



## Digitrax Complete Train Control Starter Set Manual

Includes:

DCS52 All In One  
Command Station Booster Throttle,  
PS314 Power Supply,  
LT1 Decoder & LocoNet Cable Tester



Digitrax, Inc.  
2443 Transmitter Road  
Panama City, Florida USA 32404  
Support: [helpdesk.digitrax.com](http://helpdesk.digitrax.com)  
[www.digitrax.com](http://www.digitrax.com)

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manuals & for available firmware updates.

## 1.0 Introduction

Congratulations on your purchase of a Zephyr Express Digitrax Complete Train Control Starter Set!

The design of the Digitrax Complete Train Control<sup>®</sup> system lets you operate your layout the way you choose. With LocoNet<sup>®</sup> you simply connect system components to build the layout control system that you've always wanted! The Digitrax system reduces and simplifies layout wiring.

### Your Zephyr Express Starter Set has several components:

- **DCS52** All-In-one command station, booster and throttle to run your layout. This unit does everything you need to get up and running in one unit.
- **PS314** Power Supply to provide power to run your DCS52. The DCS52 should only be powered by a PS314.
- **LT1** LocoNet Cable and Decoder Tester for testing LocoNet Cables and decoders prior to installation
- **Quick Start Guide** – To get you up and running fast!
- **Zephyr Express Manual** – System Reference Manual
- **Digitrax Decoder Manual** – Reference for Digitrax Decoders

There are many different combinations of Digitrax components that can be used to set up a layout control system that is right for you. You can combine Digitrax products with compatible decoders, boosters and computer software made by other companies that build compatible equipment.

Your success with & enjoyment of our products are very important to us. After all, this is a hobby and it is FUN!!! Please read this manual carefully before installing your system. We have included lots of hints and operating ideas based on our experience. If you have questions not covered by this manual please contact your dealer or visit our web site at [www.digitrax.com](http://www.digitrax.com). The Digitrax on-line Tech Support Depot is always open, and support staff is ready to help on our Help Desk at: [helpdesk.digitrax.com](http://helpdesk.digitrax.com).

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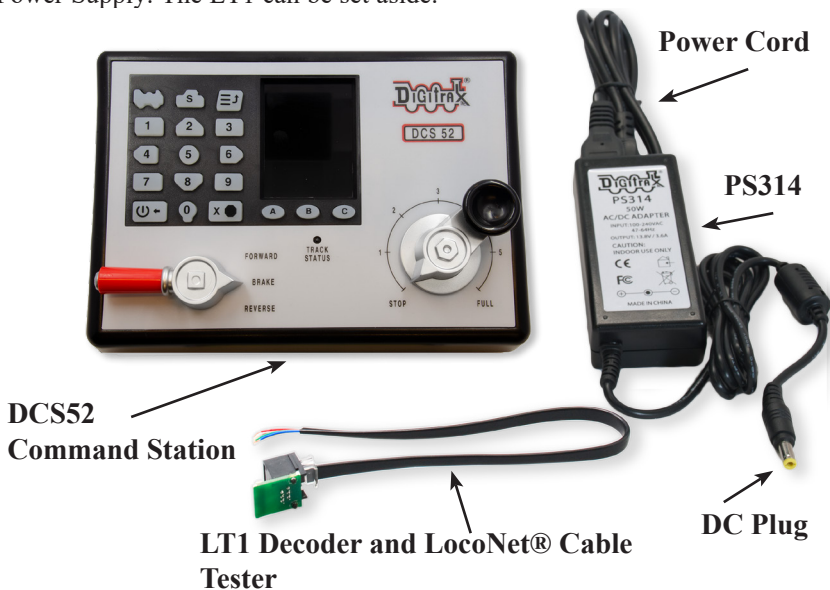
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## 2.0 Quick Start Guide

These instructions will get you up and running in just a few minutes! A full description of all controls and technical reference information are included later in this manual.

### 2.1 Unpacking Your Zephyr Express

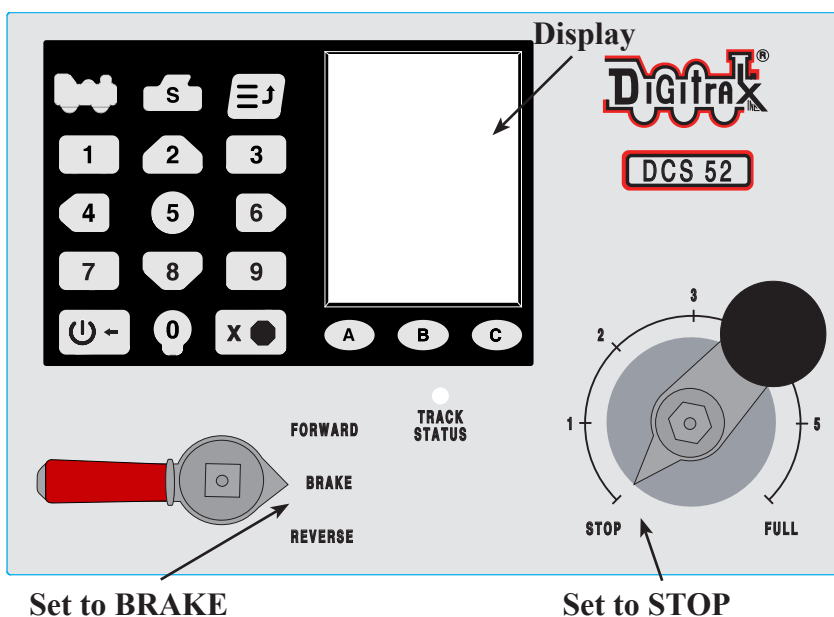
Unpack your box and locate the DCS52 Command Station and the PS314 Power Supply. The LT1 can be set aside.



#### *Zephyr Express Unpacking*

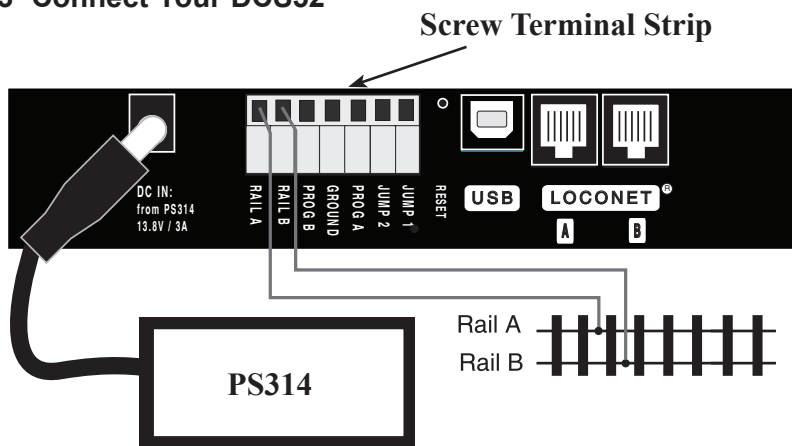
### 2.2 Before You Begin

Before you begin ensure that the **Throttle Knob** is turned all they way to **STOP** and the **Direction/Brake Lever** is set to **BRAKE**



*Zephyr Express Front*

## 2.3 Connect Your DCS52

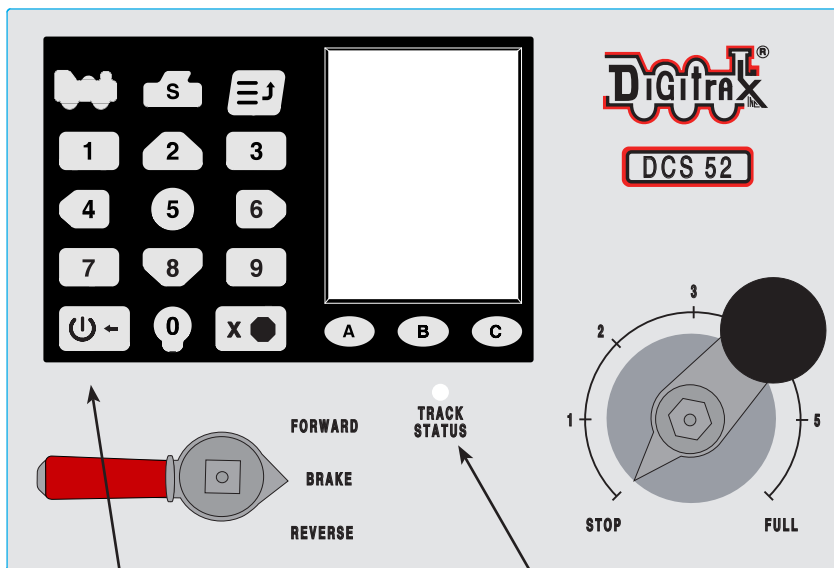


*Zephyr Express Rear Connections*

1. Locate the gray screw terminal strip on the back of your DCS52.
2. Locate the two terminals labeled **RAIL A** and **RAIL B** on the grey terminal strip. Connect wires from your track to these terminals, one for each rail. It does not matter which rail is connected to which terminal.

3. Locate the barrel plug connector marked **DC IN: from PS314**.
4. Connect the PS314 to the DCS52 by inserting the barrel plug into the connector. Only the PS314 should be used to power the DCS52.
5. Plug the PS314 to an AC wall power outlet that matches the power cord supplied with your PS314. The PS314 will work universally on 110-240V AC.
6. The DCS52 should beep and power on. A start screen will display briefly saying “Welcome to DCS52” followed by a software version and the unit’s serial number.

## 2.4 Turn On Track Power



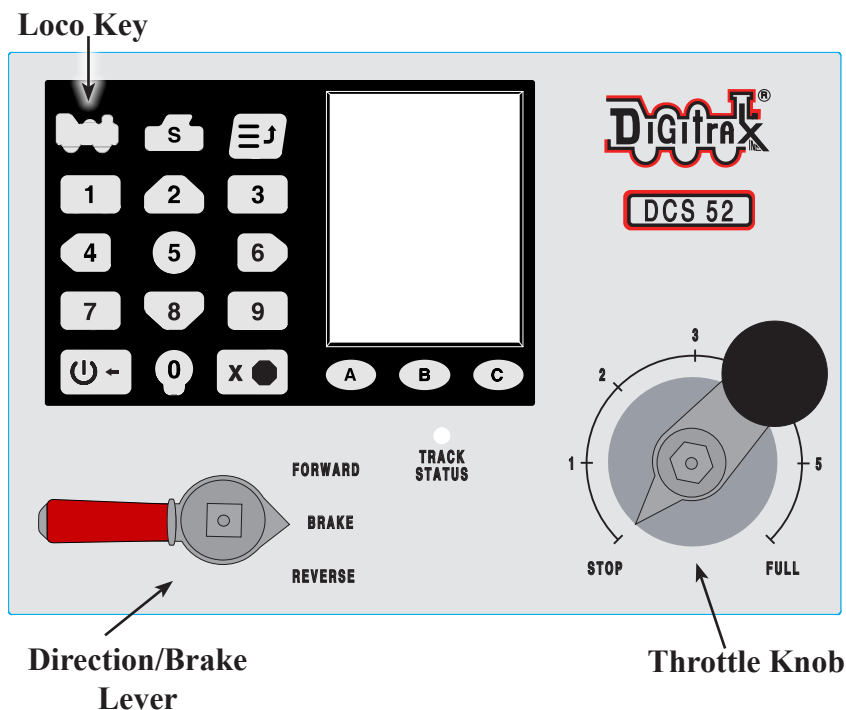
**Power/Back Key**

**Track Status Indicator**

### *Turning On Zephyr Express Track Power*

1. On the front panel of the DCS52 locate the **Power/Back Key** on the bottom left of the keypad.
2. Press the **Power/Back Key** to toggle track power on and off. The **Track Status Indicator** will be lit **ON** green when the DCS52 is in normal Command Station mode and track power is **ON**. When track power is off the **Track Status Indicator** will not be lit.

