Lessons Learned and 3-Ways to Program
DCC Specialties' Hares and Wabbits
On a Layout Using a Digitrax Command Station

About the Authors:
Brett Scott and Denny Whitaker have jointly developed this procedural document. Brett Scott has a systems background and Whitaker has an administrative and training background. This document augments the DCC Specialties' manuals for programming either Hares or Wabbits. We did this to share our "Lessons Learned" with not only the management of DCC Specialties; but also, the user community.

Naming and Style Conventions:
1. Since Hares and Wabbits essentially perform the same functions, we will refer to both devices as "Hares." This also applies to the various generations of Hares [e.g. Hare, Hare N.G (New Generation) and Hare-II]. Regrettably, the Hares themselves have no markings on their boards to tell the owner which model is which. Don't panic! If you try to program a "new" Configuration Variable (CV) into an "old" Hare, you won't do any damage.
2. For those who enjoy the power of viewing and reading this document from their PC, we present many Internet hyperlinks and bookmarks. The first time we use a particular hyperlink, we expose its address for the convenience of those reading a paper copy of this document. Bookmarks are simply links within the document that enable readers viewing this from their PC to skip around it using your keyboard and mouse.
3. When detailing a step-by-step procedure, we use a lot of bold-red font to catch the eye of the experienced user who needs a "quick reference" sheet to remind him/her of the needed steps. The black print surrounding the bold-red fills in the details needed by new users.
4. We based this document on the DCC Specialties (http://www.dccspecialties.com/) publications mailed to us in July 2007 ("The Hare Rev H-4" and "The Wabbit Rev F").
5. We expanded the DCC Specialties form called "Forms for Address and Configuration Assignments" and renamed it to "Settings for Primary-Address #____."
   A. The new form shows (1) all CVs and their applicable value choices and (2) for actual Hares, the S1 area dipswitch settings.
   B. The short blank line after the # symbol is for you to fill in the address-number you assign to that turnout/Tortoise/Hare.
   C. Feel free to make copies of the form. If you want to fill it in using your PC, download the Microsoft Excel sheet from the MGB Model Railroad Club's website at http://www.mgbrr.org/ --- at the menu bar, click on "Tips."
6. Should we update this document, we will place the new file in the Tips section of the MGB RR Club's website.

Primary Training Example:
Whitaker has 35 Hare-IIs installed on his HO layout --- with many more to come. Our three methods for programming examples a Hare come from the values that he "penciled" into a "Settings for Primary-Address #825" example form. He has completed a form for each of his Hares and he has found it invaluable when changing settings as he learns more about the many functions of these Hares.

From a programming standpoint, keep these differences in mind.
1. Both the Hare and the Wabbit perform the same functions. The Hare saves you time; the Wabbit saves you money.
2. A Hare serves one Tortoise.
   A. The Hare has a moveable plastic jumper at board location J2.
      - Program Mode: Place the jumper on pins 1 & 2.
      - Normal Operation: Place the jumper on pins 2 & 3.
   B. Hare-IIs offer more features than older Hares. Regrettably, the Hare boards do not show the model number. However, you will not damage an older Hare by trying to program in features it can't do.
      - Hare-IIs can handle 28 routes versus 13 routes on older models.
      - Hare-IIs have the "Auto Return" functionality. When you turn on your DCC system, all Tortoise/Hare turnouts on the layout will reset themselves (if necessary) to one of four predetermined positions. The reset will also happen to all Tortoise/Hares in any track-power district that experiences a track-power short-circuit (the most common being a train jumps the track).
3. A Wabbit serves two Tortoises. Think of them as A and B.
   A. It has a movable plastic jumper at board location J3.
      - Program Mode for Tortoise A/Switch-A: Place the jumper on pins 1 & 2.
      - Program Mode for Tortoise-B/Switch-B: Place the jumper on pins 2 & 3.
      - Normal Operation: Place the jumper on pins 3 & 4.
   B. Wabbits have less features than Hares
      - Early models can only handle a maximum of 13 routes

- They don't have the "Auto Return" functionality of Hare-IIs
- They have an extra Configuration Variable to deal with --- CV71.

From an installation standpoint, keep these points in mind.
1. Be sure to study your Hare manual.
2. Be consistent on connecting the Rail-A and Rail-B track-power wires to your Hares. If you wired Hare J1-terminal-1 to a nearby Rail-A connector, wire all Hare J1-terminal-1 wires to nearby Rail-A connectors. Wire all J1-terminal-2 to nearby Rail-B connectors.
   A. The track-power terminals on the boards are as follows:
      - Hares: J1-terminals 1 & 2
      - Wabbits: J1-terminals 7 & 8
   B. However, if you use your Hares to "Route Switch Point Power," you might have to swap the Rail-A and Rail-B wires on one or more of the involved Hares.
3. When mounting a Hare's blue plastic Card Edge Connector on a Tortoise, be sure to insert flat-wooden toothpick shims in each end of the blue connector. This insures proper alignment and a trouble-free connection.
4. Dealing with crossover turnouts:
   A. One Tortoise can actually serve both turnouts --- if you elect to install some additional parts and then deal with potential reliability headaches. Whitaker installs a Tortoise on each turnout.
   B. If you elect to install a Tortoise for each turnout, one Hare can serve both Tortoises.
      - If they are both within the same track-power district, do it!
        ♦ You can use one Hare/Tortoise and "slave" the other Tortoise. You must run two track-power wires from the Tortoise/Hare to the slave-Tortoise. Solder one end of the wires to the applicable terminals on the edge of the Hare. Solder the other end of the wires to the applicable silver-tabs of the slave-Tortoise. Better yet, buy a Card Edge Connector for the slave-Tortoise and solder the other end of the wires to that connector. Tony's Train Exchange http://www.tonystrains.com/ sells these (product code of TTE-TORT-CONN).
        ♦ When you "slave" a Tortoise, it will respond to the switch command sent to the Primary-Address of the Hare. Whitaker assigns a Location-Address to each Tortoise and a Primary-Address to each Hare. He notes both addresses on the Tortoise's "Settings for Primary-Address #___" form.
        ♦ For example he has a crossover with two turnouts. One has Location-Address #911 and the other #861. The Hare is mounted on #911 and a Card Edge Connector on #861.
      - If the crossover straddles two track-power districts, Whitaker does not recommend that you "slave" one of the Tortoises. The problem is that a track-power short-circuit in one track-power district (e.g. train jumps the track) will cause both track-power districts will shut down. Here are your options:
        ♦ Live with the situation. A brief outage of a few seconds to a few minutes probably won't annoy you or the other people operating on your layout. If this happens frequently or for a longer period, you and the other operators will be regretting your frugality.
        ♦ Make both turnouts part of the same track-power district. Whitaker has done this where one turnout serves the mainline and the other the yard. He made the crossover part of the mainline district, as a prolonged period of downtime only results in the loss of one yard track.
   C. Same rules apply to a double crossover. Whitaker used 4 Tortoises, two Hares and two Card Edge Connectors. Each Tortoise has its own Location-Address and all respond to one Primary-Address.
   D. Don't try to "slave" a Tortoise on a crossover that has one turnout's "throw" track joined to the mating turnout's "straight/clear" track. Whitaker tried to do this on a yard-ladder turnout that was connected to the mainline. The eight routes that utilized this crossover wouldn't behave correctly.
5. If you encounter problems with Digitrax instructions presented within Hare manual or the Programming Routine shown below, study your Digitrax manual. You can download the latest version at http://www.digitrax.com/pdfdocs.php.

Choose the tool you want to use to program your Hare by clicking on the applicable line below.
1. DT-400 Throttle --- Digitrax's most advanced model
2. DT-100 Throttle --- The predecessor to the DT-400
3. JMRI (Java Model Railroad Interface) Software

For Denny Whitaker's "Lessons Learned," click on the line that interests you.
1. Documentation Objectives
2. Synopsis of Layout
3. Plan View of Layout
4. Address Scheme for Turnouts and Routes
5. Method to Establish Routes

Programming a Hare or Wabbit with a Digitrax DT-400 Throttle
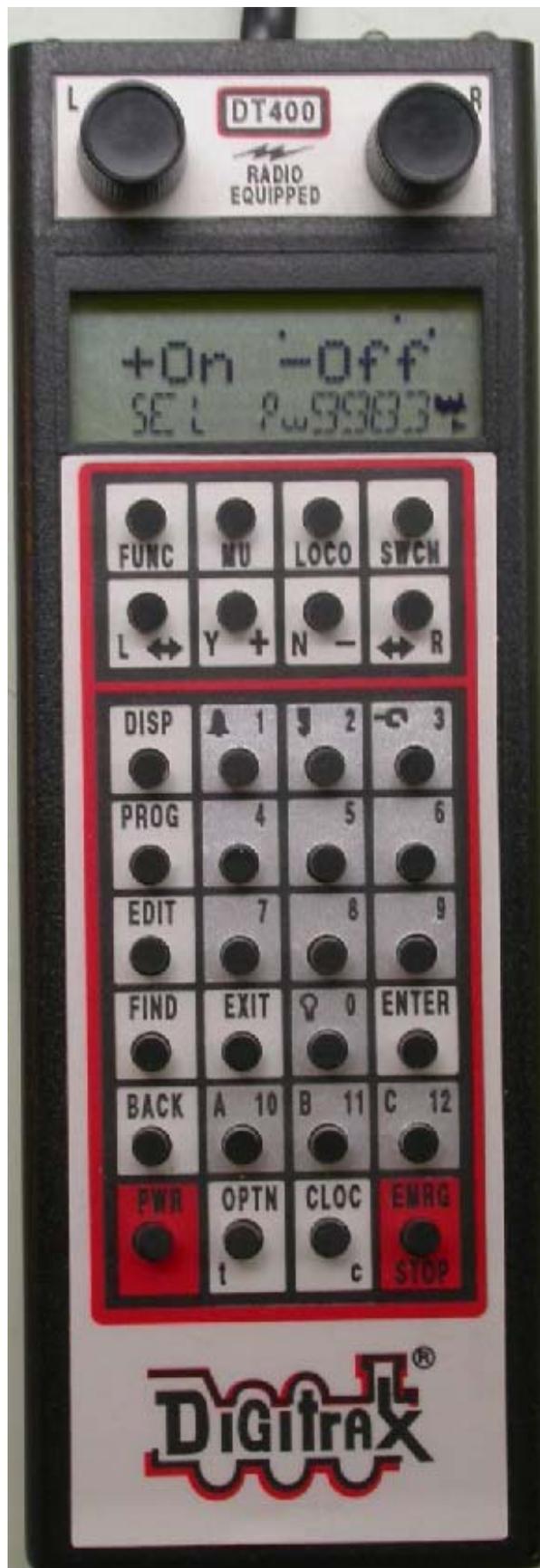
Programming Routine:

