-wise".

Figure 1: Programming table - List of most important CVs.

CV	Name	Description	Range	Default																											
1	Locomotive address	Motorola-address of locomotive	1 - 127	Refer to Insert																											
2	Start voltage	Sets the minimum speed of the locomotive	0 - 75	Refer to Insert																											
3	Acceleration	This value multiplied by 0.869 is the time from stop to maximum speed	0 - 64	Refer to Insert																											
4	Deceleration	This value multiplied by 0.869 is the time from maximum speed to stop	0 - 64	Refer to Insert																											
5	Maximum speed	Maximum speed of locomotive	0 - 64	Refer to Insert																											
6	Vmid	Medium speed of locomotive	0 - 64	Refer to Insert																											
13	Analog mode F1-F8	Status of functions F1 to F8 in analog mode	0-255	Refer to Insert																											
		<table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>value</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>function F1</td> <td>1</td> </tr> <tr> <td>1</td> <td>function F2</td> <td>2</td> </tr> <tr> <td>2</td> <td>function F3</td> <td>4</td> </tr> <tr> <td>3</td> <td>function F4</td> <td>8</td> </tr> <tr> <td>4</td> <td>function F5</td> <td>16</td> </tr> <tr> <td>5</td> <td>function F6</td> <td>32</td> </tr> <tr> <td>6</td> <td>function F7</td> <td>64</td> </tr> <tr> <td>7</td> <td>unction F8</td> <td>128</td> </tr> </tbody> </table>	Bit	Description	value	0	function F1	1	1	function F2	2	2	function F3	4	3	function F4	8	4	function F5	16	5	function F6	32	6	function F7	64	7	unction F8	128		
Bit	Description	value																													
0	function F1	1																													
1	function F2	2																													
2	function F3	4																													
3	function F4	8																													
4	function F5	16																													
5	function F6	32																													
6	function F7	64																													
7	unction F8	128																													
17	Extended locomotive address	long address of locomotive	192 - 999	Refer to Insert																											
18	locomotive address	CV 17 contains byte with higher value (Bit 6 and Bit 7 must always be active), CV18 contains byte with lower value. Only active when function in CV 29 is switched on. (see below)																													
29	Configuration register	The most complex CV within the DCC standards. This register contains important information, which is only relevant in DCC operation.	-	Refer to Insert																											
		<table border="1"> <thead> <tr> <th>Bit</th> <th>function</th> <th>value</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Reverse direction of travel (forward becomes reverse) normal direction reversed direction</td> <td>0 1</td> </tr> <tr> <td>1</td> <td>speed steps (only for DCC operation) 14 speed steps 28 or 128 speed steps</td> <td>0 2</td> </tr> <tr> <td>2</td> <td>analog operation analog operation switched off analog operation permitted</td> <td>0 4</td> </tr> <tr> <td>4</td> <td>selection of speed curve speed curve through CV 2,5, 6 speed curve through CV 67 - 96</td> <td>0 16</td> </tr> <tr> <td>5</td> <td>selection of locoaddress (only for DCC operation) short addresses (CV 1) in DCC operation long addresses (CV 17 + 18) in DCC operation</td> <td>0 32</td> </tr> </tbody> </table>	Bit	function	value	0	Reverse direction of travel (forward becomes reverse) normal direction reversed direction	0 1	1	speed steps (only for DCC operation) 14 speed steps 28 or 128 speed steps	0 2	2	analog operation analog operation switched off analog operation permitted	0 4	4	selection of speed curve speed curve through CV 2,5, 6 speed curve through CV 67 - 96	0 16	5	selection of locoaddress (only for DCC operation) short addresses (CV 1) in DCC operation long addresses (CV 17 + 18) in DCC operation	0 32											
Bit	function	value																													
0	Reverse direction of travel (forward becomes reverse) normal direction reversed direction	0 1																													
1	speed steps (only for DCC operation) 14 speed steps 28 or 128 speed steps	0 2																													
2	analog operation analog operation switched off analog operation permitted	0 4																													
4	selection of speed curve speed curve through CV 2,5, 6 speed curve through CV 67 - 96	0 16																													
5	selection of locoaddress (only for DCC operation) short addresses (CV 1) in DCC operation long addresses (CV 17 + 18) in DCC operation	0 32																													
49	Extended configuration	Additional configuration options	-	Refer to Insert																											
		<table border="1"> <thead> <tr> <th>Bit</th> <th>description</th> <th>value</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>load control activated</td> <td>1</td> </tr> <tr> <td>1</td> <td>Motor PWM (0=15 kHz, 1= 30kHz)</td> <td>2</td> </tr> <tr> <td>3</td> <td>Enable second Motorola address</td> <td>8</td> </tr> <tr> <td>4</td> <td>DCC automatic speed step detection</td> <td>16</td> </tr> </tbody> </table>	Bit	description	value	0	load control activated	1	1	Motor PWM (0=15 kHz, 1= 30kHz)	2	3	Enable second Motorola address	8	4	DCC automatic speed step detection	16														
Bit	description	value																													
0	load control activated	1																													
1	Motor PWM (0=15 kHz, 1= 30kHz)	2																													
3	Enable second Motorola address	8																													
4	DCC automatic speed step detection	16																													

Figure 1: Programming table - List of most important CVs.