## 2.5 Select and Run A Non-DCC Locomotive



1. To select a non-DCC equipped (Analog) locomotive to run, look at the top left of the keypad on the front panel. Locate the key that looks like a locomotive. This is the **Loco Key**.
2. Press the **Loco Key ONCE**, the address number will begin to flash alternating black and grey.
3. Enter **00** on the keypad and press the **Loco Key** once again. The address number will go solid black. You have selected a locomotive to run!
4. To run the locomotive, place the non-DCC locomotive on your layout, move the **Direction/Brake Lever** to either **FORWARD** or **REVERSE**, depending on which way you want the locomotive to move, and slowly turn the **Throttle Knob** clockwise until the locomotive starts to move.
5. To stop the locomotive, either turn the **Throttle Knob** back to **STOP**, or shift the **Direction/Brake Lever** to **BRAKE**.

## 2.6 Select and Run A DCC Locomotive

1. To select a DCC equipped locomotive to run, you must know the address assigned to the decoder in the locomotive. Most new decoders and decoder equipped locomotives have a default address of **03**.
2. For now we will assume you are using a new DCC-equipped locomotive with an address that is set to **03**. If you do not know the decoder's address please refer to section 11.2 for details on reading and setting a decoder address.



3. Now repeat the process for selecting the non-DCC locomotive only using address **03**
4. Look at the top left of the keypad on the front panel. Locate the key that looks like a locomotive. This is the **Loco Key**.
5. Press the **Loco Key ONCE**, the address number will begin to flash alternating black and grey.
6. Enter **03** on the keypad and press the **Loco Key** once again. The address number will go solid black. You have selected a locomotive to run!
7. To run the locomotive, place the DCC locomotive on your layout, move the **Direction/Brake Lever** to either **FORWARD** or **REVERSE**, depending on which way you want the locomotive to move, and slowly turn the **Throttle Knob** clockwise until the locomotive starts to move.
8. To stop the locomotive, either turn the **Throttle Knob** back to **STOP**, or shift the **Direction/Brake Lever** to **BRAKE**.

### 3.0 Preparing Your Locomotives

With your Zephyr Express System you will be able to run one locomotive without a decoder, so even if you don't have a decoder equipped locomotive you can still hook up your system and try it right away!

However, in order to take full advantage of your Digitrax Complete Train Control system you will need to have a number of locomotives with decoders installed. The decoder in your locomotive will allow you to individually control your locomotive's speed, direction, lights, sound and other functions. The good news is that many locomotives now come decoder equipped with DCC decoders pre-installed. There are also many easy options for installing decoders in older or non-decoder equipped locomotives.

Your dealer is your best resource for selecting the correct decoder for you locomotives and tips on installation. We also have our complete Decoder Manual included with this set for all the information you'll need on setting up Digitrax decoders. There is also a wealth of information on our website, [www.digitrax.com](http://www.digitrax.com), including a decoder selector and may tips and tricks for decoder setup and installation.

### 4.0 Preparing Your Layout

Digitrax Complete Train Control simplifies layout wiring for new layouts. If you already have a layout that runs well on DC control it will run well on DCC. The DCC signal generated by the DCS52 travels with power over the rails. You must have power to the track in all locations so that the decoders can receive the signals and respond to the commands. For more information on layout wiring visit our website [www.digitrax.com](http://www.digitrax.com)

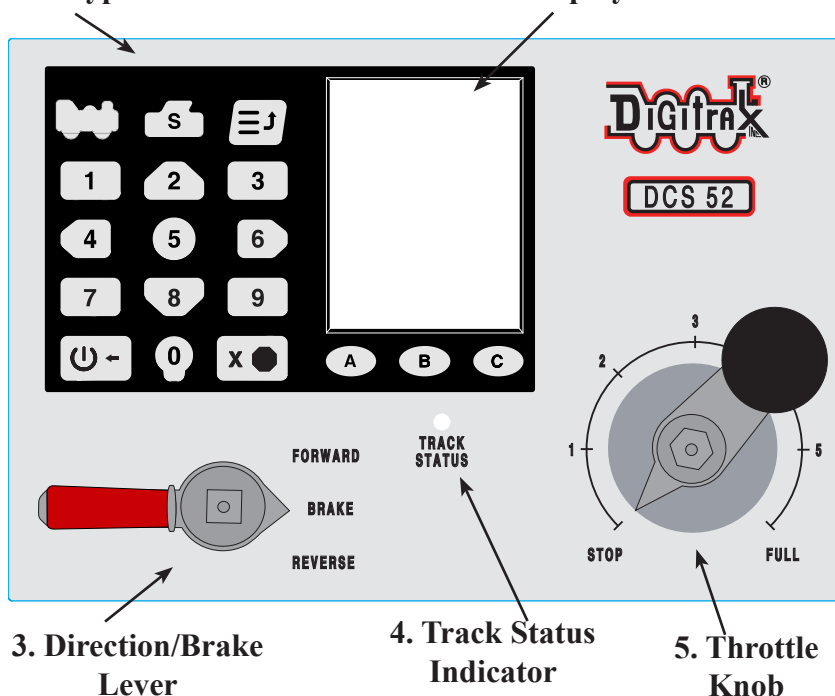
## 5.0 DCS52 Front Panel

Before diving into running trains take a few minutes to familiarize yourself with the DCS52's controls and display.

### 5.1 DCS52 Front Panel Controls and Indicators

#### 1. Keypad

#### 2. Display



#### 3. Direction/Brake Lever

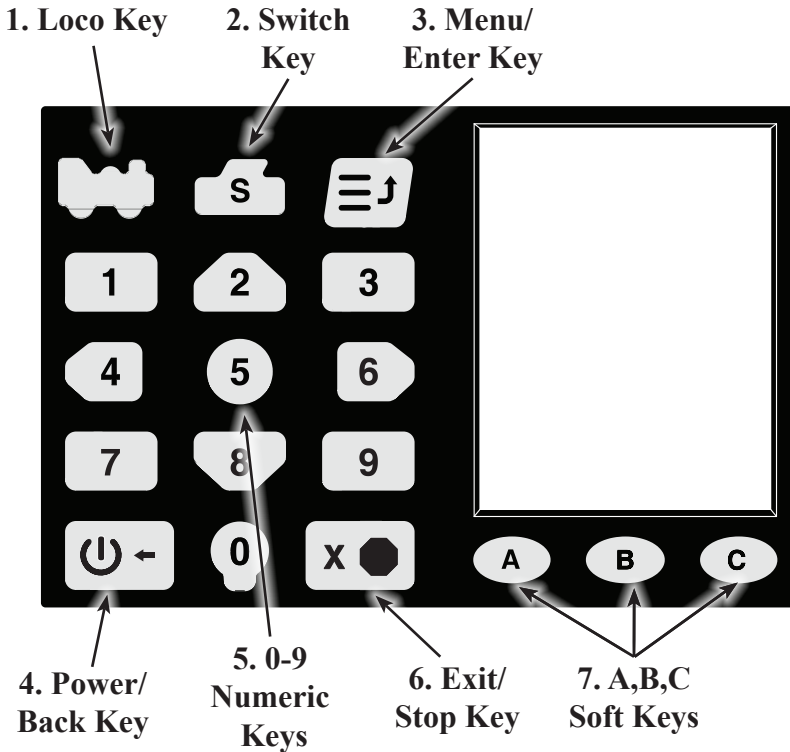
#### 4. Track Status Indicator

#### 5. Throttle Knob

1. The **Keypad** consists of 18 back-lit keys. It features a full numeric keypad for direct data entry, 3 context sensitive soft keys, and other task specific keys. Most keys serve more than one use depending on the operation mode of the DCS52. The **Keypad** is covered more in depth in section 5.2
2. The **Display** is a 2.4 inch color LCD screen. The screen will provide you with a variety of information and input prompts to assist in running locomotives. The **Display** is covered more in depth in section 5.3.
3. The **Direction/Brake Lever** is the small red and silver lever that is used to control the selected locomotives direction or set the brake. The lever has 3 positions **FORWARD**, **BRAKE**, and **REVERSE**. When set in **BRAKE** the loco will slow to a stop and a message will scroll in the display. When the **Direction/Brake Lever** is turned to **FORWARD** or **REVERSE** the loco will accelerate back to the speed set on the **Throttle Knob**.
4. The **Track Status Indicator** is lit when Track Power is on and being provided to the track. If this indicator is not lit Track Power is turned off or the booster is short circuited.

## 5.2 DCS52 Keypad

The DCS52 **Keypad** consists of 18 back-lit keys. It features a full numeric keypad for direct data entry, 3 context sensitive soft keys, and other task specific keys. Most keys serve more than one use depending on the operation mode of the DCS52.



1. The **Loco Key** is primarily used for selecting locomotives to run. Pressing the **Loco Key** will enter locomotive selection mode and give you access to the Mu, Recall, Disptch (Dispatch), and St Edit (Status Edit) soft keys to access those features.
2. The **Switch Key** is used to activate switch mode during normal operation. Pressing the **Switch Key** will allow for direct input of switch addresses and access to the Thrown and Closed soft keys to control switch position.
3. The **Menu/Enter Key** is used to open the DCS52 Main Menu giving you access to programming and setup functions.
4. The **Power/Back Key** is primarily used to turn track power on or off. During normal operation pressing the **Power/Back Key** will toggle track power on or off as indicated by the **Track Status Indicator** discussed in

section 2.1 When entering values like loco or switch addresses this key can be used to backspace.

- 5. The **0-9 Numeric Keys** are used for any numerical input that is required. During normal operation these keys control locomotive functions on and off, with the **2** key being a special non-latching key. In loco selection and switch mode these keys are used to select locomotive and switch addresses. In Menu screens these keys are used make numerical menu selections and input data values.
- 6. The **Exit/Stop Key** is used to exit a current task. Pressing it will immediately exit back to the Home Operations Screen from any other screen or menu.
- 7. The **A,B,C Soft Keys** are context sensitive keys that change meaning depending on mode or menu you have selected on the DCS52. The current purpose of each **Soft Key** is shown in small text directly above the key in the **Display**.


5.3 DCS52 Display

The DCS52 **Display** is a 2.4 inch color LCD screen. The screen will provide you with a variety of information and input prompts to assist in running locomotives and system setup. In this section we will outline the Home Operations Screen, other menu displays will be covered in their respective sections.

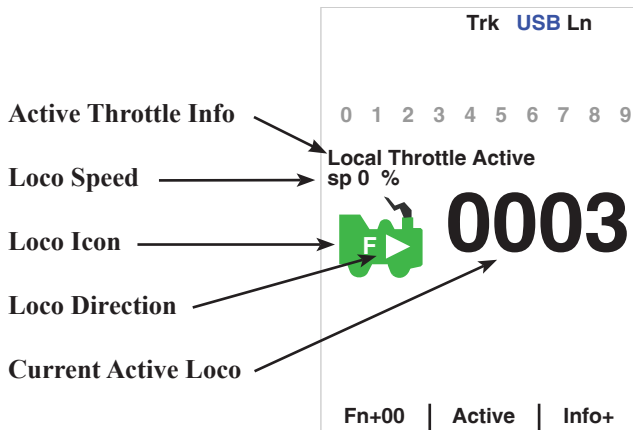
**NOTE:** The display is best viewed from directly above, viewing the screen at some angles may distort the perceived screen colors and actions.