1. Study the "Settings for Primary-Address #825" example form. The red rows are being used to program the Hare or Hares with Primary-Address 825. The blue CV values must be entered with your throttle as described below.
2. Fill out a "Settings for Primary-Address #___" form for each of your Hares.
3. The bold red phrases that follow cover the needed steps. The other data lets you know a little background information.
4. **Plug-in your Digitrax Command Station and set the station's two toggle switches as follows**:
    Scale: To your scale (e.g. HO)
    Mode: To Run
5. Using your DT-400 throttle, turn on track-power.
    Press PWR
    Press Y+
        NOTE: Make sure the screen shows a small dot-indicator above the word "Off."
6. **Select a Locomotive-Address/number that doesn't exist on your layout**. Available range is 01, 02 or 04 through 9983. The National Model Railroad Association (NMRA) DCC standards reserve Locomotive-Address 00 for one analog locomotive or train and number 03 for the Default-Locomotive-Address of all DCC locomotive decoders. Digitrax can't handle locomotive numbers 9984 and higher.
    Assuming you want to select locomotive number 9983 and put it under the control of the right-hand knob of your throttle,
    Spin or push the right knob
    Press LOCO.
    Enter an unused locomotive number (e.g. 9983).
    Press LOCO.
        NOTE: Locomotive number 9983 will be showing in the lower-right area of your screen and the locomotive symbol will be blinking. This means you are ready to use locomotive 9983, which is active on the right knob.
7. Turn off track-power.
    Press PWR
    Press N-
        NOTE: The small dot will disappear from above the word "Off."
8. No need to disconnect the track-power wires to Hare, as recommended by DCC Specialties. This is because we are resetting the Hare to its factory defaults and we don't care about the "junk data" that will enter the Hare when we turn track-power on in step 10 below.
9. **Move the plastic jumper to Program Mode position;**
    A. **Hare**: Board location J2; place it on **pins 1 & 2**.
    B. **Wabbit**: Board location J3; choose the Tortoise you are programming.
        - **Tortoise-A/Switch-A**, place it on **pins 1 & 2**.
        - Tortoise-B/Switch-B, place it on **pins 2 &3**.
10. Turn on track-power.
     Press PWR
     Press Y+
11. **Wait 45 or more seconds** for the Command Station to send test messages to all the DCC components on your layout. If you start programming sooner, the test signals will get mixed into your programming efforts. It doesn't break your Hare. It simply causes it to misbehave until you properly reprogram it. Be patient.
12. Get into the mode of "Programming on the Main," which is also known as "Ops Mode."
    Press PROG repeatedly to get to the screen, which will show both "O/No Po" and the locomotive number you selected above (e.g. O/No Po 9983).
13. Enter all Configuration Variables (CV) that apply to your Hare using the following actions for Address #825 as an example:
    With the left knob, **dial in 63** (the CV number)
    With the right knob, **dial in 42** (the value)
    Press ENTER and the screen will momentarily show "063Good" and then the screen simply shows "063=042."
        NOTE: You have reset your Hare to its original factory default settings.
    With the left knob, **dial in 63** (the CV number)
    With the right knob, **dial in 0** (the value)
    Press ENTER and the screen will momentarily show "063Good."
        NOTE: You have cleared any previous Route-Addresses from your Hare.
    Continue entering all remaining CV values as described above.
        Each entry will produce the following screen images: CV049=001, CV050=003, CV051=002, CV052=002, CV053=002, CV054=002, CV055=002, CV056=002, CV064=002, CV072=007.
14. Get out of the mode of "Programming on the Main."
    Press EXIT.

NOTE: Your throttle has returned to its normal running mode.

15. Using your throttle's turnout switching functionality, enter your Hare's Primary-Address, which cannot exceed 3-digits. The following actions are for Address #825:

   Press SWCH
   Enter 825 with the throttle's keypad.
   Press OPTN-t and the screen will show "Sw 825=t." You have set the Primary-Address.

   > **NOTE:** To set an address, press either OPTN-t (for throw) or CLOC-c (for "clear" in DCC Specialties manuals and "closed in Digitrax manuals). If you used the "clear" button, the screen will show "Sw 825=c."

16. If your Hare serves one or more routes, enter each Route-Address, which cannot exceed 3-digits. The following actions are for Address #825:

   Enter 22 to set your Hare's "Route #1" address.
   Press OPTN-t and the screen will show "Sw022=t." You have set the first of seven routes served by Address #825.

   > **NOTE:** As stated when setting the Primary-Address, it doesn't matter if you set the Route-Address with either the "throw" or "clear" button.

   Continue entering all remaining Route-Addresses as described above.

   > **NOTE**: If you use the "throw" button for the six remaining entries, you will see the following screen images: Sw023=t, Sw024=t, Sw025=t, Sw026=t, Sw027=t, and Sw028=t.

17. Turn off track-power.

   Press PWR
   Press N-

18. **Move the plastic jumper to its Normal Operation position**:
   A. **Hare**: Place it on **pins 2 & 3**.
   B. **Wabbit**: Place it on **pins 3 & 4**.

19. Turn on track-power.

   Press PWR
   Press Y+

20. Test newly programmed Hare to make sure everything works as planned. If your Hare responds to Sw=001, you must reprogram your Hare. You might have pushed the "throw" or "clear" key too slowly when entering the Primary-Address. Most likely you started to reprogram your Hare in less than 45-seconds after turning on the track-power. See Steps 10 and 11 above.

21. Assuming all is well, you are ready to program another Hare.

Programming a Hare or Wabbit with a Digitrax DT-100 Throttle
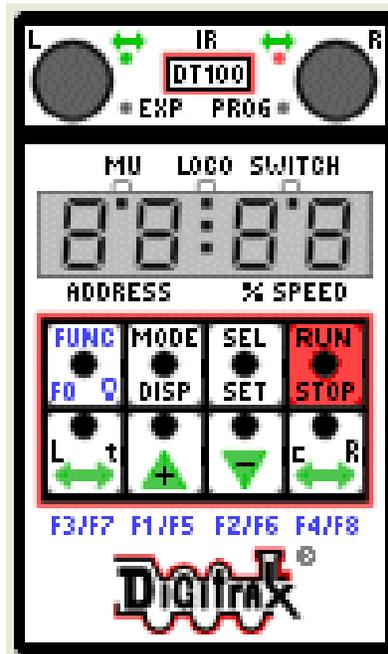
Programming Routine:

1. Study the "Settings for Primary-Address #825" example form. The red rows are being used to program the Hare or Hares with Primary-Address 825. The blue CV values must be entered with your throttle as described below.
2. Fill out a "Settings for Primary-Address #___" form for each of your Hares.
3. The bold red phrases cover the needed steps. The other data lets you know a little background information.
4. **Plug in your Digitrax Command Station and set the station's two toggle switches as follows**:
   Scale: To your scale (e.g. HO)
   Mode: To Run.
5. Using your DT-100 throttle, turn on track-power.
   Simultaneously press two buttons --- RUN/STOP and the green-up-arrow (which bears a plus sign).
   NOTE: You will know the track-power is on when the throttle's top two LEDs appear in any combination of unlit, green or red. If the two LEDs are orange, the track-power is off.
6. **Select a Locomotive-Address/number that doesn't exist on your layout**. Available range is 01, 02 or 04 through 9983.
   A. The National Model Railroad Association (NMRA) DCC standards reserve Locomotive-Address 00 for one analog locomotive or train and number 03 for the default locomotive-address of all DCC locomotive decoders. Digitrax can't handle locomotive numbers 9984 and higher.
   B. If you are using a 2-digit "short-address" --- 01, 02, or 04 through 127, follow the Digitrax manual's instructions. This involves using hexadecimals for locomotives 100 through 127.
   C. The example below utilizes a 4-digit "long-address" --- 128 through 9983.
   D. Assuming you want to select locomotive number 9983 and put it under the control of the right-hand knob of your throttle,
      Simultaneously press and hold SEL/SET and turn the right knob.
         NOTE: The throttle will enter the 4-digit Long-Address range. The LED labeled EXP (that is immediately to the right of the left knob) will appear solid red.
      Release SEL/SET
      Turn the right knob to select the locomotive number (e.g. 9983).
         NOTE: You might find it faster to use the left knob to dial-in the first two digits (e.g. 99) and the right knob to dial-in the last two digits (e.g. 83).
      Press SEL/SET to lock the locomotive into the system (e.g. 9983).
      NOTE: The top of the screen should show a dot immediately under LOCO and between 99 and 83. That means you are in LOCO mode and ready to use locomotive number 9983. The right LED at the top of the throttle should be blinking to indicate the right knob is active.
7. Turn off track-power.
   Simultaneously press two buttons --- RUN/STOP and the green-down-arrow (which bears a minus sign).
      NOTE: You will know the track-power is off when the throttle's top two LEDs appear orange.