CV	Name	Description	Range	Default		
50	Analog mode	Selection of desired analog mode		0-3	Refer to Insert	
		Bit	description			value
		0	AC analog mode			
			AC analog mode off			0
AC analog mode on	1					
1	DC analog mode					
	DC analog mode off	0				
	DC analog mode on	2				
51	Brake mode	Selection of desired brake mode			Refer to Insert	
		Bit	description			value
		0	Märklin® brake mode			
			Märklin® brake mode off			0
			Märklin® brake mode on			1
		1	Zimo brake mode			
			Zimo brake mode off			0
Zimo brake mode on	2					
2	not used					
3	Lenz DC brake mode					
	Lenz brake mode off	0				
	Lenz brake mode on	8				
63	sound volume	0 = low, 64 = max. volume	01 - 64	Refer to Insert		
121	Whistle sound volume	0 = low, 64 = max. volume	01 - 64	Refer to Insert		

3.1.3 Decoder Reset

You can reinstate the factory settings at any time if you cannot get any further:

Set CV8 to value 8 for automatic resetting

Lenz digital plus

There are various software versions available of the Lenz digital plus command station. You need firmware version 2.3 or higher in order to program LokSound V3.5 decoders. Contact Lenz for more details regarding upgrades of older versions.

3.2 Programming with Märklin® 6021

With the Märklin® command station you cannot modify standard CVs as it does not comply with the NMRA DCC standards.

However, the most important CVs of LokSound V3.5 decoders may be changed .

3.2.1 How to program using the 6021

To get into programming mode: Press the "stop" and "go" keys simultaneously on 6021 to activate a reset (or pull the plug of the power pack). To switch off the track voltage, press the "stop" key. Enter the current decoder address (alternative "80").

- Activate the change of direction feature (turn the control knob far left until you hear a "click"), hold the knob in position and press the "go"-key.
- The Loksound decoder is now in programming mode (the headlights flash as an indicator).
- Enter the CV number you want to change. Make sure you always enter a two digit number (e.g. "01" and not "1")
- To confirm any entry turn the knob to the far left (change of direction feature).
- Now enter a new value for the CV as a two digit number.
- Turn the knob to the far left to confirm.

(the headlights are on for about 1 second).

- Enter further CVs you want to modify.
- Exit the programming mode by selecting CV "80" or switch the track voltage off and on (press "stop"-key and then "go"-key on 6021).

Note that you may only enter values 01 to 80 with the 6021. Value "0" is missing, enter instead "80".

You may also choose to contact Precision Craft Models directly. For enquiries please use either email or fax (don't forget to provide your own fax-no.) and we will reply within a few days.

PCM also offers telephone based technical assistance. However, please use telephone based support only in case of complex inquiries that cannot be dealt with by email or fax. Phone support is often very busy and you may encounter delays.

Also check the PCM website for more information, <http://www.precisioncraftmodels.com>.

4. Additional Information

The LokSound V3.5 decoder installed in your locomotive offers more options than described in this manual. However, they have already been optimally adjusted to the model and thus there is no need to adjust them.

Expert users can use the information as outlined in the comprehensive "LokSound V3.5 Installation and Operating Manual". You can download this manual free of charge from the ESU website <http://www.loksound.com> under the section "instructions" ("Anleitungen").

For easy programming of the numerous options offered by the LokSound V3.5 decoder we recommend that you use the "LokProgrammer". With the aid of this interface and the software that is supplied with the LokProgrammer you can easily adjust all parameters on your PC. System requirements are Windows 2000 or XP. No need for studying tables and calculating values – everything can be done by way of mouse clicks while you have all important information readily available on screen.

Please note: you require at least the Lokprogrammer Nr. 53451 to be able to program your Precision Craft Models locomotive. An update is available from the ESU website <http://www.loksound.com>

by phone: 386-615-1912

Monday to Friday

from 8am to 5pm EST

by Fax : 386-615-1720

by email:

service@precisioncraftmodels.com

Internet:

www.precisioncraftmodels.com

5. Service - Support and Assistance

Your first contact should always be the model train or hobby shop where you have purchased your Precision Craft Models locomotive. Your dealer is your competent partner for all your questions regarding model trains and also your Precision Craft Models locomotive.

1. Operating your Conventional DC Locomotive

Operation of your conventional DC locomotive is simple.

To operate, you will need a conventional DC power pack. Speed is controlled by the rheostat on the power pack and the direction is controlled by the direction switch on the power pack.

Users who own both conventional DC locomotives as well as sound equipped locomotives will note that the voltage required to start a conventional DC locomotive in motion is substantially lower than a sound equipped unit.

2. Upgrading your Conventional DC Locomotive to DCC

Your Precision Craft Models DCC ready locomotive can be upgraded to DCC using the onboard DCC socket.

You may install any NMRA compliant DCC decoder which fits inside the space confines of your particular model. Simply plug the user-supplied DCC decoder into the onboard DCC socket on the locomotive (or tender) motherboard.

Certain models have specifically tailored sound & DCC upgrade kits which include a DCC decoder, speakers and necessary wiring. Please check the PCM website www.precisioncraftmodels.com for more information. Or check with your local hobby dealer.

**Precision Craft Models, Inc.
4 Signal Ave., STE A
Ormond Beach, FL 32174**

www.precisioncraftmodels.com