5.3.1 Home Operations Screen

This is the primary operations screen for the DCS52. This is the screen you will see most often when operating trains. The Home Operations Screen and it's components are shown below. The below example is shown with a locomotive selected. If you ever get lost you can always press the **Exit/Stop Key** to return to this screen.

Trk USB Ln	1. Status Bar
	2. Switch/Info + Area
0 1 2 3 4 5 6 7 8 9	3. Function Bar
Local Throttle Active sp 0 %  0003	4. Loco Info Area
	5. Jump Throttle Area
	6. Scrolling Help Text
Fn+00     Info+	7. Soft Key Bar

1. The **Status Bar** is always active and will show the status of your system. There are multiple indicators that appear in the **Status Bar**. The “Ln” indicator is solid black when LocoNet is OK. The “Trk” indicator is solid black when system track power is turned on. The blue “USB” indicator comes on when there is a successful USB connection to a computer.
2. The **Switch/Info + Area** is where switch information is displayed in switch mode. Switch mode is covered in more detail in section 13.0. This area of the screen is also where complete active function information is displayed when the “Info +” soft key is pressed. For more info on controlling and managing functions see section 10.0.
3. The **Function Bar** is where active functions are shown. Active functions are blue and inactive functions are grayed out. The function information shown in this bar correlates to the “Fn+” soft key, pressing the “Fn+” soft key will cycle through control of higher functions and display them in the **Function Bar**. For more information on using functions see section 10.0.



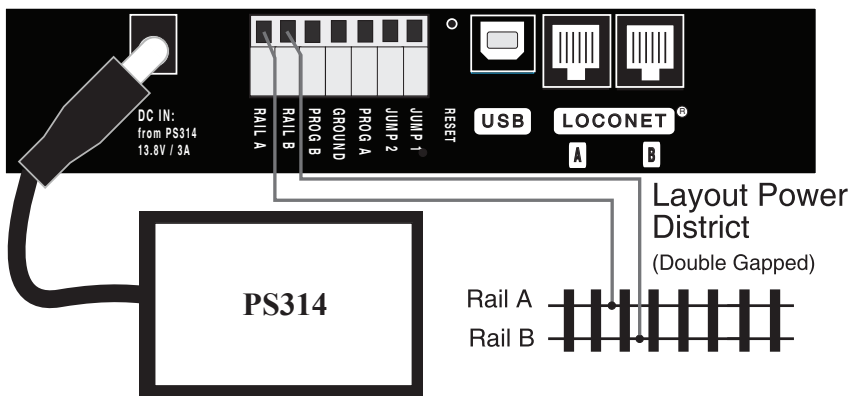
4. The **Loco Info Area** is where the current active locomotive information is shown. This area shows the currently active loco, loco speed, and loco direction. The top of this area tells what throttle the display is currently showing information for and if it is active or inactive. The DCS52 by default will only have the Local throttle enabled. If the jump ports are turned on you will be able to cycle through the additional throttles using the “Active” soft key. For more info on using jump ports see section 17.0. Next the current loco’s speed is listed as “sp XX%”. There is a loco icon with the current direction indication either forward or reverse, shown with a “F” and an arrow or a “R” and an arrow. If a loco is currently selected this icon will be green with flashing smoke coming from the smokestack. If no loco is selected the icon will be gray with no smoke. Finally, the

currently active address is shown in the large numbers. If a loco is selected the numbers will be solid black, if no loco is selected the numbers will be gray. The **Active Throttle Info** area will show additional information during locomotive selection, see section 8.1 for complete information on selecting locomotives.

5. The **Jump Throttle Area** shows information related to the jump ports available on the DCS52. By default jump ports are turned off. If jump ports are turned on two additional smaller loco info panels will appear providing basic info on the status of the two non-active throttles. For complete information on using your DCS52's jump ports see section 17.0.
6. The **Scrolling Help Text** line displays helpful instructions in plain scrolling text. This purple scrolling text will give you instructions to complete the task at hand or other useful state information.
7. The **A,B,C Soft Keys** are context sensitive keys that change meaning depending on mode or menu you have selected on the DCS52. The current purpose of each **Soft Key** is shown in small text directly above the key in the **Display**. In the Home Operations Screen these keys will show "FN+xx" and Fn Info+ when a loco is selected. If jump ports are enabled, there will be a third soft key "Active"

## 6.0 DCS52 Rear Panel and Connections

Your DCS52 rear panel is where the unit is powered and your connections to your layout and other LocoNet devices are made. Take a few minutes to familiarize yourself with the rear panel before proceeding to hook up your DCS52.



1. The **DC IN** connection is where your PS314 connects to your DCS52. Only the Digitrax PS314 should be used to power your DCS52.
2. **RAIL A & B** is where your track is connected to the DCS52. One rail connects to **RAIL A** and one connects to **RAIL B**.
3. **PROG A & B** is where your separate programming track should be con-

nected to you DCS52. The programming track should be a separate piece of track not connected to your layout and isolated for decoder programming. See Section 11.0.

4. **GROUND** provides electrical safety features and an RF ground reference for minimum radiated noise. This should be the **ONLY** point of any DCS52 installation that is connected to the AC safety ground pin provided on most 3 pin 110V AC power sockets. Grounding the system is a sensible safety precaution that should not be ignored.
5. The **JUMP 1 & 2 Ports** are used for connecting one or two smooth DC power packs to the DCS52 for use as additional throttles. By default this feature is disabled, see section 17.0 for more details.
6. The **RESET** button will clear the DCS52's loco slots when pressed.
7. The **USB** connection is used for connecting your DCS52 and LocoNet system to a computer. For more information see section 22.0.
8. **LocoNet ports A & B** are used to connect your DCS52 to other LocoNet devices for expanding the capabilities and size of your system or layout.

## 7.0 Connecting the Zephyr Express to your Track

These simple instructions will help you get up and running quickly. A full description of all controls and technical reference information are included elsewhere in this manual. This section assumes that you are using a new set straight out of the box.

1. Hook up the wires from the track to the **RAIL A & RAIL B** terminals on the DCS52. Insert the wire from one rail of the track into the **RAIL A** terminal on the back of the DCS52. Insert the wire from the other rail of the track into the **RAIL B** terminal. Turn the screw counter clockwise to open the connector and clockwise to close it once the wire is in place.
2. Plug the barrel connector from the PS314 into the **DC IN** jack on the back of the DCS52. Plug the body of the PS314 in to a regular wall outlet. Once power is applied, the DCS52 beep and power on. A start screen will display briefly saying "Welcome to DCS52" followed by a software version and the unit's serial number. The DCS52's display will change automatically to the Home Operations Screen. The last address that was on the throttle when you turned it off will be selected.
3. Turn track power on by pressing the **Power\Back Key**. Check the **Track Status Indicator** and look for the solid black "Trk" in the status bar. If they are on, you are ready to go. If the **Track Status Indicator** is unlit, press the **Power\Back Key** to turn track power on. When power is being provided to the track the **Track Status Indicator** will be lit.

## 8.0 How to Select and Run Trains

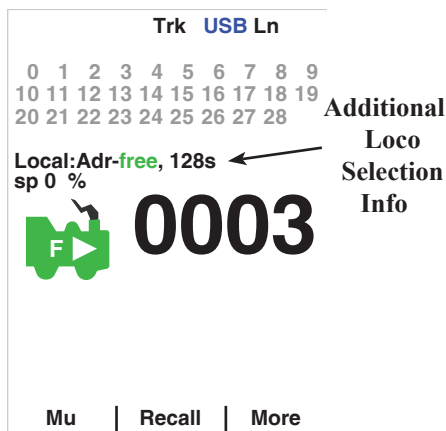
Each decoder receives a unique address. To select a decoder equipped locomotive and run it on your throttle, you must know it's address. Digitrax decoders are set up at the factory with the "default" address "03". This means that when you take a Digitrax decoder out of the package and install it in your loco, you can select address "03" on your throttle and run the decoder. The first Configuration Variable (CV) programmed by most users is the decoder's address since it is not very useful to have all of your locos run on address "03."

If you do not know the address of the decoder equipped locomotive you want to run, you can simply program the decoder's address and select it to run using the new, known address or use the DCS52 to read back the decoder address.

*See Section 11.2 for details on address programming.*

### 8.1 How to Select a Locomotive

1. In order to select a locomotive you must know it's address and make sure it is placed on the track connected to the DCS52.
2. Make sure that **Track Power** is turned on. The **Track Status Indicator** should be lit.
3. Press the **Loco Key** once to enter loco selection mode, the large numbers in the Loco Info Area will begin to blink black and gray. The soft keys will also change to give you the options "MU" "Recall" and "MORE". Pressing "MORE" will bring up "Disptch" "Stat. Edit" and "MORE" as soft key options. Pressing "MORE" again will return to the previous soft key options. These keys will be covered in the following sections.



4. Enter the address of the locomotive you want to select. The text above the address number will provide you additional information about the loco address you are selecting. If it says "free" the locomotive is available for selection. If it says "busy" the locomotive is in use on another throttle, to select it you must complete the steal process. See section 8.6. The second set of numbers, usually "128" specifies the number of speed steps associated with the address. See Status Editing, Section 16.1 for more details. Next, if there

is "cn", "mid", or "top" the locomotive is part of a consist, see section 12.0 regarding consisting.



5. Once you have entered the address, press the **Loco Key** again. The entered address will go solid black and you will have control of the locomotive.
6. Set the **Direction Lever** to **FORWARD** or **REVERSE** and turn the **Throttle Knob** to run your Locomotive. To stop your locomotive set the **Throttle Knob** to **Stop** or the **Direction Lever** to **BRAKE**. See section 8.7 for complete instructions on speed and direction control.

## 8.2 Selecting an analog Locomotive

A locomotive without a DCC decoder is called an analog locomotive. While an analog locomotive, without a decoder, is sitting still on your digital layout, you will hear a “singing” sound. This is caused by the DCC track signal when it is applied to an analog locomotive. Once the analog locomotive is moving, this sound will change and be less noticeable. To avoid heat build up in your locos without decoders, Digitrax recommends that analog locos **NOT** be left sitting on DCC powered track for long periods of time when they are not running.

Address “00” is reserved for running an analog locomotive. You select and run these locos like you would a regular DCC equipped locomotive as described above, only using address “00”. Your analog locomotives will not run with any other address. As with a regular DC system, only one analog locomotive can be controlled at a time. If you try to run more than one analog locomotive at the same time on the layout all of the analog locos will respond to the commands sent to address “00”.

## 8.3 Releasing An Address From A Throttle

When you are finished running a locomotive address, release it from your throttle so that it is available for other throttles to select and run.

1. Use the **Throttle Knob** to make the locomotive’s speed zero (this step is optional but strongly recommended as the loco will continue to move if speed is not reduced to zero).
2. Press the **Loco Key** to go into select mode.
3. The address will begin to blink in the display. Press the **Exit/Stop Key**, this will release the address from both the throttle and the locomotive stack in the system. The display on your DCS52 will show the previously selected address grayed out.
4. If you press the **Loco Key** again, the throttle will begin flashing the address you just released. You can re-select that address by pressing the **Loco Key** or you can enter a new address to select.