8. No need to disconnect the track-power wires to Hare, as recommended by DCC Specialties. This is because we are resetting the Hare to its factory defaults and we don't care about the "junk data" that will enter the Hare when we turn track-power on in step 10 below.
9. **Move the plastic jumper to Program Mode position;**
    A. **Hare**: Board location J2; place it on **pins 1 & 2**.
    B. **Wabbit**: Board location J3; choose the Tortoise you are programming.
        - **Tortoise-A/Switch-A**, place it on **pins 1 & 2**.
        - **Tortoise-B/Switch-B**, place it on **pins 2 &3**.
10. Turn on track-power.
    Simultaneously press two buttons --- RUN/STOP and the green-up-arrow.
11. **Wait 45 or more seconds** for the Command Station to send test messages to all the DCC components on your layout. If you start programming sooner, the test signals will get mixed into your programming efforts. It doesn't break your Hare. It simply causes it to misbehave until you properly reprogram it. Be patient.
12. Get into the mode of "Programming on the Main," which is also known as "Ops Mode."
    Simultaneously work with two buttons. Hold down RUN/STOP and repeatedly press FUNC until screen shows "OPs."
13. Enter all Configuration Variables (CV) that apply to your Hare using the following actions for Address #825 as an example:
    With the left knob, **dial in 63** (the CV number)
    With the right knob, **dial in 42** (the value of 42)
        NOTE: On older Command Stations use the hexadecimal value of 2A to get the same result.
    Press SEL/SET and the screen will momentarily show "Good" and then the screen simply shows "063:042."
        NOTE: You have reset your Hare to its original factory default settings.
    With the CV63 showing, **right dial in the value of 0**.
    Press SEL/SET and the screen will momentarily show "Good" and then the screen simply shows "063:000."
        NOTE: You have cleared any previous Route-Addresses from your Hare.
    Continue entering all remaining CV values as described above.
        NOTE: Each entry will produce the following screen images: CV049:001, CV050:003, CV051:002, CV052:002, CV053:002, CV054:002, CV055:002, CV056:002, CV064:002, CV072:007).
14. Get out of the mode of "Programming on the Main."
    Simultaneously work with two buttons. Hold down RUN/STOP and press FUNC.
        NOTE: Your throttle has returned to its normal running mode**.**
15. Using your throttle's turnout switching functionality, enter your Hare's Primary-Address, which cannot exceed 3-digits. The following actions are for Address #825:
    Repeatedly press MODE/DISP until a dot appears at the top of the screen --- under the word SWITCH.
    Dial 825 using the left knob to set the 8 and the right knob to set the 25.
    Press L-t button. The screen will show "825·t." You have set the Primary-Address.
        NOTE: To set a Primary-Address, press either the L-t button (for throw) or c-R button (for "clear" in DCC Specialties manuals and "closed in Digitrax instructions). If you used the "clear" button, the screen will show "825·c."
16. If your Hare serves one or more routes, enter each Route-Address, which cannot exceed 3-digits. The following actions are for Address #825:
    Dial 22 using the knobs
    Press the L-t button to set your Hare's "Route #1 Address" and the screen will show "022·t." You have set the first of seven routes served by Address #825.
        NOTE: As stated when setting the Primary-Address, it doesn't matter if you set the Route-Address with either the "throw" or "clear" button.
    Continue entering all remaining Route-Addresses as described above.
        NOTE: If you use the "throw" button for the six remaining entries, you will see the following screen images: 023·t, 024·t, 025·t, 026·t, 027·t, and 028·t.
17. Turn off track-power.
    Simultaneously press two buttons --- RUN/STOP and the green-down-arrow.
18. **Move the plastic jumper to its Normal Operation position**:
    A. **Hare**: Place it on **pins 2 & 3**.
    B. **Wabbit**: Place it on **pins 3 & 4**.
19. Turn on track-power.
    Simultaneously press two buttons --- RUN/STOP and the green-up-arrow.
20. Test newly programmed Hare to make sure everything works as planned. If your Hare responds to Sw=001, you must reprogram your Hare. You might have pushed the "throw" or "clear" key too slowly when entering the Primary-Address. Most likely you started to reprogram your Hare in less than 45-seconds after turning on the track-power. See Steps 10 and 11 above.
21. Assuming all is well, you are ready to program another Hare.

Programming a Hare or Wabbit with Digitrax and JMRI Systems
Sample applies to Whitaker's Hare with Primary-Address 825

Introduction:
The JMRI (Java Model Railroad Interface Software) is a "shareware" that you can download for free through http://jmri.sourceforge.net/. This terrific organization accepts donations.

Thanks to Brett Scott (co-author of this document); JMRI's production version 2.0 (released December 31, 2007) contains templates of Brett's JMRI scripts for the following DCC Specialties products: Hares, Wabbits, Power Shields, and Block Watchers.

If you have never used JMRI:
1. After seeing a short demonstration of the web-based software by Brett Scott, Whitaker downloaded and opened the application and went straight into the Decoder Pro tool and studied its Help Menu documentation. Within about an hour, he was reprogramming a decoder on one of his locomotives. He had never done this with his Digitrax DT400 Throttle. He has no intention of learning how to do it with any brand of throttle.
2. Connect your PC to the Digitrax LocoNet serving that Tortoise/Hare. Whitaker purchased an RR-Cirkits Loco Buffer USB (http://www.rr-cirkits.com/locobuffer-usb/LB-usb-flyer.pdf) from Tony's Train Exchange to bridge the gap from his PC to a nearby LocoNet jack. There are other manufacturers of devices to connect a PC to the LocoNet.

Be sure to read your Hare or Wabbit manual to really learn about installation and functionality.

Unless absolutely necessary, we refer to all models of Hares and Wabbits as Hares.

How to Create a JMRI Script:
1. Study the "Settings for Primary-Address # 825" example form. The red rows are being used to program the Hare or Hares with Primary-Address 825. The blue Configuration Values (CVs) are values/numbers that must go into the JMRI script shown below.
2. Study the JMRI script shown below that covers Primary-Address 825.
   A. Don't let the script overwhelm you. It simply takes up a lot of space, but it isn't hard to modify. Once you modify one script, you will find it is easy to replicate that script and modify it for your next Hare, etc., etc.
   B. Notice that most lines (but not all lines) begin with a # symbol.
   C. The CVs are presented in the same order as the "Settings for Primary-Address #____" example form.
   D. The red lines relate to applicable CVs --- the CVs needed to make this Hare perform as Whitaker has planned it to perform.
   E. The blue values/numbers in the script are the applicable CV values for Primary-Address 825.
   F. The yellow highlighting is to alert you to a special message.
   G. As too the # symbols that precede most of the lines, please keep these points in mind.
      • When JMRI executes the script, JMRI ignores all lines beginning with a # symbol.
      • We are using the # symbol to help you in two ways.
         ♦ Its primary job is to identify the instruction lines for you to read.
         ♦ Its secondary job is to block unneeded command lines from executing in JMRI.
      • When you need to enter a Configuration Variable's (CV) value, a Primary-Address, or a Route-Address, simply remove the # symbol from the line you are customizing.
         ♦ Be sure to remove the # from the "self.waitMsec(750)" line. This gives the Hare sufficient time to process each preceding command.
   H. Notice that every command line in this script uses Locomotive-Address 9983.
      • If you have an actual locomotive bearing that Locomotive-Address, you will have to select another Locomotive-Address. Consider using Word's "Find and Replace" function.
      • If you have a locomotive with an address of 9983 sitting on your layout while running this script, this script will reprogram several of its CV's.
      • For more information on Locomotive-Addresses, skip back to the DT400 or DT100 throttle instructions --- line 5. "Select a Locomotive-Address/number that doesn't exist on your layout."
3. Simply copy the "JMRI Script --- Address 825.py" shown below --- starting with the first # symbol and ending with the last character of the last line.
4. Open Microsoft Word (or some similar software).
   A. Paste the copied script into Word.

B.   Start modifying the form on a CV by CV basis to get the script in exact sync with your "Settings for Primary-Address #___" form.
- The color coding of rows and CV values is strictly for training purposes.
- On all of Whitaker's other scripts, he colors the rows he uses red. That way he knows which CVs are active within the script. This helps him when re-programming a Hare or using the script as a template to create a script for another Hare.

C.   We don't recommend that you delete any rows from the script. If you are programming a Hare that doesn't use many CVs, you will have more "red" rows than you need. Be sure to reset their CV values to the default value shown on the "Settings for Primary-Address #___" form.

5.   Open Microsoft Notepad (or some similar software). Paste the data in Notepad. Notice that all formatting from Microsoft Word has gone away. The script is just about ready for use.

6.   From Notepad, click on File, and then Save As.
A.   Let's assume you want to file your script where JMRI normally places the script files provided when you download and install the JMRI software --- C:\Program Files\JMRI\jython. Feel free to place the file anywhere you choose on your PC.
B.   Enter your file name "Address 825.py" exactly as shown in the screen shot below. Make sure that the "Save as Type" is "All Files." Make sure the "Encoding" is "ANSI." The goal is to make sure your file name ends with "py" and not "TXT."
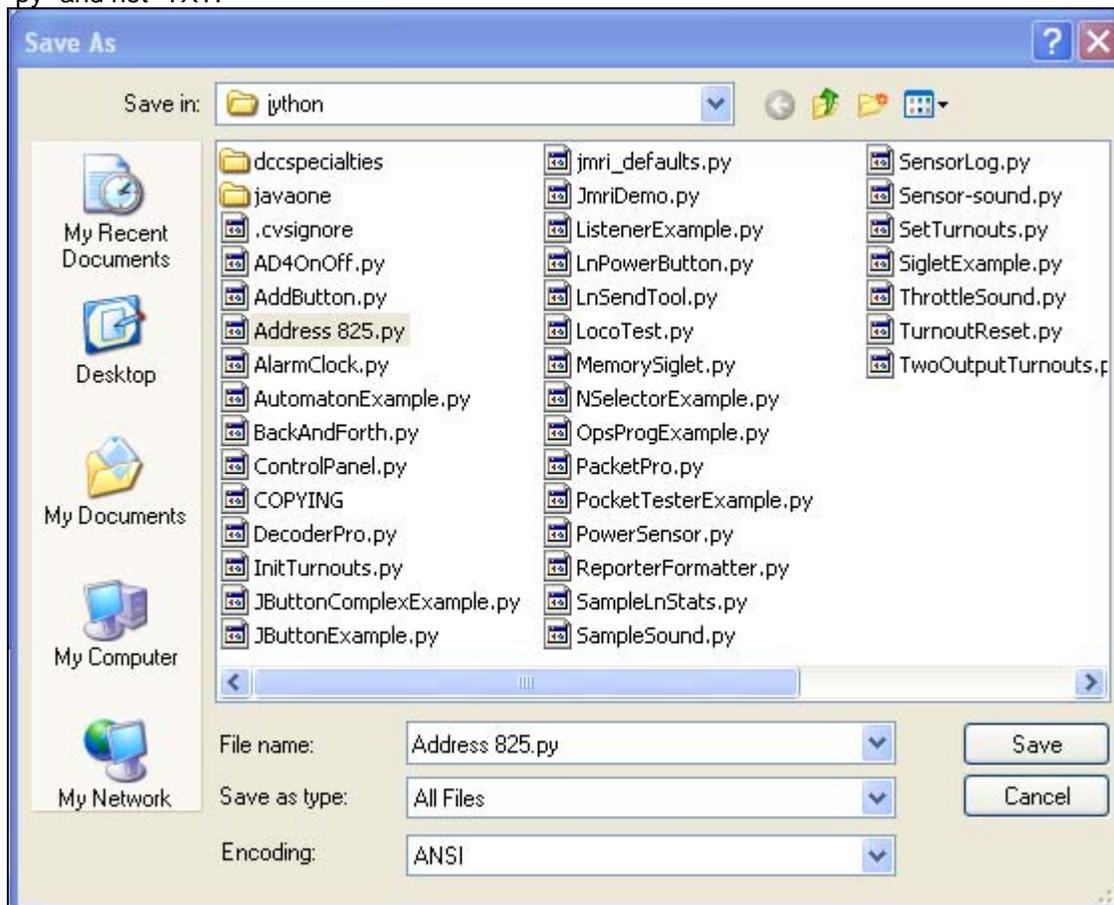
Programming Routine:
1.   When programming a Hare, you will be going back and forth between your computer and the Hare.
2.   The bold red phrases cover the needed steps. The other data lets you know a little background information.
3.   **Plug in your Digitrax Command Station.** There is no need to use its toggle switches for Scale or Mode.
4.   **Connect your PC to the LocoNet**.
5.   **From your PC, open the JMRI Decoder Pro tool**.
A.   If you want to turn track-power on/off with JMRI, open a throttle (these have a track-power on/off icon).
B.   From Decoder Pro's top menu bar, click on Tools, then Throttle, and then choose a new or existing throttle.
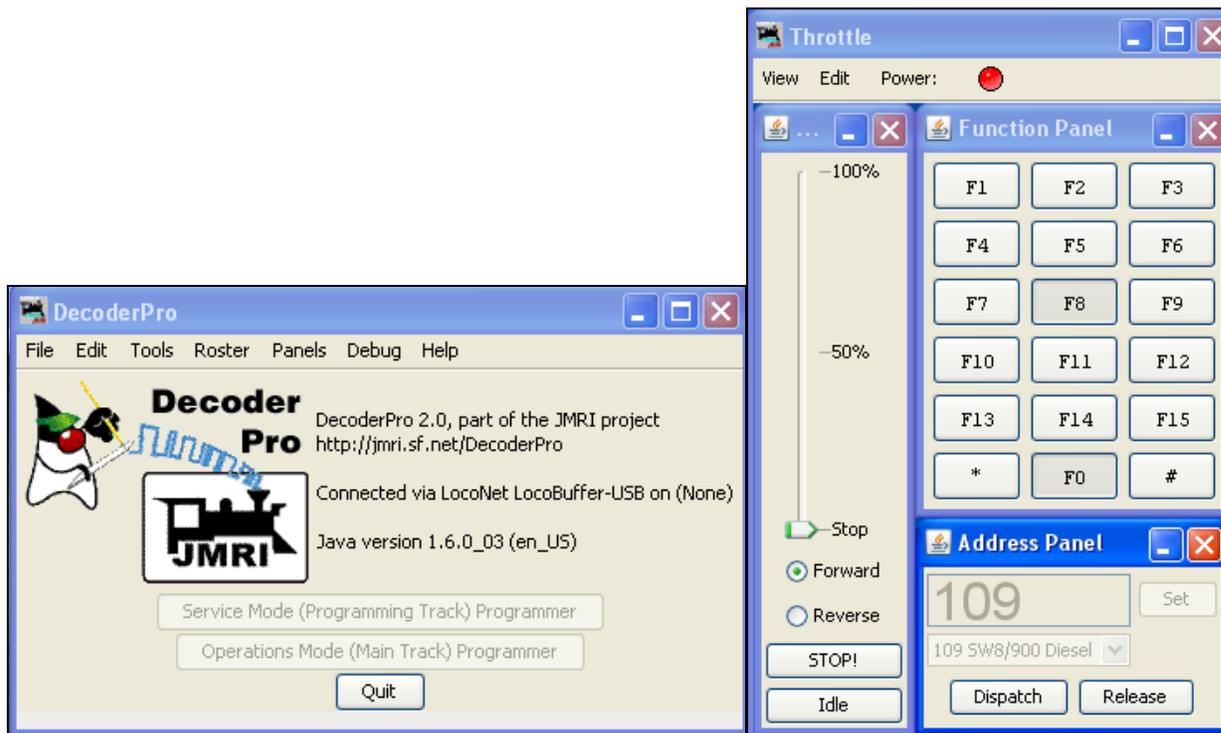
6. **Turn Off Track-Power** --- use a throttle or JMRI.
7. **Move the plastic jumper to Program Mode position**;
    A. **Hare**: Board location J2; place it on **pins 1 & 2**.
    B. **Wabbit**: Board location J3; choose the Tortoise you are programming.
        - **Tortoise-A/Switch-A**, place it on **pins 1 & 2**.
        - **Tortoise-B/Switch-B**, place it on **pins 2 &3**.
8. **Turn On Track-Power**.
    A. Allow 30 to 45 Seconds before running the script.
    B. The Digitrax system runs tests during that period and these will disrupt the script
9. **Run your JMRI script**.
    A. From Decoder Pro's top menu bar, click on Panels and then Run Scripts.
    B. The Find Desired Scripts window will open and you must locate your file named "Address 825.py." If it isn't there when the window opens, simply navigate to the place where you stored it.
    C. If you accepted the default installation of JMRI, the scripts provided to you by JMRI can be found using this Windows path --- C:\Program Files\JMRI\jython.
        - If you want to open and inspect or modify any of the files shown in the screen below, you can't do it from the Find Desired Scripts window.
        - Open Microsoft Notepad (or similar software). Click on File, and then Open. At the Open window --- near the bottom --- set the "Files of type" field to "All Files." If you don't do this, you won't see the files with the "py" file extension.
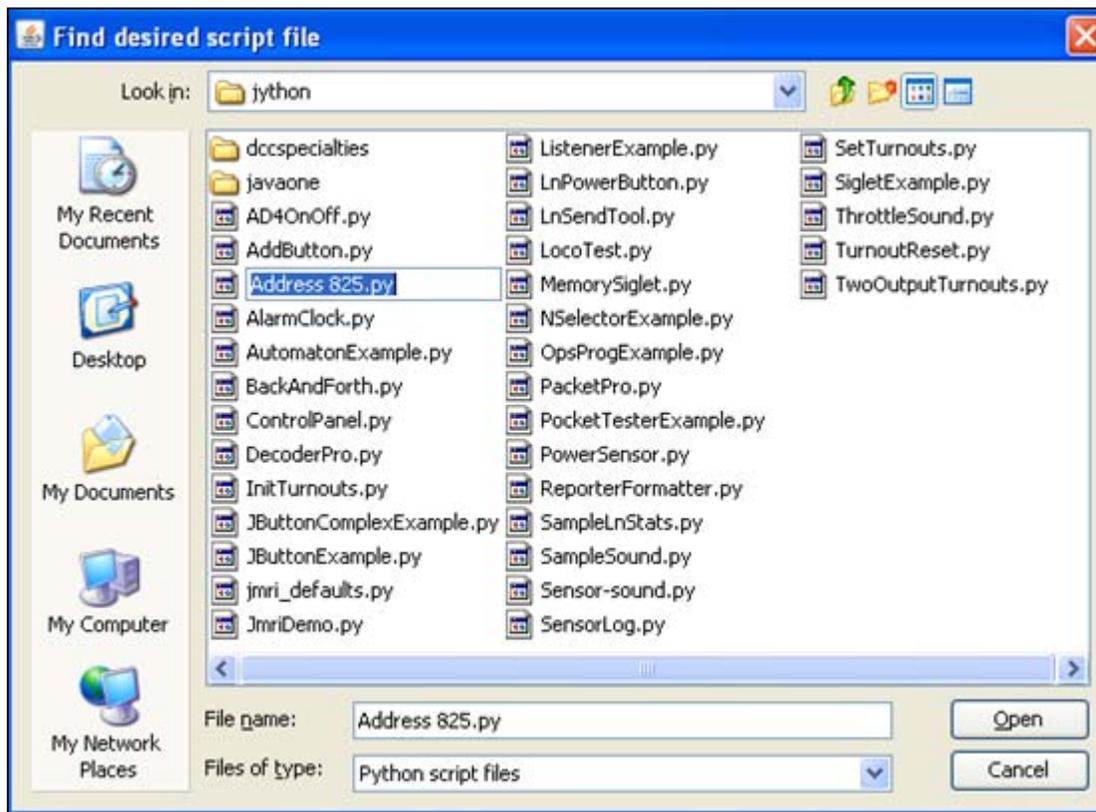
D. **When you find your file, simply double click on that file name or highlight it and click Open**. The script will execute.
- Script can take 3 to 60 seconds to run --- depending on the number of CV's and addresses being programmed.
- Depending on your PCs basic setup, when the script is complete, a small message window should appear. Usually, in the upper left corner of your screen.
- If you would like to watch the script execute, from Decoder Pro's top menu bar, click on LocoNet and then Monitor LocoNet. Just before you execute the script, click the "Clear screen" button to get rid of all the earlier traffic.
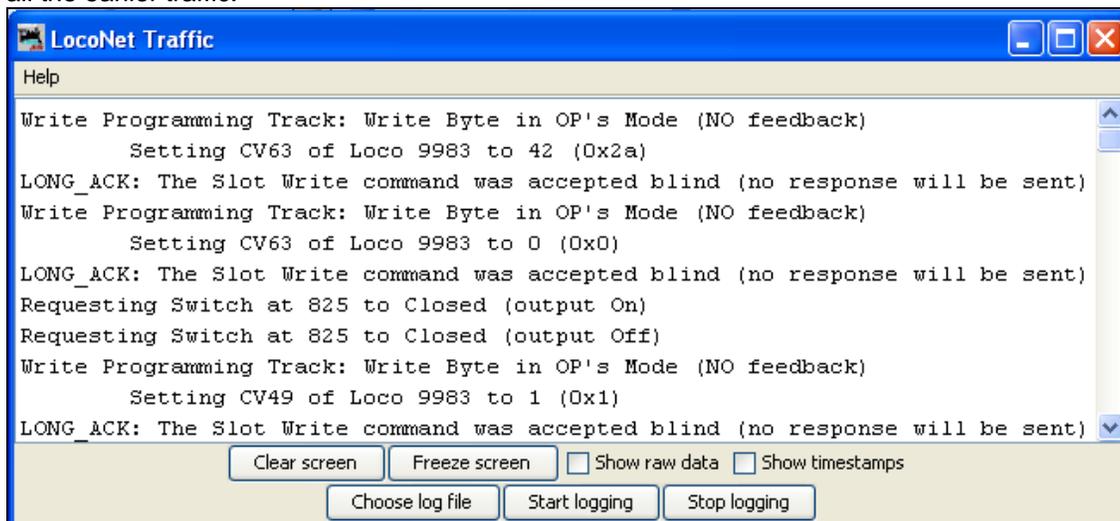
10. **Turn Off Track-Power**.
11. **Move the plastic jumper to its Normal Operation position**:
   A. **Hare**: Place it on **pins 2 & 3**.
   B. **Wabbit**: Place it on **pins 3 & 4**.
12. **Test newly programmed Hare** to make sure everything works as planned. If your Hare responds to Sw=001, you must reprogram your Hare.
13. Assuming all is well, you are ready to program another Hare.