## 8.4 Selecting a Locomotive using the Recall Soft Key

The DCS52 has a recall feature that remembers the last 10 locomotives you have selected for easy recall. To select a locomotive using recall:

1. Press the **Loco Key** once to enter loco selection mode, the large numbers in the **Loco Info Area** will begin to blink black and gray. The soft keys will also change to give you the options “MU” “Recall” and “MORE”.

2. Press the **B Soft Key** labeled “Recall”: This will open Recall Session Loco List:
3. Press the number key 0-9 that corresponds to the loco address you want to recall. The locomotive address will be recalled to the Home Operations Screen blinking black and gray.
4. Press the **Loco Key** to complete the selection process.

Trk <b>USB</b> Ln		
Recall Session Loco List:		
0-	0003	
1-	0069	
2-	0009	
3-	0085	
4-	0045	
5-	0065	
6-	1000	
7-	0026	
8-	0006	
9-		
<b>Mu</b>	<b>Recall</b>	<b>More</b>

### 8.5 Dispatching addresses or consists

Dispatching is a special feature incorporated in the LocoNet language to meet the needs of operators that wish to enforce a strict discipline in how operators gain access to locomotives during an operating session. Dispatching also lets you run consists with basic throttles that can’t set up their own consists and run four digit addresses on basic throttles that only have two digit capability. It lets you have newcomers run trains on the layout without giving them access to the entire operation.

When you dispatch a locomotive address or consist to your LocoNet system, you make it available to be acquired by another throttle. Only one address at a time can be marked as a dispatched address in the system.

#### To dispatch a locomotive address using a the DCS52

1. Press the **Loco Key** to enter address selection, enter the address you want to dispatch.
2. Press the **Soft Key C** marked “MORE” to bring up additional address selection soft keys. Pressing more will bring up “Disptch”, “Stat.Edit” and “MORE” as soft key options.
3. Press the **Soft Key A** marked “Disptch” to dispatch the entered Loco Address.

The dispatched address can be a single locomotive address, either two digit or four digit, or a consist that was set up by the DCS52. The TOP locomotive in a consist or MU can be dispatched to transfer control of the entire consist to another throttle.

### 8.6 Stealing: Forcing An Address Selection

If you try to select a loco address that is already selected on another throttle the DCS52 will display “adr-busy” in red above the address in the Loco Info area of the display when the address is entered. Pressing the **Loco Key** again will prompt for additional actions. This is a safety interlock to prevent operators from taking control of locos that are already selected on other throttles. Occasionally it is necessary to override this interlock to gain control of a loco that is “lost” for whatever reason. This override is called stealing. When steal-

ing with the DCS52 it is possible to have an address selected on more than one throttle on your system.

#### **To steal an address with the DCS52:**

1. Press the **Loco Key** to enter selection mode.
2. Enter the address of the loco you want to steal and press the **Loco Key** again.
3. A scrolling message will appear in the Scrolling Help Text Area reading "Press YES to steal Loco, No to exit" and the soft keys will change to "YES" and "NO".
4. To steal the loco address press the **Soft Key A** marked "YES", to cancel the selection press the **Soft Key B** marked "NO".

## **8.7 Locomotive Speed and Direction Control**

### **8.7.1 To control the speed of a locomotive:**

1. Select the loco address on the throttle.
2. Turn the **Throttle Knob** clockwise to increase speed and counterclockwise to decrease speed. Speed is displayed above the Loco Icon in the display.

### **8.7.2 To control the Direction of a Locomotive**

Move the **Direction Control Lever** to **FORWARD** or **REVERSE** to change the direction of the loco address running on the throttle. To determine the direction of a loco that is not moving, simply look at the position of the lever. You can also look at the green locomotive in the display, it will show either a F or a R with a corresponding arrow. You can move the lever quickly past the **BRAKE** position with no adverse effects.

If you change direction while a loco is moving it will slow down to 0 speed and then speed up to the commanded speed according to the decoder's programmed CV values for deceleration and acceleration.

### **8.7.3 Stopping a loco by setting a Loco to Zero Speed**

#### **To immediately stop a locomotive:**

Make sure the loco address is selected on the throttle and turn the **Throttle Knob** counterclockwise until it is in the **STOP** position. The loco should slow to a stop as you rotate the throttle knob. This lets you slow down your loco and stop it prototypically. If you have set up deceleration (CV4) for the loco and you move the throttle knob to **STOP**, your loco will slow down and come to a stop at the programmed deceleration rate.

### **8.7.4 Brake Operation**

#### **To use the brake to stop and start a locomotive:**

Move the Direction Control Lever to the **BRAKE** position, the Scrolling Help Text line will say "Local Throttle braking" and stop at the brake rate set up in the DCS52. As the loco slows to a stop, the speed percentage displayed in the Loco Info Area will decrease to 0%.

Move the **Direction Control Lever** to the **FORWARD** or **REVERSE** posi-

tion and the loco will accelerate at the programmed rate to the speed on the throttle knob. As the loco accelerates, the speed percentage displayed in the Loco Info Area will increase to match the speed set on the **Throttle Knob**.

Braking can also be handled on a loco by loco basis if you set up each decoder with acceleration and deceleration rates that simulate the scale effects of braking the train. Then when you command an instant reverse, the system will simulate braking by slowing down the locomotive at the programmed deceleration rate, come to a stop and then accelerate at the programmed acceleration rate in the opposite direction.

## 9.0 Emergency Stop

**To stop everything on the layout immediately:**

Press the **Power/Back Key** to turn off power to the whole layout. This option will stop everything on the layout. Do not turn Track Power off during a short. Clear the short first. The Zephyr Express shuts off when it sees a short to protect itself.

**Having Trouble Stopping?** If the deceleration CV value you set for a particular loco is very large, this can make it look like the loco is not stopping on command because the deceleration CV value is causing the loco to take a long time to come to a stop.

## 10.0 Functions

Most DCC decoders have function outputs that you can use to control lamps, LEDs, sound, smoke generators and other on/off devices installed in your locomotives. Most locomotives made today come with a head light and sometimes with a rear light, too. With DCC, these are controlled by the decoder's function outputs. You can also install additional DCC controlled lighting such as cab lights, Mars lights, ditch lights, rotating beacons and others on your locos. The addition of these functions can add to the fun and realism of your locomotives. *You must have the functions installed and connected to the appropriate decoder function leads in order to use the following keys.*

### 10.1 Controlling Functions F0-F9

**To operate functions F0-F9 on your locomotive:**

1. Select the loco you want to control. By default the Home Operations Screen uses the numerical keypad to operate functions. On the throttle, you will see the "Fn+00" over the **A Soft Key** and "Fn Info+" over the **C Soft Key** to let you know that you can use the numeric keys to operate the functions.

**NOTE:** "Fn+00" should be over the **A Soft Key** and numbers 0-9 should be shown in the **Function Bar** area of the display.

2. Use the DCS52's numeric key pad to turn functions on and off. For example, to turn the head light on, press the **0** key. Press the **0** key again to turn it off. The corresponding function number will go blue for on and grey for off in the **Function Bar** area of the display.

### 10.1.1 Function 0 (F0) Headlights Forward and Reverse

Press the **0** key to toggle F0 between on and off. Each time the **0** key is pressed while in function mode, Function 0, also called F0 will change from off to on or vice-versa. On locos with reversing head lamps and back up lamps, the head lamp or back up lamp in your loco will come on depending on the direction of travel of the loco. Function 0 is most often used to turn on/off the head light/back up light but can be set up for other functions as well (See your Decoder Manual for more information). It can be used as two functions.

### 10.1.2 Functions 1,3, 4, 5, 6, 7, 8 & 9

Press the number key on the numeric keypad that corresponds with the function number you want turn on/off. The function will toggle between on and off each time you press the number key.

### 10.1.3 Function 2 (F2) Momentary Operation

Press the **2** key on the numeric keypad. The **2** key operates Function 2 and is the preferred function for whistle or horn operation. This key is set up as a “non-latching key” so that if a horn or whistle sound is installed in the loco, it will sound for as long as the key is held down. This lets you vary the length of time that the horn or whistle blows, just like the prototype.

## 10.2 Functions 10 through 28 (F10 - F28)

From the Home Operations Screen, press the **A Soft Key** labeled “Fn+00” to cycle through the functions “Fn+10” and “Fn+20”. When “Fn+10” is displayed over the soft key the numeric keypad will control functions 10-19. If “Fn+20” is displayed the keypad will control functions 20-28. Press the **A Soft Key** again to return to “Fn+00” which will allow the keypad to control functions 0-9. In addition to watching the soft key data the full function number and status will be displayed in the **Function Bar** area of the display.

## 10.3 Fn Info+

If you wish to view the status of all 29 functions you can use the “Fn Info+”



soft key. From the Home Operations Screen, press the **C Soft Key** labeled “Fn Info+” this will expand the **Function Bar** area to show functions 0-28. To collapse these press the **C Soft Key** labeled “Fn Info-”.

**NOTE:** The functions controlled by keypad still correspond to the status of the **A Soft Key**, “Fn+00”, “Fn+10”, and “Fn+20”.

## 10.4 Troubleshooting Function Operation

**If the function you want to operate does not respond, check the following:**

1. Is Track Status on? If not press the **Power/Back Key** to turn it on.
2. Did you select the correct loco? If not, select it now.
3. Is the function you want to use installed in the loco? If not, you may need to install it. Most new locos have a head lamp/backup lamp installed, but most do not have any additional lights or sounds installed.
4. Change the position of the **Direction Control Lever** and see if the lamp comes on in the other direction. If the normal direction of travel feature in the decoder loco is set for the opposite of what you were expecting, you will see the head lamp operating in what you expected to be the reverse direction and vice versa for the back up lamp. See your Decoder Manual for information about how to change the Normal Direction of Travel (NDOT).

## 11.0 Programming & Reading Your Digitrax Decoders

Your DCC Decoders have many different **configuration variables** (CVs for short) that let you set up a different set of characteristics for each decoder installed in a locomotive. When you want to change a loco's address, set up how its lights work, change its momentum characteristics, etc. you will program new CV values into the appropriate CVs to set it up just the way you want.

Each CV controls a characteristic of the decoder. See your Decoder Manual for a list of the most commonly used CVs and their meanings. A Digitrax Decoder Manual is included as a part of your Zephyr Express system. Each decoder comes pre-programmed with factory settings that will let you run it right away.

***If you are using non-Digitrax decoders or sound decoders, please consult the manual provided by the manufacturer for how CV's are used and programming instructions.***

The factory set address for all Digitrax decoders is "03". This is the first CV you will want to change because it is not very useful to have all of your locos respond to the same address. The DCS52 has a Quick Decoder Setup that makes it easy to setup the most common CVs including addresses and CV29 values.

Decoders are programmed when the command station sends programming information to them through the rails. Your DCS52 supports two types of programming:

**Service Mode Programming** is done on an electrically isolated programming track. Using this mode, the command station broadcasts programming information to all decoders on the program track. Because this is a broadcast mode, you must isolate the decoder you want to program from the others on the layout. You do this by using a separate programming track that is connected to the command station for programming but not powered for operation of the locomotive. This mode works with all DCC decoders. This is the most commonly used programming method.