JMRI Script --- Address 825.py: --- Copy the Script Below --- Do Not Copy This Line.

```
import jmri
import javax.swing

class setStartup(jmri.jmrit.automat.AbstractAutomaton) :
  def init(self):
      return

  def handle(self):
    # Next Two Lines - Reset Hare to Factory Defaults
    programmers.getOpsModeProgrammer(True, 9983).writeCV(63, 42, None)
    self.waitMsec(750)          # time is in milliseconds

    # Next Two Lines - Point Hare to Receive Primary-Address, Not Necessary; however,
    # good practice.
    programmers.getOpsModeProgrammer(True, 9983).writeCV(63, 0, None)
    self.waitMsec(750)

    # Next Two Lines - Set Primary-Address - Change 1234 to Address Desired
    turnouts.provideTurnout("825").setState(CLOSED)
    self.waitMsec(750)

    # Next Two Lines - CV49 - Controls What the Hare Sees as Clear or Thrown (Values 0,1)
    programmers.getOpsModeProgrammer(True, 9983).writeCV(49, 1, None)
    self.waitMsec(750)

    # Next Two Lines - CV64 - Power up Position (Smart Default) (Values 0,2,3)
    programmers.getOpsModeProgrammer(True, 9983).writeCV(64, 2, None)
    self.waitMsec(750)

    # Next Two Lines - CV65 - Programmable Point Speed (Values 0-15)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(65, 0, None)
    # self.waitMsec(750)

    # Next Two Lines - CV66 - Dispatcher Over-Ride (Auto-Throw Lock-Out)
    #                         (Values 0,1)OR(Values 0,1,2,4)DEPENDING ON VERSION
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(66, 0, None)
    # self.waitMsec(750)

    # Next Two Lines - CV67 - Auto Throw Timer(Auto Throw Inhibit Time)(Values 0-255)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(67, 0, None)
    # self.waitMsec(750)

    # Next Two Lines - CV68 - Semaphore OPS Mode (Values 0,1)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(68, 0, None)
    # self.waitMsec(750)

    # Next Two Lines - CV69 - Auto Return Enable (Values 0,1,2,4,8) IF VERSION SUPPORTED
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(69, 0, None)
    # self.waitMsec(750)

    # Next Two Lines - CV70 - Auto Return Delay (Values 0-255) IF VERSION SUPPORTED
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(70, 0, None)
    # self.waitMsec(750)

    # CV71 APPLIES ONLY TO WABBITS - IF VERSION SUPPORTED
    # Next Two Lines - CV71 - Manual Switch Ops: Toggle or Push Button (Values 0,1)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(71, 0, None)
    # self.waitMsec(750)

    # Next Two Lines - CV72 - Sets the Number of Routes Available for Programming & Use.
    #                         (Values 0-28) IF VERSION SUPPORTED
    programmers.getOpsModeProgrammer(True, 9983).writeCV(72, 7, None)
```

```
self.waitMsec(750)

# Next Four Lines - Set Route 1 Address - Remove the # Symbols and Change 1234 to
# Address Desired CV50 - Indicates Clear or Thrown Switch Position for Route 1
# (Values 0,1,2,3)
turnouts.provideTurnout("22").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(50, 3, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 2 - Address & Switch Position
turnouts.provideTurnout("23").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(51, 2, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 3 - Address & Switch Position
turnouts.provideTurnout("24").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(52, 2, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 4 - Address & Switch Position
turnouts.provideTurnout("25").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(53, 2, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 5 - Address & Switch Position
turnouts.provideTurnout("26").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(54, 2, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 6 - Address & Switch Position
turnouts.provideTurnout("27").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(55, 2, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 7 - Address & Switch Position
turnouts.provideTurnout("28").setState(CLOSED)
self.waitMsec(750)
programmers.getOpsModeProgrammer(True, 9983).writeCV(56, 2, None)
self.waitMsec(750)

# Next Four Lines - Setup Route 8 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(57, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 9 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(58, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 10 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(59, 1, None)
# self.waitMsec(750)
```

```
# Next Four Lines - Setup Route 11 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(60, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 12 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(61, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 13 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(62, 1, None)
# self.waitMsec(750)

# THE FOLLOWING ROUTES --- 14 THROUGH 28 --- WILL ONLY WORK IF YOUR HARE WAS BUILT TO
# HANDLE MORE THAN 13 ROUTES. If you don't know, try to program these. You won't do any
# damage by trying to program them.


# Next Four Lines - Setup Route 14 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(73, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 15 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(74, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 16 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(75, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 17 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(76, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 18 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(77, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 19 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
# self.waitMsec(750)
# programmers.getOpsModeProgrammer(True, 9983).writeCV(78, 1, None)
# self.waitMsec(750)

# Next Four Lines - Setup Route 20 - Address & Switch Position
# turnouts.provideTurnout("1234").setState(CLOSED)
```

```python
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(79, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 21 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(80, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 22 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(81, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 23 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(82, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 24 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(83, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 25 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(84, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 26 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(85, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 27 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(86, 1, None)
    # self.waitMsec(750)

    # Next Four Lines - Setup Route 28 - Address & Switch Position
    # turnouts.provideTurnout("1234").setState(CLOSED)
    # self.waitMsec(750)
    # programmers.getOpsModeProgrammer(True, 9983).writeCV(87, 1, None)
    # self.waitMsec(750)

    javax.swing.JFrame("Programming Complete!").show()

    return

setStartup().start()
```

End JMRI Script --- Address 825.py: --- Do Not Copy This Line.

Denny Whitaker's Lessons Learned
Documentation Objectives

As an HO model railroader (without any formal education in electronics), I really struggle reading and understanding almost every Digital Command Control (DCC) document that I encounter.

As a person who has trained thousands of people on a wide variety of adult-education subjects (e.g. public speaking, boating safety, computer software, etc.), I know that equipment builders and software/hardware developers often make the erroneous assumption that the people buying their products will understand their instruction manuals. Most model railroad electronics companies don't have the financial resources to hire professional writers who can (1) put themselves in the "buyer's shoes" and (2) rewrite the manuals at the level of the average modeler. I have a personal objective of letting the developers, that I truly respect, know how I interpreted their original manuals. I try to share my learning experiences with them and other hobbyists. By doing so, I'm "passing forward" the knowledge others have shared with me.

The primary purpose of this document is to document what I have done with my DCC Specialties' Hare-IIs so that I don't have to "reinvent the wheel" a year or so from now when I make changes to what I have already built. The secondary purpose is to share my "Lessons Learned" with the developers of the Hares and other Hare users.

I liked the advertised features of the Hare-IIs. Thus, in early 2007 I bought some from Tony's Train Exchange with the proviso that I expected help if I couldn't understand the documentation. Tony Parisi, owner, agreed and cheerfully answered my countless installation questions that I made to him via telephone and e-Mail. He even put me in contact with Larry Maier, the designer of the Hare. In early January, 2008, Tony put me in contact with Norm Stenzel, who Tony thought might have a route-pushbutton solution for me. Norm will be rewriting the Hare manuals. To show my appreciation, I told these gentlemen that I would share my "Lessons Learned" with them. I'm doing that now and they are welcome to use whatever I present here as if it were theirs and I expect nothing in return for my efforts.

Don't take what I'm saying as "gospel." Read the Hare's documentation manual; study the DCC Specialties' website data. View me as a "newbie" that has only recently gotten his feet very wet in the DCC and Hare arena. I've installed 35 Hares on my layout with another 90 or so to go over the next couple of years. As too a self-evaluation,
1. I feel very confident on the following:
    A. Improving the DCC Specialties "Forms for Address and Configuration Assignments" form. The resulting single-page "Settings for Primary-Address #___" form has every CV and its applicable values for both Hares and Wabbits (including the Hare's S1 Area dip-switch settings). Religiously, I fill out a form for each of my turnouts --- even if it doesn't have a Hare mounted on it. Meaning every turnout has a Location-Addresses (to tell me where it is at on the layout) and a Primary-Address (the 3-digit number we enter in our throttles to switch the points on a turnout)
    B. Developing a logical and intuitive numbering scheme for Address Scheme for Whitaker's Turnouts and Routes. This numbering scheme made it easy for me to develop and program the 24 routes that pass through and around my large classification yard and engine terminal area. You may want to review Whitaker's Method for Creating Routes. The people who have operated on the operational portion of my layout don't get mixed up or show signs of frustration. Several friends, who earlier said that routes in and around yards aren't prototypical, are now saying that they really like the way the turnouts on the yard ladders work.
    C. Deciding whether or not I want to save money by having one Hare drive two Tortoises. This includes dealing with crossovers that straddle two track-power districts.
    D. Dealing with the many functions of the Hares --- specifically each CV and that CV's applicable values and the results that each CV and value produces.
    E. Providing consistent track-power hookups to first the track buses and then the feeds to he Hares.
    F. I have thoroughly tested, but gotten into having the Hares provide feedback to the LocoNet (Command Station) on the position of the points of a turnout thrown by a fascia mounted pushbutton or a track-power short circuit).
2. I'm just starting to install pushbuttons (control panel and fascia board) and LEDs by the turnouts. My mock up is working as designed.
3. I'll be getting into using the "Auto Throw" functionality and the dispatcher override functionality. I think I understand how to pull this off.
4. I'm not sure if I will ever get into "Using a Hare to Route Switch Point Track power," as my 30 Peco #5 Insulfrog turnouts, 1 Walthers #6 Double Crossover, and 1 Atlas #4 Customline turnout are generally handling all my engines without any problems. Occasionally, a slow moving short diesel switcher will stall on the double crossover and one of the Pecos.

Again, the primary purpose of this "Lesson Learned" document is to document how I have programmed the Hares installed on my HO layout and how I worked around some Hare wiring issues. For planning routes, I created a matrix to record how I want each turnout to be set (e.g. clear or throw) for each route that passes over a turnout. For programming each Hare, I tried to enhance the DCC Specialties Hare form called "Forms for Address and Configuration Assignments." My one-page "Settings for Primary-Address #825" form shows all programmable Hare functions with their CV numbers and their required values (with a couple of words for each value) --- including manual settings for the Hare's S1 area to "Route Switch Point Track power." The form served as the foundation for my friend and fellow modeler, Brett Scott (brettscott@pobox.com), to write a JMRI (Java Model Railroad Interface) script that makes it super easy to program Hares. His efforts and questions caused me to improve my original form. This document will continue to grow. To learn more about JMRI, go to http://jmri.sourceforge.net/.

Again, the secondary purpose of this document is to present my data in such a way that other Hare users might benefit from what Brett and I have learned. It assumes the reader has read the advertisements and installation manual on the Hares. Readers may contact me via e-Mail (denny7710@roadrunner.com). Please keep in mind that that my hobby is building my HO version of the Nickel Plate Road and I have absolutely no intention of turning this hard found electronics knowledge into a job!

Synopsis of Whitaker's Layout

My son Douglas and I created the basement and layout drawing in 3rd PlanIt Software http://www.trackplanning.com/. Basically, we exchange the 3rd PlanIt file via e-Mail and we tweak it until we are both satisfied. Doug prints the 3rd PlanIt drawings on his AutoCAD printer and I nail the tracks directly on the drawings (removing the paper when we are satisfied). I've got the childhood memories of the Nickel Plate Road (NKP) and my many years of membership in the Nickel Plate Road Historical & Technical Society --- http://nkphts.org/ (which has a Yahoo Group for Society Members and there is also a non-Member Yahoo Group). Doug has the imagination and skill to compress prototype ideas into our forthcoming HO layout, which is being designed for operating sessions with about 10 operators. Doug enjoys designing scenery, weathering rolling stock, and building models. I enjoy laying track, installing wiring, and participating in operating sessions.

Train Room = 1,250 square feet with each square being equal to 1-square foot
Ceiling Valance (installed to hide 48 fluorescent lamps) and fascia board (not yet installed) are each 153 feet long.
500 square feet of L-girder bench work completed.

Color Coding of Track:
 - Regardless of color, the fascia board and valance are represented by the outside line of the layout.
 - Black = Straight Track
 - Green = Easement Track (e.g. Might leave a straight track at a 60" radius and gradually get to a 30" radius track)
 - Red = Radius Track (e.g. 30" radius)

Plan View of Whitaker's Layout
(Screen shot from 3rd PlanIt software)

North

West
Bellevue, Ohio
with some
staging tracks for
imaginary
interchanging to
other NKP
divisions and
other RRs.

**Cleveland Terminal to
Kingsbury Run**

East
Coal Country of
Southeastern Ohio
with some staging
tracks for
imaginary
interchanging to
other RRs.

**Dispatcher
Station**

Crew Lounge

utility

South

Restroom
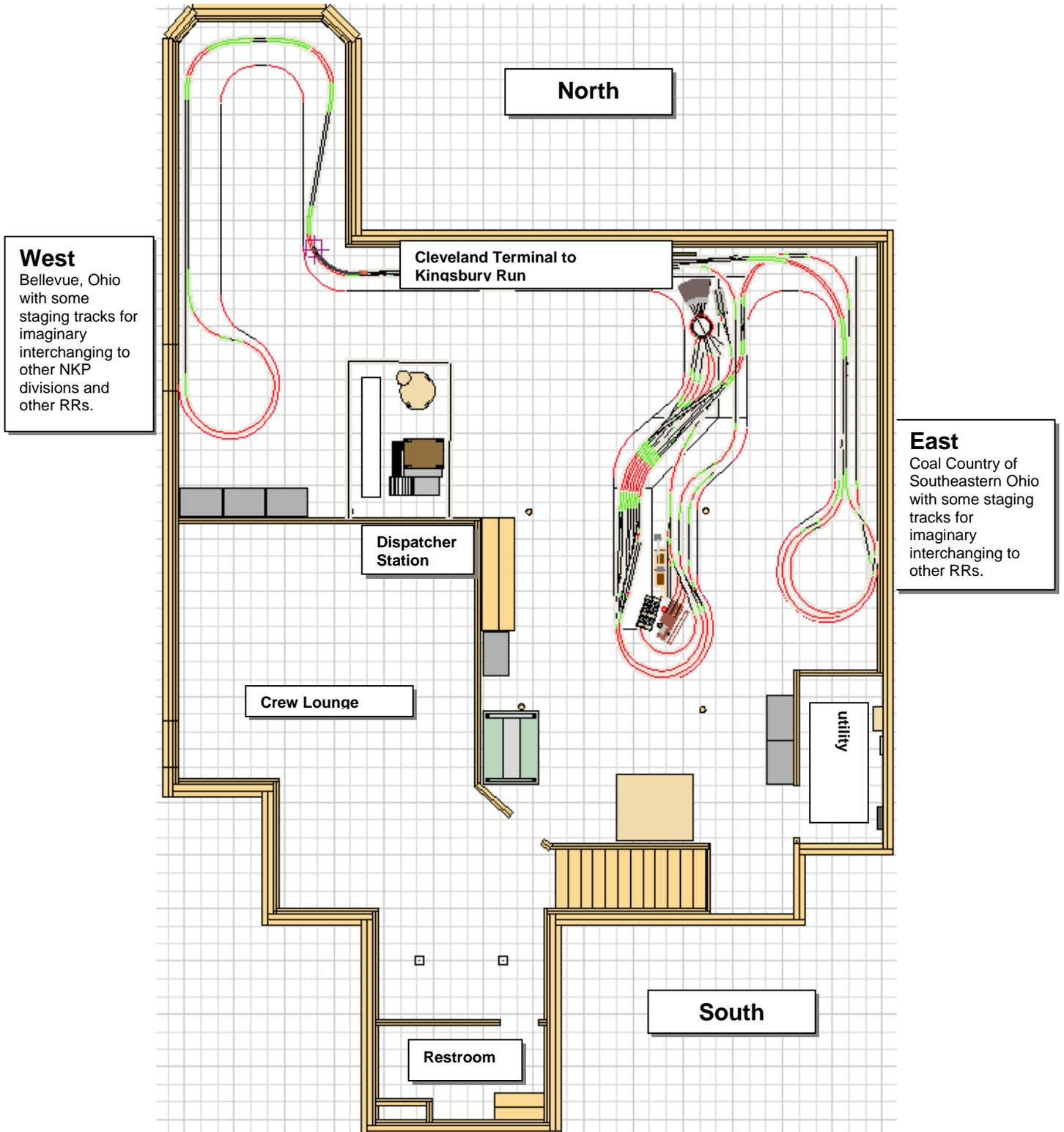
Address Scheme for Whitaker's Turnouts and Routes

A Digitrax Command Station can handle 300 switch-addresses that are made up of 3-numeric digits. My overall scheme is as follows:

- 001 .... Factory Default-Locomotive-Address that you must overwrite when programming each Hare.
- 002 – 099 .... Route-Addresses.
- 100 – 149 .... Cleveland Flats area
- 150 – 199 .... Not yet assigned
- 200 – 299 .... South side of Cleveland to Ohio coal fields
- 300 – 399 .... Cleveland Terminal through Kingsbury Run
- 400 – 499 .... Cleveland West Side to Bellevue, Ohio.
- 500 – 799 .... Not yet assigned
- 800 – 899 .... Campbell Road Classification yard
    - o   800 – 809 .... Drill Tracks
    - o   810 – 819 .... 1st of 6 ladder tracks: Arrival / Departure #1:
            Turnout 810 starts the south-end of ladder and 815 marks the north-end.
    - o   820 – 829 .... 2nd of 6 ladder tracks: Arrival / Departure #2:
            Turnout 820 starts the south-end of ladder and 825 marks the north-end.
    - o   830 – 839 .... 3rd of 6 ladder tracks:
            Turnout 830 starts the south-end of ladder and 835 marks the north-end.
    - o   840 – 849 .... 4th of 6 ladder tracks:
            Turnout 840 starts the south-end of ladder and 845 marks the north-end.
    - o   850 – 859 .... 5th of 6 ladder tracks:
            Turnout 850 starts the south-end of ladder and 855 marks the north-end.
    - o   860 – 869 .... 6th of 6 ladder tracks:
            Turnout 860 starts the south-end of ladder and 865 marks the north-end.
- 900 – 929 .... Campbell Road Engine Terminal
    - o   900 – 913 .... Engine Terminal Drill to South Yard Drill
    - o   914 – 929 .... Engine Terminal
- 930 – 999 .... Not yet assigned

The goal of the address scheme is to make it easy for regular operators to mentally recall Primary-Addresses and Route-Addresses. At the moment, I've neatly labeled each turnout with its Primary-Address and if applicable, the Route-Address to get to it. I used my Dymo RhinoPro5000 label maker. The labels will go away when the pushbuttons and control panels are installed.