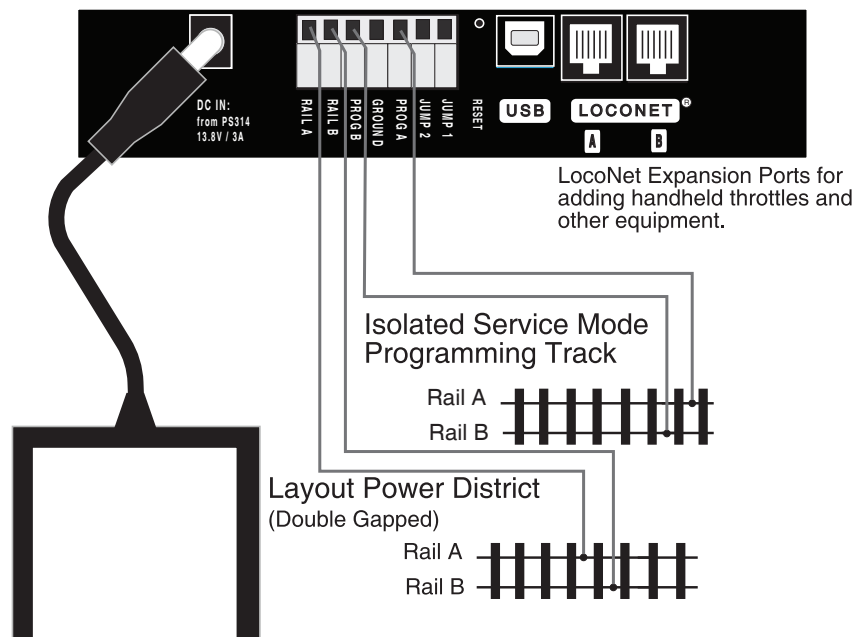
**Operations Mode Programming** is done on the layout by sending programming commands to a specific locomotive address while they are powered on the mainline or main layout track. To use this mode, you must have decoders that are capable of operations mode programming. The programming track is not used when using ops mode programming.

## 11.1 Setting Up a Programming Track

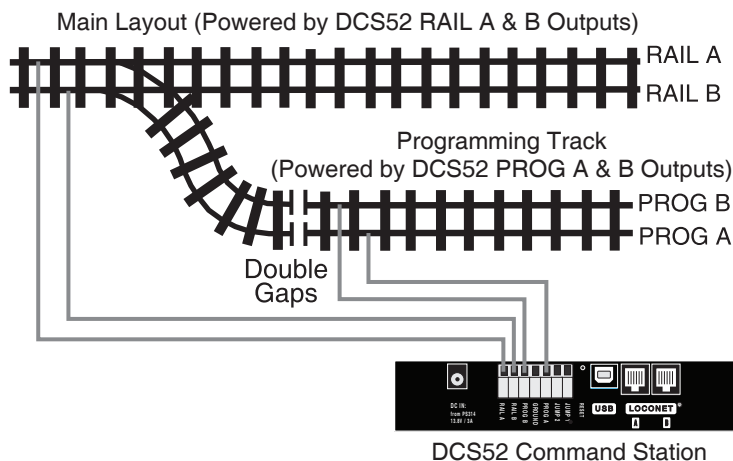
Your DCS52 has two sets of DCC outputs. This means that you will be able to program decoders using one set of DCC outputs while the layout is running on the other set of DCC outputs. When you hooked up your DCS52 to the layout, you used the **RAIL A & RAIL B** connections to the track. Now we will use the **PROG A & PROG B** outputs to set up a programming track.

**NOTE:** The programming track is powered for programming only and cannot run locomotives. You will have to manually move your locomotive on to the track whether using the siding or isolated track programming setup.

### DCS52 Rear Panel Programming Track Hook Up Diagram



Your programming track can be as simple as a spare piece of track not connected to the layout as shown above or it can be a double gapped section of track connected to the DCS52's **PROG A & PROG B** outputs as shown below.



NOTE: Some wiring omitted for clarity

### Programming Track Example Diagram

## 11.2 Using Quick Decoder Setup

Be sure that only the locomotive you want to program is on the programming track if you use Direct, Paged or Physical CV programming.

1. To enter Quick Decoder Setup, press the **Menu Key**. Main Menu A will display giving you a list of menu options. Select 1-Quick Decoder Setup by pressing the **1** key on the keypad.
2. This will put you in Quick Decoder Setup. Quick Decoder Setup uses Direct Programming mode on the program track. In Quick Decoder Setup you can change the locomotive address and CV29 settings.
3. Once in the Quick decoder setup menu you can change AD2 and AD4. You must decide what address you want to use, for addresses 0000-0127 you must use AD2. For addresses 0128-9983 you must use AD4.
4. Press the **A Soft Key** “READ” to read the current data from your decoder. This step isn’t required but is useful in confirming existing decoder settings.
5. To set AD2 press the **1** key on the keypad to highlight the AD2 line. Press the **C Soft Key** “DATA” to select the line. Use the keypad to enter the address you want to use, press **B Soft Key** “WRITE” to write the address to the decoder. To make changes to AD4 or CV29 press the **C Soft Key** “SELECT” to select additional lines in the Quick Decoder Setup Menu. If you are done making changes press the **Exit/Stop Key**.

Trk USB Ln	
<b>Quick Decoder Setup</b>	
<b>Pd Mode</b>	
0- Last Menu	
1- AD2 ShortAdr =	
2- AD4 Long Adr =	
3- CV29 Value =	
4- NDOT Rev	OFF
5- 28 not 14 Step	ON
6- Analog	ON
7- Speed Table	OFF
8- Use AD4	ON
9-	
<b>READ</b>	<b>WRITE</b>   <b>DATA</b>



6. To set AD4 make sure you are back in select mode (**C Soft Key** will read “DATA”). Press the **2** key on the keypad to highlight the AD4 line. Press the **C Soft Key** “DATA” to select the line. Use the keypad to enter the address you want to use, press **B Soft Key** “WRITE” to write the address to the decoder.

**NOTE:** “Use AD4” must be set to OFF when using AD2 and must be set to ON when using AD4. The DCS52 will automatically set this value when a change is made to AD2 or AD4. This option can also be manually set by following the below instructions.

7. CV29 can also be setup in the Quick Decoder setup. CV29 also called the Configuration Register is a special CV that controls a number of characteristics for your decoder. CV29 controls:
  - Normal Direction of Travel (NDOT)
  - Speed Step Control: Advanced Mode or Standard Mode
  - Analog Mode Conversion
  - Speed Tables
  - 2 or 4 digit addressing

See your decoder manual for a full listing of these features.

8. CV29 can be changed two ways in the Quick Decoder Setup. When in Select mode (**C Soft Key** will read “DATA”) simply press the number key corresponding to the feature you want to turn off or on. For example pressing the **4** key will toggle analog mode conversion off and on. The CV29 Value will automatically be calculated. Once you have all the settings configured the way you want simply press the **A Soft Key** “WRITE” to write the configuration to the decoder.
9. Alternately, if you know the CV29 Value you want to program into the decoder you can select it and use the keypad to enter the number. CV29 values can be looked up in the Decoder Manual or on [www.digitrax.com](http://www.digitrax.com).
10. To manually enter the CV29 value. Press the **3** key on the keypad to highlight the CV29 Value line. Press the **C Soft Key** “DATA” to select the line. Use the keypad to enter the value you want to use, press **B Soft Key** “WRITE” to write the value to the decoder.
11. After values are written to the decoder the text “CV Task Completed OK” will scroll in the **Scrolling Help Text** line.

### 11.3 Read and Write Configuration Variables

There are many different CVs that have been defined to control the operating characteristics of your locomotives. Your decoder manual has a complete listing of CVs that are available in specific decoders, what they do and suggested values for each CV. Programming these CVs is simple:

1. Be sure that only the locomotive you want to program is on the programming track (if using Operations mode the loco will need to be on the mainline).

2. To enter the CV Programmer, press the **Menu Key**. Main Menu A will display giving you a list of menu options. Select 2- CV Programmer by pressing the **2** key on the keypad.
3. You will be presented with CV Program Menu A. From this menu use the keypad to select the method of programming you wish to use by pressing the corresponding number.
  - 1-Po; Ops on Mainline
  - 2-Pd; Direct on Prg Trk
  - 3-Pg; Paged on Prg Trk
  - 4-Ph; Physical on Prg Trk

Note: Direct programming is the Digitrax preferred method

4. Once you have selected a programming method, it will be listed above entries for CV number and CV data. CV number is the number of the CV you are changing. CV data is the value you are programming to the CV number.
5. To change the CV number you are editing press the **A Soft Key** “CVNUM”, then use the keypad to enter the CV number you want to change.
6. Once you have the CV number selected press the **B Soft Key** “CVDATA”. The soft keys will change to “WRITE”, “READ”, and “BACK”. Press the **B Soft Key** “READ” to read the current value of the CV number you have selected. Use the keypad to enter the value you wish to program to the CV number you have selected. Press the **A Soft Key** “WRITE” to save the data entered. The **Scrolling Help Text** line will read “Program Task OK” when it has successfully programmed the value.
7. Press **C Soft Key** “BACK” to exit to the previous menu to select another CV to change if you wish. If you are done editing CVs press **C Soft Key** “DONE” to return to normal operations.

Trk <b>USB</b> Ln		
<b>Recall Session Loco List:</b>		
0- Last Menu		
1- Po; Ops on Mainline		
2- Pd; Direct on Prg Trk		
3- Pg; Paged on Prg Trk		
4- Ph; Physical on Prg Trk		
5-		
6-		
7-		
8-		
9-		
CVNUM	CVDATA	DONE

Trk <b>USB</b> Ln		
<b>CV Program Menu A:</b>		
2- Pd; Direct on Prg Trk		
<b>CV Number: 0001</b>		
<b>CV data: 0001</b>		
CVNUM	CVDATA	DONE

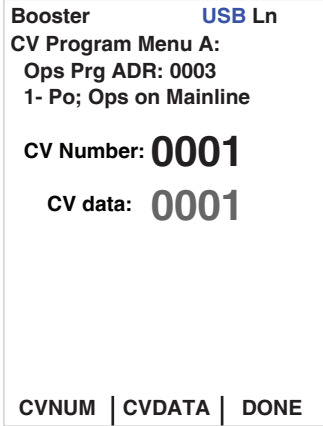
## 11.4 Programming On The Mainline

**Operations (OPS) Mode Programming** lets you program CVs in DCC locomotives equipped with extended packet format decoders while they are on the mainline. A typical use for OPS mode programming would be to change the acceleration rate (CV03) or the deceleration rate (CV04) of your locomotives to simulate the weight and braking capability of the train to compensate for changing the number of cars or power units on a train.

Your DCS52 can use OPS Mode Programming to change the CV value in ANY CV, including 2 digit and 4 digit addresses, but some decoders may not accept changing these CVs in Operations mode.

**How to use Operations Mode Programming:**

1. Make sure the loco you want to program is on the mainline connected to the Rail A and B terminals of your DCS52.
2. Select the Locomotive on your DCS52. Operations Mode programming will program the active address on your DCS52.
1. To enter the CV Programmer, press the **Menu Key**. Main Menu A will display giving you a list of menu options. Select 2- CV Programmer by pressing the **2** key on the keypad.
2. You will be presented with CV Program Menu A. From this menu press **1** to select Po; Ops on Mainline.
3. In addition to Po; Ops on Mainline, the display will also show Ops Prg ADR: followed by the address you will be programming on the mainline. This information will be listed above entries for CV number and CV data. CV number is the number of the CV you are changing. CV data is the value you are programming to the CV number.
4. To change the CV number you are editing press the **A Soft Key** “CVNUM”, then use the keypad to enter the CV number you want to change.
5. Once you have the CV number selected press the **B Soft Key** “CVDATA”. The soft keys will change to “WRITE”, “READ”, and “BACK”. Press the **B Soft Key** “READ” to read the current value of the CV number you have selected, see the note below. Use the keypad to enter the value you wish to program to the CV number you have selected. Press the **A Soft Key** “WRITE” to save the data entered. The **Scrolling Help Text** line will read “Program Task OK” when it has successfully programmed the value.
6. Press **C Soft Key** “BACK” to exit to the previous menu to select another CV to change if you wish. If you are done editing CVs press **C Soft Key** “DONE” to return to normal operations.