Whitaker's Method for Creating Routes

The "Settings for Primary-Address #____ " form provided a great place to record data as I created 24 easy-to-remember routes. Basically, I had to mentally run a train from one destination to another and then make a note of the Location-Addresses of each turnout the route uses. At each turnout, I had to think about whether the turnout's movable-points should be in the "Clear" or "Closed" position. Then I plugged that data into the "Matrix Used to Create My Routes" (shown later in this section).

For example, I simply imagined that I had a train on the mainline that must enter the yard and pass through X number of turnouts to get to the engine terminal. I didn't concern myself with whether or not I could save any money on Hares by mounting an inexpensive Card Edge Connector on a Tortoise rather than a more expensive Hare. My job was to identify each of the route's turnouts and the position of their movable-points as the train passed over the turnout.

My most complex situation (to me) is a double crossover bearing Primary-Address #912. My guest operators are oblivious to the fact it is powered by four Tortoises and two Hares. The operators like the fact it is easy to use. They have several choices on how to get this double crossover to do what they want. (1) Push a button on the control panel for the south end of my yard (shown later in this section), (2) use a DT400 throttle to switch # 912 to either clear or throw, or (3) use a DT400 throttle to switch Route-# 29 as either throw or clear. I programmed the Hare for this route to respond to clear even if the operator pushed the throw button. Using JMRI during an operating session, the dispatcher can take control of some or all of the turnouts.

Since creating the "Matrix Used…," I've repeatedly improved the "Settings for Primary-Address…" form to make it easy to create a route. The next time I create a route; I will pick a Route-Address-# (e.g. 53), and fill out a "Settings for Primary-Address…" form for each turnout involved in the route. Then I will take the form for each turnout and note the desired

"Clear" or "Throw" setting for that turnout on its "Settings" form. If the turnout for Primary-Address #825 is involved, I would note three things on the "Route #8" line of the form.

1. In the "Address Number" column, pencil in 53.
2. In the "For each route…" column, pencil in Clear, if I want the train to go straight through the turnout. If I want the train to take the divergent track of the turnout, I would pencil in Throw.
3. Since I already know that this turnout #825 has a CV49 value of 1, I would use the far right-hand column to note the CV value of 0, 1, 2, or 3. Consider the following:
    A. I personally like the "Always Clear or Always Throw" choices --- rather than the "Follow or Reverse" Choices. The reason being when the operator pushes either the Clear or Throw button on his/her throttle, all turnouts snap the way I want them to for this route. If the operator then pushes either the Clear or throw, the turnouts don't move.
    B. If I used the "Follow or Reverse" choices, the route will behave as planned when the operator pushes the Clear button. However, when the operator pushes the Throw button, the turnouts will all go to the Throw position. The route concept simply won't work.

Primary-Address & Route-Addresses Served by This Hare		For each route that uses this turnout, state whether the turnout should be set to "Clear" or "Throw"		Record Applicable CV Value — Use Either Left or Right Column — (Factory Default Setting for CVs = 0) — When Facing Tortoise Arm	
				If Arm to Right CV49 = 0	If Arm to Left, CV49 = 1
				Routes Use These CV Values	
				0 = Follow	0 = Follow
				1 = Reverse	1 = Reverse
Type of Address	Address Number	"Clear" or "Throw"	CV Number	2 = Always Throw	2 = Always Clear
				3 = Always Clear	3 = Always Throw
Primary	825	N/A	49		1
Route #1	22	Throw	50		3
Route #2	23	Clear	51		2
Route #3	24	Clear	52		2
Route #4	25	Clear	53		2
Route #5	26	Clear	54		2
Route #6	27	Clear	55		2
Route #7	28	Clear	56		2
Route #8			57		
Route #9			58		
Route #10			59		

Keep in mind that my Route-Address #53 will be shown on the Route #8 line of the above form, but it can be on any "Route #___" line on the "Settings" forms for the other turnouts involved in this route. It doesn't matter if the Address Numbers are in numerical order on the form. When adding a new route to Primary-Address #825, I simply re-program the Hare starting at the top of the form and working to the bottom of the form. It is actually a very quick process after doing it a few times.

Primary-Address #912 and
Location-Addresses of each Tortoise
(Screen shot from 3rd PlanIt software)

863   # 862

913   # 912
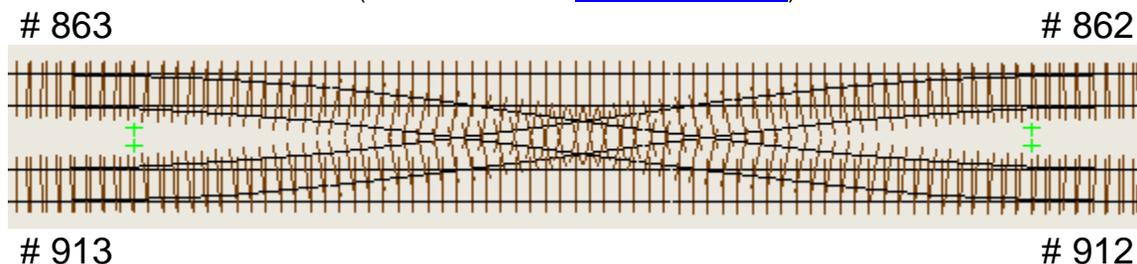
South Ladder Control Panel
(Panel designed in Microsoft Word 2003 software)
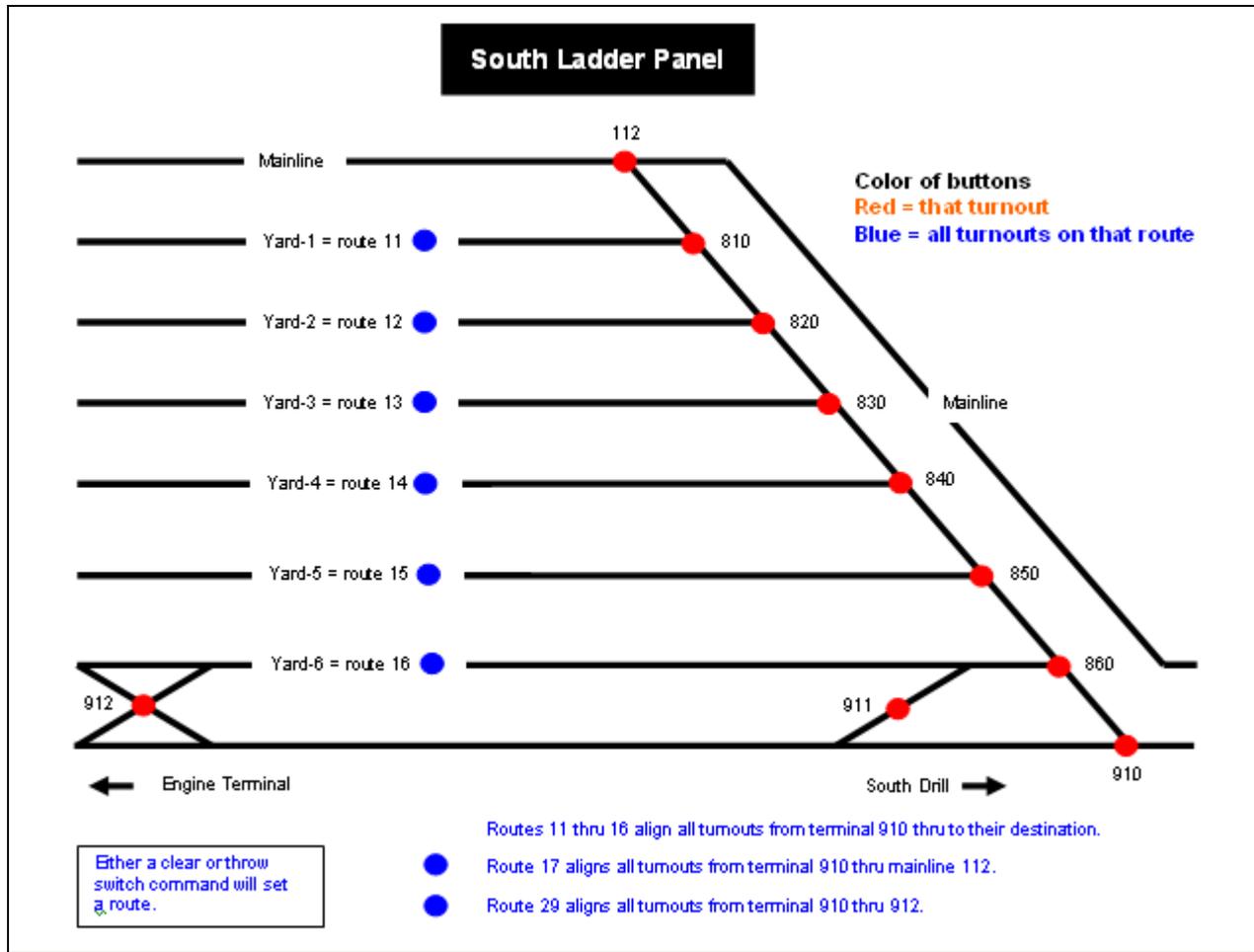
When pushed, the blue buttons will execute a route (via LocoNet) just as if an operator had entered the route into a throttle (DT-400 or DT-100) or JMRI or similar software. **NOTE**: All the routes on this panel assume you want to get to/from turnout # 910.