**NOTE:** OPS Mode Programming on most systems is write only. OPS mode read back requires Digitrax compatible transponding decoders and transponding detectors on the layout in order to provide the two way communication required for OPS Mode read back.

## 11.5 Programming Error Messages

When you are programming decoders, there are a few error messages you may encounter. The messages will scroll in the **Scrolling Help Text** line.

**“Program Track Empty”** means there is an open circuit on the programming track inputs and no current draw is detected by the programmer.

**“No Decoder ACK Pulse!”** means there is no acknowledgment from the decoder typically during decoder write operations.

**There are many causes for these error messages but most can be solved by checking the following:**

1. Be sure the programming track is connected properly to the DCS52.
2. Be sure a decoder is correctly installed in the locomotive with all motor and pick up connections made correctly.
3. Be sure the loco with decoder correctly installed is making electrical contact with the programming track and that it remains in contact with the programming track until programming is complete.
4. Be sure there is not too much current draw from lamps and other loads from the locomotive that is being programmed.
5. Be sure the decoder you are programming supports the programming mode you are using. Not all decoders support all programming modes.

## 11.6 Configuration Variable (CV) Programming Notes:

1. Check your decoder manufacturer’s manual for factory settings, recommended CV value ranges and for instructions on resetting the CVs to factory settings.
2. It is good practice to record the changes you make to the CV values for each decoder/locomotive combination. This will allow you to profile each locomotive type for programming similar locomotives.
3. Resetting your decoder CV values to factory settings can eliminate some problems caused by inadvertently changing a CV value.

## 12.0 MU (Multiple Unit) Operations

It is not uncommon to see two, three or even four diesel locos pulling in consist at the front of a train. Sometimes, there is a locomotive added in the middle of the train or at the end of the train to give “helper service” to the head end locomotives. This is called Multiple Unit Operation or MU operation. With DCC, each locomotive is separately controlled. But in the case of MUing we would like to have more than one locomotive address controlled by a single throttle to simplify MU operation.

Your DCS52 uses universal consisting to make MU operations simple and easy to do. This is the most flexible and realistic method of MUing available. You

can add any locomotive to your MU, no matter what kind of DCC decoder is in your loco. You can even add an analog loco to your MU. You can add a locomotive to an MU in either orientation and in any physical location in the train. When you send commands to the MU you use the address of the TOP locomotive to control the entire MU and the command station handles the rest of the commands to the other locomotives in the MU. As the address you will use to control the consist is not necessarily the address of the lead or head end loco, we use the term “TOP” for this special address. The TOP address can also be the train number.

You will not be able change the speed or direction of any individual loco that is part of an MU, however you can control individual locomotive functions. Locomotive speed and direction for all locos in the MU are controlled by the TOP address.

## 12.1 Adding a Locomotive to an MU

### To MU two addresses together with the DCS52:

1. Choose two locos you want to MU together. Place them on the track. Make sure that both locos that will be part of the MU are running in the same physical direction. Select and run the first loco to determine which way it is headed. Then select the other loco and run it in the same physical direction.
2. Select the address you want to use to control the MU. This is called the TOP address. To do this, press the **Loco Key**, enter the address & press the **Loco Key** again.
3. Press the **Loco Key** once to enter loco selection mode, the large numbers in the Loco Info Area will begin to blink black and gray. The soft keys will also change to give you the options “MU” “Recall” and “MORE”.
4. Press the **A Soft Key** labeled “Mu”: This will enter MU mode. The display will show the TOP address below the now blinking loco address number. It will say “Consist To:” and then the TOP loco’s address.
5. Use the Keypad to enter the locomotive address you wish to add to the consist.
6. Press the **A Soft Key** now labeled “Mu+”.
7. You will exit MU mode and the TOP locomotive will remain selected on the throttle.
8. To add additional locos to the consist repeat steps 3-6.

If your MU could not be set up the DCS52 will display an informational message in the **Scrolling Help Text** line.

This happens when you try to link to an address that is already part of an MU or link an address that is under the control of another throttle. For example if you MUed address 14 to the TOP loco 23 and then tried to MU another address

to 14 you would get this error. If you wanted to add another loco to the MU with 23 as the TOP address, the right way to do it is to add that loco to 23, not to another address in the MU.

## 12.2 Removing a Loco from an MU

**To remove a loco address from an MU:**

1. Select the TOP address of the consist you want to use to remove the loco from. To do this, press the **Loco Key**, enter the TOP address & press the **Loco Key** again.
2. Press the **Loco Key** once to enter loco selection mode, the large numbers in the Loco Info Area will begin to blink black and gray. The soft keys will also change to give you the options “MU”, “Recall” and “MORE”.
3. Press the **B Soft Key** labeled “Mu”: This will enter MU mode.
4. Enter the address of the loco you wish to remove from the consist.
5. Press the **B Soft Key** now labeled “Mu-”.
6. You will exit MU mode and the removed locomotive will remain selected on the throttle.

## 12.3 MU of Mismatched Locomotives

If all the locomotives in the MU have performance characteristics that are closely matched, you can run all the MUed locomotives in 128 step mode. If the units are completely mismatched (for example if you are running two different brands of locos with noticeably different characteristics), then we recommend speed matching the locos by programming the decoder with either Simple 3 step or Advanced 28 step loadable speed tables (See your Digitrax Decoder Manual for more information on these features of your decoder).

## 12.4 Controlling Functions On MUed Locomotives

Even though an individual locomotive is part of an MU and you can't control its individual speed and direction, you can still control its function outputs independently as follows:

1. Select the loco that is part of an MU for which you wish to independently control functions. Press the **Loco Key**, enter the MUed loco's address, press the **Loco Key**.
2. Use the numeric keypad to control the functions like you would any other loco. The changes will take effect immediately if the locomotives are moving, otherwise changes will take effect when you reselect the TOP address on the throttle.
3. When you are finished turning functions on or off for the consisted loco, simply select the TOP address and resume running the MU.
4. Remember, you will not be able change the speed or direction of any individual loco that is part of an MU. Locomotive speed and direction for all locos in the MU are controlled by the TOP address.

**NOTE:** You can also control the functions of a MUed loco from a different throttle that is connected to LocoNet or with one of the Jump ports on the DCS52 (see Section 17.0 for setting up the Jump Ports), leaving the TOP locomotive selected on the main throttle of the DCS52. Function state changes will take effect immediately whether or not the loco is moving.

### 13.0 SWITCH Mode

Switch Mode is used for sending commands to accessory decoders and for changing Option Switches (OpSw) on other LocoNet devices. The most common use of switch mode is for operating turnouts. The DCS52 remembers the current switch settings during the session. Switch commands may also be used for controlling Digitrax compatible signal units.

#### To change the position of a turnout:

This section assumes that you have already installed and programmed turnouts and turnout decoders on your layout.

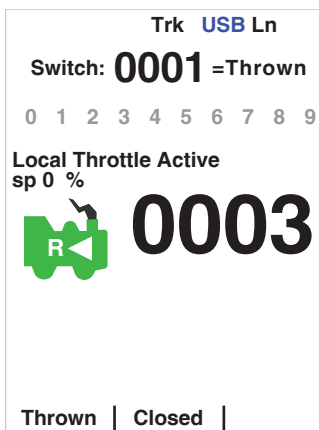
1. Press the **Switch Key**.
2. The last switch address you selected will be displayed in the **Switch/Info + Area** of the display. If 0001 was the last switch you set to throw the display “Switch:0001=Thrown” for example.
3. After pressing the **Switch Key** the **A Soft Key** will become “Thrown” and the **B Soft Key** will become “Closed”.

**NOTE:** The “Closed” or “Thrown” shown in the display may or may not match the physical position of the turnout selected.

4. Use the numeric keypad to enter the turnout address for the turnout or switch you want to change.
5. Press the **A Soft Key**, “Thrown”, and the **B Soft Key**, “Closed”, to throw or close the turnout or switch.

**NOTE:** While you are in switch mode, the throttle knob and direction lever will continue to control the loco address running on the throttle.

6. When you have finished your switch operations, press the **Exit/Back Key** to return to normal operation mode.



### 14.0 DCS52 Address Management: SLOTMAX

Your DCS52 has a finite number of “slots” available in its memory. The DCS52 has the capability of selecting 20 addresses at a time. Once the slots available in your command station are full, the system will display a SLOT MAX information message and action in the **Scrolling Help Text** line to let you know that you need to release some locos if you want to select and run others. The recall function can be used to select and release recently used locos. *Find details on loco dispatching in section 8.5.*

You may also press the reset button on the back of the DCS52 to clear all the slots.

## 15.0 DCS52 Error Messages

The DCS52 displays several types of error messages:

1. **Short circuit shutdown** occurs when the DCS52 detects a short circuit in the power district where it is connected to the layout. This can be a loco that has derailed, picked a switch or some other conductive material lying across the tracks. In this case you will see this message “Local Booster Track Fault” will scroll in the **Scrolling Help Text** line. The DCS52 will beep 3 times and the track status light will blink. Once the short is cleared, the DCS52 will resume normal operations.
2. **Input overvoltage:** The DCS52 will display the message “HIGH Input DC voltage” and beep continuously when the input power to the DCS52 causes the internal voltage level to exceed about 16.9V DC. The DCS52 is designed to operate with **DC input power only** with a PS314 power supply.
3. **Input undervoltage:** The DCS52 will display the message “LOW Input DC voltage” and beep continuously when the input power to the DCS52 causes the internal voltage level to drop below about 9.5V DC. The DCS52 is designed to operate with **DC input power only** with a PS314 power supply.

## 16.0 Decoder Speed Step Settings

Within the DCC format there are several ways decoders and command stations communicate speed step information. All of your decoders and command station must be “speaking the same version of the DCC language” for everything to work smoothly. Digitrax DCS52 is set at the factory to send 128 speed step mode information because the 128 speed step format provides for the best speed control available. All Digitrax decoders are 128 speed step decoders. Some older non-Digitrax decoders use other speed step formats and won’t respond to your DCS52 sending 128 speed step information.

If you have a non-Digitrax decoder that can’t run in 128 speed step mode, you can change the number of speed steps the DCS52 sends to that decoder so that you will be able to control the decoder. This is called **Status Editing** the decoder. When you status edit a decoder, the DCS52 will send a different format to that decoder without affecting the 128 speed step operation of the Digitrax and other 128 speed step decoders on the layout.

**NOTE: Status editing does not reprogram anything in the decoder. It only changes the messages that are sent to the decoder by the command station.**



## 16.1 Changing Speed Step Settings: Status Editing

### To Change the Speed Step Settings for a Decoder:

1. Select the loco address you want to status edit.
2. Press the **Loco Key** once to enter loco selection mode, the large numbers in the Loco Info Area will begin to blink black and gray. The soft keys will also change to give you the options “MU”, “Recall” and “MORE”.
3. Press the **C Soft Key** labeled “MORE”: This will bring up the additional loco selection tasks of “Disptch” and “Stat.Edit” above the **A and B Soft Keys**. Pressing the **C Soft Key** labeled “MORE” will return you to “Mu” and “Recall” soft key selections.
4. Press the **B Soft Key** labeled “Stat.Edit”.
5. The Status Edit Loco# menu will appear displaying the available speed step settings.
6. Press the number on the keypad to select the corresponding speed step setting. The menu will exit and you will see the corresponding speed selection in the Additional Loco Selection Info area.
7. Once the speed step setting you want to use is in the display, press the **Loco Key** to complete the selection and speed step setting change. Once this change is made, the DCS52 command station will send DCC commands to the edited decoder in the speed step setting you entered.

Booster	USB Ln
Status Edit Loco#:	
Decoder modes	
0-	
1- 28: 28step	
2- reserved 1	
3- reserved 2	
4- 128: 128step	
5- 28A: 28step/CV19	
6- reserved 5	
7- reserved 6	
8- 128A: 128step/CV19	
9-	
Disptch	Stat.Edit   More

## 17.0 Adding Throttles: LocoNet & Jump Ports

Sooner or later you will probably want to have one or more other people run trains with you. This means you'll have to add more throttles to your DCS52.

You can add any LocoNet throttle to your DCS52 or you can use one or two smooth DC power packs as jump throttles.

### 17.1 Adding LocoNet Throttles To Your DCS52

Any LocoNet throttle can be used with your DCS52. Simply plug the LocoNet throttle into either LocoNet port on the back of your DCS52 or into any LocoNet or Throttle Jack anywhere on your LocoNet system. If you want to be able to plug in a throttle at a remote location, we recommend using a UP5 Universal Panel.

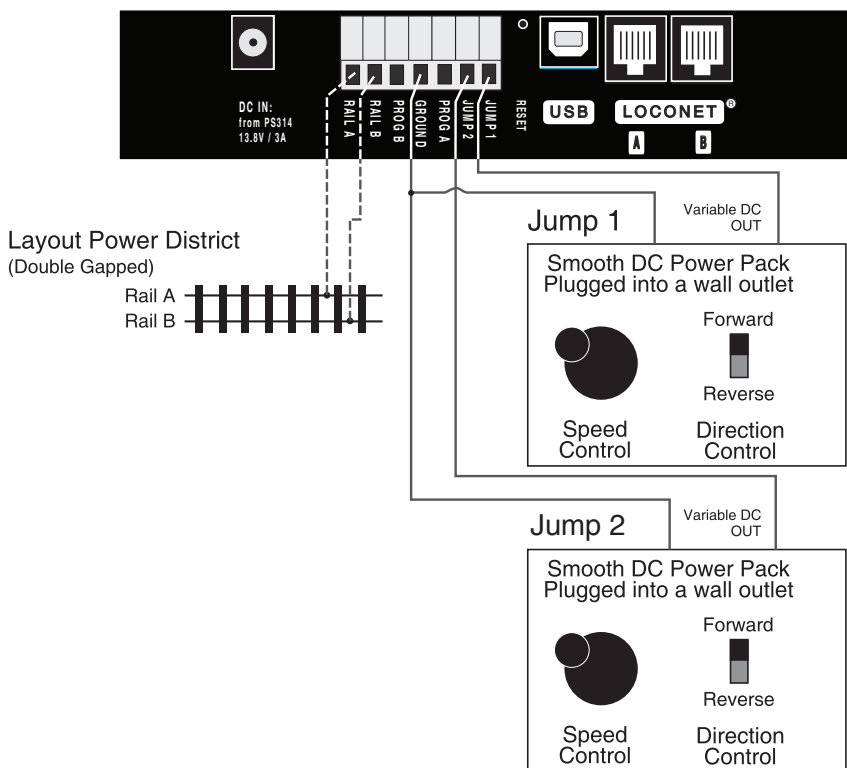
Your DCS52 can handle up to 20 LocoNet Throttles. If you need to run more than 20 throttles, you can move up to a Digitrax Command Station with additional capacity. You can continue to use your DCS52 as a throttle and booster with any command station on your Digitrax LocoNet system.

## 17.2 JUMP Ports: Using a Smooth DC Power Pack As An Additional Throttle

DCS52's Jump 1 & 2 ports can host two DC power packs as additional throttles. Begin with an operating DCS52 attached to your layout. Hook up one or two smooth DC power packs as shown in the [following illustration](#). This configuration gives you three throttles to control three loco addresses. By default the jump ports on the DCS52 are disabled and must be enabled in Option Switch setup. See section 18.0 for option switch setup.

1. Ensure that OpSw 83=Closed and that Jump Ports are enabled on your DCS52. If Jump Ports are enabled there will be additional text in the **Jump Throttle Area** of the display. The Display should show "Jump1" and "Jump2" as well as speed and direction info for each throttle. The **B Soft Key** will populate with the "Active" function.
2. The Throttle Knob and Direction Lever on your DCS52 is called the **Local Throttle**.
3. The throttle and direction controls on each of the smooth DC power packs you are using will control the jump throttles are called respectively, **Jump1** and **Jump2**.
4. Press the **B Soft Key** "Active" to cycle from the **Local Throttle** to **Jump 1** to **Jump 2** and back to the **Local Throttle**. The top line of the **Loco Info Area** tells you which throttle info is being shown and which functions are being addressed by the DCS52 keyboard. The top line will read "LocoThrottle", "Jmp1 Throttle", or "Jmp2 Throttle" to indicate which throttle you have selected for function control.
5. The functions for each throttle are controlled by the DCS52's keypad you will only be able to control the functions for the throttle that is listed in the top line of the **Active Throttle Info** line.
6. The throttle knobs and direction controls for all three throttles will continue to control the loco selected on them while you are working with function controls for the loco selected in the **Active Throttle Info** line. Speed, direction, and loco selected info for the other throttles will be shown in the **Jump Throttle Area**. Inactive throttles will be shown as grey in the **Jump Throttle Area**.
7. To access function controls for each throttle, simply press the **B Soft Key** "Active", to cycle among the three throttles. The three throttle will cycle from the **Jump Throttle Area** to the **Loco Info Area** to show which is active for function and address control.
8. When the throttle's name for which you want to control functions appears in the **Loco Info Area** on the display, use the DCS52's keypad to change the functions or select a loco.





### To run a locomotive address on Jump 1 or Jump 2:

1. Press the **B Soft Key** “Active”, until you have **Jump Port** throttle you want to run in the **Loco Info Area** of the display, if nothing is selected the last selected address will be show in all grey. If a loco is selected on the throttle you wish you use, you will need to reselect it, by pressing the **Loco Key**, then the **Exit/Stop Key**.
2. To select a loco on a Jump port or to change the loco that is already there follow the same procedure you’d use to select a loco on the local throttle. Press the **Loco Key**, the address will begin flashing to let you know that the loco selection is pending. The display will now show the last loco that was selected on this throttle.
3. Use the numeric keypad to enter the loco address you want to run and press the **Loco Key** again to select it on the selected jump port. The display will be steady and you will be able to control the speed and direction of the loco you selected using the DC power pack attached to the jump port.
4. When you have **Jump1 or Jump2** on the DCS52’s **Loco Info Area** of the display, you can use the numeric keys to make changes to the function controls on the selected loco (turn on/off lights etc.). The smooth DC power pack being used as the for the **Jump1 or Jump2** throttle will continue to con-

trol speed and direction of the loco address selected. The DCS52's **Throttle Knob** and **Direction Control Lever** will continue to control the speed and direction of the loco selected on the **Local Throttle**. Speed, direction, and loco selected info for the other throttles will be shown in the **Jump Throttle Area**.

## 18.0 Customizing DCS52-Option Switch Setup

The Option Switch (OpSw) setup allows you to customize the operation of the unit to meet your layout and operation preferences. The DCS52's power up defaults are fine for most applications and the DCS52 will run "out of the box." We have included a few option switches below that you may want to change. For a full listing visit [www.digitrax.com](http://www.digitrax.com).

### 18.1 Changing DCS52 Option Switches

1. See the Option Switch Table below to decide which option switches you want to change.
2. Press the **Menu/Enter Key**.
3. Select options 3- Option Switch Setup by pressing the **3** key.
4. Use the keypad to enter the number of the OpSw you wish to change.
5. Press the **B Soft Key** "Closed" or the **A Soft Key** "Thrown" to set the option switch according to the desired change in the OpSw table. The changes will take immediate effect.
6. Press the **C Soft Key** "SAVE" to save the Option Switch settings. If you do not save the settings the OpSw changes will not be saved when the unit is powered off.

USB Ln

Switch: **0001** = Thrown

Option Switches:

Thrown | Closed | SAVE

**NOTE: Do not adjust any Op Switches not listed**

These option switches are reserved and changing them may cause problems with your system.

### 18.2 DCS52 Option Switch Tables

The following tables provide a list of the DCS52 Option Switches and the impact of the change on the system.

Option Switch #	Effect on System operation	Factory Default
OpSw 36	<b>Closed</b> = Clears all mobile decoder info & consists	<b>Thrown</b>
<i>DCS52 Option Switch Tables</i>		

Option Switch #	Effect on System operation	Factory Default
OpSw 39	<b>Closed</b> = Clears all internal memory states	<b>Thrown</b>
OpSw 40	<b>Closed</b> = Clears all internal memory states and sets DCS52 to Factory Default	<b>Thrown</b>
OpSw 83	<b>Thrown</b> = DCS52's Jump Mode Disabled	<b>Thrown</b>
	<b>Closed</b> = DCS52's Jump Mode Enabled	
<i><b>DCS52 Option Switch Tables</b></i>		

## 19.0 Clearing the System and the Reset Button

The Reset button can be found recessed on the back of the DCS52, you will need a small pin to press the button. Pressing the reset button on the back of your unit will activate OpSw 36. All mobile decoder and consist info will be cleared. Set OpSw 40 = Closed to reset the DCS52 to factory defaults.

## 20.0 General Troubleshooting

### 20.1 Nothing is responding

Is track power turned on? If the **Track Status Indicator** is not lit, press the **Power/Back Key** to turn on track power.

### 20.2 No Power or Intermittent Operation

The majority of intermittent operation problems can be traced to bad connections and poor or noisy wheel pickups on locomotives. The DCC digital packet communication strategy performs exceptionally well in a less than perfect environment, and will often mask bad connections until they are really impossible to work with! Clean the track and wheel pickups of your locomotives.

### 20.3 The Quarter Trick

If your track does not have adequate power supply to the locomotives, then the DCC signal won't get through either. Take a quarter or screwdriver blade and go around your layout creating electrical shorts by laying the quarter/screwdriver blade across both rails every 10 feet. Your DCS52 should shut-down when the short is present. You will see a "Local Booster Track Fault" message on your display to indicate a short circuit shutdown. When the short is removed, the booster should return to normal operation. If the unit does not see a short or it does not return to normal operation after the short is removed, then you need to add more feeders.

### 20.4 The LT1 Tester

Check your LocoNet cables with the LT1 tester to be sure you don't have any cables that were made incorrectly. See Section 23.4.

## 20.5 Emergency Stop

If the layout starts to “get away” on you, press the **Power/Back Key** to stop everything on the layout.

## 20.6 Mechanical Drive Train Problems

Pay attention to the mechanical drive train and free movement of the locomotive wheel sets. This is especially important with inexpensive locomotives. Using Digitrax decoders with appropriate programming settings, you can achieve surprisingly good quality operation, if you carefully adjust the mechanisms for smooth running. See manufacturers instructions.

## 20.7 “Strange” Locomotive Lights

If you can’t control the operation of the lights in your locomotive with the DCS52, be sure that the decoder is programmed to match the speed setting commands of your DCS52 command station. The factory setting for the DCS52 is advanced 28/128 speed step mode.

Your Digitrax decoder was shipped programmed to 28/128 speed step mode. You may have changed your decoder’s programming when performing the decoder test procedure. In any case, if you are not able to turn the locomotives lights on and off, you will need to change CV 29 to a value of “06” to have proper light operation when using the DCS52 in its optimum 28/128 speed step mode. Refer to Section 11.0 for programming instructions. information about programming CV29 is available in your Digitrax Decoder Manual.

If you have a Digitrax decoder and you can control the lights but not the motor, check for a motor short circuit. These decoders are designed to shutdown motor operation when a short is detected to prevent damage to the decoder.

## 20.8 Decoder Won’t Respond

### Did you select the locomotive’s actual address?

If you don’t know the address of the locomotive on the track, you can read it back in programming mode or you can reprogram it to a new address. See Section 11.2.

### Is the loco on powered track?

Make sure the **Track Power Indicator** on the DCS52 is on, press the **Power/Back Key** to turn on track power. See Section 2.4.

Use the “Quarter Trick” to test for track power at several locations around the layout. If there is not track power, check your layout wiring. See Section 20.3.

### Can you select the loco on your throttle?

Is the loco in use by another throttle did the throttle ask you to Steal the locomotive during selection? If it did, then dispatch the loco from the other throttle.

If the loco is part of an MU, Cn will be shown in the **Additional Loco Selection Info**. When you select it, you can control the functions, but not speed and direction. See section 12.0 on consisting...

### **Have any CVs changed since last running the loco?**

It is possible to set acceleration so high that it will take 10 minutes for the loco to start moving. Try resetting the CV values to their factory settings and then running the locomotive. Remember, Digitrax uses address 03 for the factory setting for all decoders. Check your decoder manual for factory settings and instructions on resetting the values.

### **Was the loco running normally just before it stopped?**

Check to make sure the decoder has not heated up and gone into a thermal shutdown. If it is warm, remove the loco from the track, let it cool off and then see if it starts again. Also check for localized track problems.

### **Are there burn marks on the decoder?**

You'll need to send it in for repair!

If all else fails, reprogram the decoder address and reset CVs to factory original values. See your decoder manual for factory settings and reset instructions.

## **20.9 Does your throttle say "SLOT MAX..."?**

This means that the Zephyr Express system's capacity to handle operating locos is full. The DCS52 can run up to 20 addresses at the same time. This includes all decoder/locomotive addresses in use on the system, whether they are being run individually or as part of an MU. If you have the "SLOT MAX: Release unused locomotives at zero speed to free space" message, be sure that all locos that are not running are released from throttles.

If you run into this problem often, you should consider a command station with more capacity. If you want to clear all of the loco addresses and consist information in the DCS52 and start over, set OpSw 36 to "Closed" or press the Reset button.

## **20.10 I'm totally lost!**

If your DCS52 display isn't showing you what you expect based on the manual, press the **Exit/Stop Key** to return to the Home Operations Screen. Then try the throttle task again. If you think you might have made an inadvertent change to one of the factory settings in either the decoder or the command station, try resetting everything to the factory settings and try the task again. See your decoder instructions for resetting the factory settings of the decoder. See Section 19.0 for resetting the DCS52 factory settings.

## **21.0 DCS52 Shutdown**

If the DCS52 shuts down briefly and then comes back on again, it is probably being run too close to its pre-set current limit of 3.0 Amps. In this case it may clip or mutilate some outgoing packets of information to keep the track current within acceptable limits. To solve this problem, reduce the track current load by running fewer locomotives or setting up additional power districts and adding more boosters to provide more power for the layout.

## 22.0 Connecting the DCS52 to a Computer

The DCS52 can be connected to a computer using the USB plug on the back. It provides all the same functionality as a PR4 giving you access to Digitrax SoundLoader II and other computer utility programs. It can also be used as an interface for other compatible layout control software. For complete information visit [www.digitrax.com](http://www.digitrax.com).

### 22.1 Updating the DCS52 to the latest firmware

Occasionally Digitrax makes updates and improvements to the operational code of its products. In order to update your DCS52 you will need to have the DigilPLII utility installed on a computer connected to your LocoNet and the latest firmware (.dmf) file. The DCS52 can be updated either directly using its USB connection or via LocoNet using a PR4 or other computer to LocoNet interface. When updating via USB & LocoNet the display will dim and the keypad will flash green. For complete instructions and the latest firmware files visit [www.digitrax.com/downloads/](http://www.digitrax.com/downloads/).

## 23.0 LocoNet: The Digitrax Difference!

### 23.1 System Architecture



System architecture is the biggest difference among layout control systems. System architecture is the way the components of a control system communicate among themselves. Digitrax LocoNet is a Peer to Peer local area network (LAN) designed specifically for model railroad operation. LocoNet wiring is cost effective, flexible and expandable to accommodate almost

anything you want to do with your railroad today and in the future.

The system architecture used for communication within DCC and other control systems is not standardized. Therefore DCC compatibility encompasses only decoders, command stations and boosters but not throttles and other devices. In addition, devices that require feedback and other types of signals that are outside the domain of DCC, such as detection systems and transponding, are not standardized. LocoNet is a hybrid system that incorporates DCC and other technologies to expand the capabilities of your system. Your Digitrax system gives you the best of both worlds with a system that is compatible with today's DCC standards and also goes beyond those standards to deliver enhanced system performance and advanced features that are far beyond the scope of DCC. With Digitrax, you get Complete Train Control®!

### 23.2 LocoNet Expansion for Complete Train Control

Your DCS52 is compatible with any other LocoNet device. The DCS52 offers you the ability customize your layout and add the features you want. Many different combinations of hardware will work, not all combinations will have all features available. With LocoNet some of the things you can add are:

- More boosters to give you more power to let you run more trains
- More throttles for more operators
- Different types of throttles



- More throttle jacks for convenient walk-around operation
- Infrared or radio capability for more freedom for operators
- Accessory decoders for turnout and accessory control
- Detection
- Transponding
- Signaling
- A personal computer to automate operations or for dispatching
- Automatic reversing with a booster or power manager

With LocoNet, you customize your layout to run the way you want it to run! Visit [www.digitrax.com](http://www.digitrax.com) for a full product line and information on how to expand your system.

### **23.3 LocoNet Wiring Components**

Connecting the LocoNet components is easy to do. Digitrax LocoNet devices are connected using 6-conductor cables with RJ12, 6-pin connectors.

Making your own LocoNet Cables is simple and cost effective. However, we offer Digitrax Pre-Made Pre-Tested LocoNet Cables in a variety of lengths. Cable Maker kits and additional cabling supplies are also available. Visit [www.digitrax.com](http://www.digitrax.com) for more details.

We recommend using the LT1 tester that came with your DCS52 to test the cables to be certain they are good before installing them. Many layout problems we see are related to LocoNet cables that were not built or crimped correctly or that have become damaged.

### **23.4 Testing LocoNet Cables with an LT1**

1. Disconnect the wire harness from the LT1.
2. Plug one end of the LocoNet cable being tested into the LT1.
3. Connect the other end to your DCS52 LocoNet A & B Jack. Make sure that track power is turned ON.
4. All four LEDs on the LT1 will light if the cable is good. LEDs may not all be the same brightness, this is normal.
5. If any of the LEDs fail to light, re-crimp the plugs on the LocoNet cable and retest.

## **24.0 What's Next**

Now that you've learned all you can about your Zephyr Express Set, it's time to learn more about the features and options offered by Digitrax Complete Train Control and the LocoNet system. The Zephyr Express is just the first step in what is available with the Digitrax Compete Train Control system. We welcome you to visit our website [www.digitrax.com](http://www.digitrax.com) to learn more about additional features and products available for your system.

## 25.0 FCC Information

Radio or TV Interference: (this information is MANDATED by the FCC) This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measure

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note that any modifications to the equipment not expressly approved by Digitrax voids the user's authority to operate under and be in compliance with CFR 47 rules, as administered by the Federal Communication Commission. Digitrax believes any conscientiously installed equipment following guidelines in this manual would be unlikely to experience RFI problems.

### For Canadian Users:

"This digital apparatus does not exceed the Class B limits for Radio noise emission from digital apparatus set out in the Radio Interference Regulation or the Canadian Department of Communications."

Le present appareil numerique n emet pas de bruits radio-electriques depassant les limites applicables aux appareils numeriques de la classe B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministre des Communications du Canada.

### Patents and Trade Secret

Digitrax uses material covered by US Patents 6,220,552, 6,275,739, 6,318,678, 6,367,742, 6,545,886, 6,513,763, 6,747,579, 6,536,716, 6,533,223, 6,533,224, 8,229,582, 8,292,237, 6,729,584 and others under non-exclusive licenses and/or assignments from Anthony J. Ireland. Licensing for material covered by these patents are available to other companies and individuals. Other patents covering technology used by Digitrax are pending. Measures to protect trade secret information are enforced.

Digitrax licenses the commercial use of LocoNet, which is trade secret technology, to other companies on a non-exclusive basis. LocoNet is copyrighted property.

## 26.0 Warranty and Repair Information



Digitrax gives a one-year “no worries” warranty against manufacturing defects and accidental customer damage on all Digitrax products. That’s it! Simple, straightforward warranty, no tricky language!

All warranties on Digitrax products are limited to repair or replacement of Digitrax products at the discretion of Digitrax. Except to the extent expressly stated, there are no warranties, express or implied, including but not limited to any warranties of merchantability or fitness for a particular purpose.

For items that are no longer covered under warranty, whenever possible we will make repairs to units at fair and reasonable rates.

Please visit our warranty and repair page at [www.digitrax.com/warranty](http://www.digitrax.com/warranty) for warranty and repair information and procedures.

Digitrax, Inc. reserves the right to make changes in design and specifications, and/or to make additions or improvements in its products without imposing any obligations upon itself to install these changes, additions or improvements on products previously manufactured.

**Digitrax, Inc. is not responsible for unintentional errors or omissions in this document.**

## Need Help?

**Digitrax Tech Support Team**

**Need Help?:** [helpdesk.digitrax.com](https://helpdesk.digitrax.com)

### **Digitrax Tech Support Depot 24/7/365**

[www.digitrax.com/support](https://www.digitrax.com/support)

Contains links to all instructions sheets and manuals, application notes, videos and tons of helpful information.

### **Digitrax Decoder Selector**

[www.digitrax.com/decoderselector](https://www.digitrax.com/decoderselector)

Helps you find which decoder will fit in a particular locomotive.

### **Digitrax CV Calculators**

[www.digitrax.com/support/cv](https://www.digitrax.com/support/cv)

Calculate a CV value to program your locomotive,

### **Digitrax Tool Box App**

[www.digitrax.com/toolbox](https://www.digitrax.com/toolbox)

Download our Mobile App for on the go help at your fingertips. This app contains links to all manuals and instruction sheets, videos, CV calculator, decoder selector, news and events & dealer locator,

### **Warranty and Repairs**

[www.digitrax.com/support/returns](https://www.digitrax.com/support/returns)

Fill out the online form, print it out and return it with your item for repair