There are a number of ways to get a pushbutton to activate a route already programmed in the Hares that serve a given route.
1. The Hare manuals show how to wire a Hare to two different brands of accessory decoders.
    A. Digitrax DS64 (or its predecessor DS54): The Hare manual clearly shows how to wire the Hare to a DS64 or DS54.
    B. Team Digital SRC8 http://www.teamdigital1.com/prod_catalogue/src8_product/src8.html): The Hare manual's SRC8 diagram was unclear to me. At DCC Specialties request, Team Digital Technical Support provided me with the "Team Digital SRC8 Connected to Hare Drawing" shown below.
    C. In June 2007, I didn't want to go to the expense of adding one DSC64 for every four Hares just to (1) activate routes with a pushbutton and (2) to let LocoNet know the position of the turnout points after I pushed a simple pushbutton. **NOTE**: If LocoNet knows the position of the points at the time of a power outage, I can program my Hares to go back to that position when the track-power comes back on.
        • Brett Scott and I thought their must be a less expensive solution to give the pushbutton feedback to LocoNet.
        • I currently have a single pushbutton hooked to a Hare and a bi-colored LED and they work flawlessly.
        • I can activate the Hare routes with a DT400 or DT100 throttle or a JMRI throttle panel.
2. In early January 2008, Norm Stenzel (the person who will be rewriting the Hare manuals) told me that I can put route-pushbuttons on my control panels by using a CML Electronics' DTM30 Super Tower Master (http://www.cmlelectronics.co.uk/products/dtm30.htm), which will interface with up to 30 pushbuttons. He and the product description webpage state that up to 30 pushbuttons can be programmed with a switch command that

emulates a command from the following throttles: DT400, DT100 or a JMRI throttle panel. The website offers a 45-page manual on the DTM30. When studying this webpage and manual, I decided to clarify a few things that were not crystal clear to me. Thus, I participated in an e-Mail exchange between Stenzel and the Laurence Barker, Director of CML Electronics, Limited. Keep these points in mind.

    A. The British term "points" means the same as the USA model railroad term "turnout."

    B. Stenzel stated the Hare is an accessory decoder.

    C. Barker wrote the following: "Your 'Hares' are the accessory decoders. You will need a DTM30 but no more accessory decoders. The DTM30 sends a message to LocoNet; your existing command station sends a DCC accessory message on the rails; your existing accessory decoders see that DCC rail message and change the points (turnouts)."

    D. On January 14, 2008, I purchased a DTM30 for experimentation and it will be shipped from England via Air Mail on January 16, 2008.

CML is located in England. They offer the DTM30 for £60 (British Pound) assembled & tested board with ribbon cable and connectors --- switch, LED packs available if required. That price converts to $117.55 (American Dollar) at --- http://www.x-rates.com/calculator.html. They accept PayPal and they also have four USA Distributors.

CML must be a home-based business as their website states "Telephone (evenings & weekends only please)." CML recommends e-Mail for sales inquires and technical support. Should you feel compelled to telephone CML, this website will help you convert your local time to London Time (which covers all of the UK) --- http://www.timeanddate.com/worldclock/.

Team Digital SRC8 Connected to Hare Drawing:
(Provided by Team Digital, LLC)

Hare Connection

SRC8 Connection

J3
Throw Output
Opto-isolators
Clear Output

Group# Pin#
1t   1
1c   2

J3
Throw Output
Opto-isolators
Clear Output

2t   3
2c   4
- GND   5

J3
Throw Output
Opto-isolators
Clear Output

3t   7
3c   8

J3
Throw Output
Opto-isolators
Clear Output

4t   9
4c   10

Four additional Hare

Group 5 to 8 with the same connection as above

TSA

Pin# 1 2 3 4 5 6 7 8 9 10

Inputs 1 to 8
Outputs 1 to 8

IDC 10 PIN

SRC8

IDC 10 PIN   Inputs 9 to 16
Outputs 9 to 16   IDC 10 PIN

LED

Serial bus

RJ12 6 PIN   RJ12 6 PIN

To other LocoNet devices

Matrix Used to Create My Routes

	Installed Turnouts Not Involved in Routes					
Primary-Address	111	113	114	831		
Location-Address	111	113	811	114	841	

Route Address	To/From or Action	Program Address with Smart Route Command (C = Clear and T = Throw)							
N/A	Primary-Address	910	860	850	840	830	820	810	112
	Location-Address	910	860	850	840	830	820	810	112
11	South Drill to Yard-1	11-T	11-C	11-C	11-C	11-C	11-C	11-T	-
12	South Drill to Yard-2	12-T	12-C	12-C	12-C	12-C	12-T	-	-
13	South Drill to Yard-3	13-T	13-C	13-C	13-C	13-T	-	-	-
14	South Drill to Yard-4	14-T	14-C	14-C	14-T	-	-	-	-
15	South Drill to Yard-5	15-T	15-C	15-T	-	-	-	-	-
16	South Drill to Yard-6	16-T	16-T	-	-	-	-	-	-
17	South Drill to Main @ 112	17-T	16-C	16-C	16-C	16-C	16-C	16-C	17-T
N/A	Primary-Address	115		815	825	835	845	855	865
	Location-Address	115	800	815	825	835	845	855	865
21	North Drill to Yard-1	21-C	21-C	21-C	-	-	-	-	-
22	North Drill to Yard-2	22-C	22-C	22-T	22-T	-	-	-	-
23	North Drill to Yard-3	23-C	23-C	23-T	23-C	23-T	-	-	-
24	North Drill to Yard-4	24-C	24-C	24-T	24-C	24-C	24-T	-	-
25	North Drill to Yard-5	25-C	25-C	25-T	25-C	25-C	25-C	25-T	-
26	North Drill to Yard-6	26-C	26-C	26-T	26-C	26-C	26-C	26-C	26-T
27	North Drill thru 914	27-C	27-C	27-T	27-C	27-C	27-C	27-C	27-C
28	North Main thru 914	28-T	28-T	28-T	28-C	28-C	28-C	28-C	28-C
N/A	Primary-Address	910	911		912				
	Location-Address	910	911	861	862	863	912	913	
29	South Drill up to 914	29-C	29-C	29-C	29-C	29-C	29-C	29-C	
30	North Drill to South Drill	27-C	29-C	29-C	29-C	29-C	29-C	29-C	
N/A	Primary-Address	914	915	916	917	918	919	920	
	Location-Address	914	915	916	917	918	919	920	
31	914 to Engine Terminal-1	31-C	31-C	31-T	-	-	-	-	
32	914 to Engine Terminal-2	32-C	32-C	32-C	-	-	-	-	
33	914 to Engine Terminal-3	33-C	33-T	-	33-T	-	-	-	
34	914 to Engine Terminal-4	34-C	34-T	-	34-C	34-T	-	-	
35	914 to Engine Terminal-5	35-C	35-T	-	35-C	35-C	35-T	-	
36	914 to Engine Terminal-6	36-C	36-T	-	36-C	36-C	36-C	36-T	
37	914 to Engine Terminal-7	37-C	37-T	-	37-C	37-C	37-C	37-C	

Primary-Addresses Serving More Than One Hare:

Every turnout on the layout has a Location-Address. Most of the time that becomes the Primary-Address entered in the Hare controlling that turnout. However, in crossover situations, I assign one Primary-Address to each Tortoise/Hare supporting that crossover (e.g. a single crossover has 2 turnouts; a double crossover has 4 turnouts). My crossover bearing a Primary-Address of 115 is actually made up of turnout 115 on the mainline and turnout 800 in the yard. The Hare mounted on 800 gets programmed as 115. Operators have no need to think about why one switch command moves two turnouts.

Don't try to save money by having one Hare control two or more Tortoises when the crossover straddles two track-power districts. If you do, expect a derailment to shutdown both track-power districts. When the track-power is restored, every turnout in both districts will get reset to its normal "Power up Position." That means the operators in both districts might have turnouts reset under trains when they don't expect it. As the owner of the layout, expect to be criticized by the operators that (1) didn't cause the derailment or (2) didn't help you plan how your Hares are to behave.

Don't try to save money by having one Hare control a second Tortoise when the crossover turnouts aren't joined "throw" track to "throw" track. When joined "clear" track to "throw" track, Configuration Variable (CV) 49 can't be set

properly. One turnout will need its Hare's CV49 set to a value of 0 and the other will need its Hare's CV49 set to a value of 1.

Address 113: Serves turnouts 113 (Mainline) and 811 (Yard - Location-Address only). Each Tortoise has its own Hare as the crossover straddles two track-power districts.

Address 115: Serves turnouts 115 (Mainline) and 800 (Yard - Location-Address only). Each Tortoise has its own Hare as the crossover straddles two track-power districts.

Address 831: Serves turnouts 831 (Tortoise with a Hare) and 841(Location-Address only --- Tortoise with a Card Edge Connector --- wired to the 831 Hare). This crossover is served entirely by the Yard's track-power district. Thus, derailments on either of the turnouts will only shutdown the Yard track-power district.

Address 911: Serves turnouts 911 (Terminal) and 861 (Yard - Location-Address only). Each Tortoise has its own Hare as the crossover straddles two track-power districts.

Address 912: Serves a Walthers Double Crossover with 4 Tortoises and 4 Hares. It straddles two track-power districts. Terminal Track-power District: 912 (south side) and 913 (Location-Address only - north side) Yard track-power District: 862 (Location-Address only - south side) and 863 (Location-Address only - north side).

Route-30 has Route-27 nested within it.

Prepared By:
D.F. (Denny) Whitaker

File:
Lessons Learned on Hares-Wabbits MS-Word Section v1.doc
January 16, 2008

Settings for Primary-Address # _____

If slave-Tortoise, note its Location-Address and brief description:_____

Configuration Variable (CV) Choices	CV Number	Record CV Value
42 = Reset to Factory Default (always do it)	63	42
0 = Reset Smart Route Addresses (always do it)	63	0
At Power-On, turnout points go to	64	
0 = Last Operator Command		
2 = Clear		
3 = Throw		
Programmable Point Speed	65	
Play with values 0 thru 15 --- 15 is fastest		
Dispatcher Over-Ride (Auto-Throw Lock-Out)	66	
0 = Inhibits DCC Operation		
1 = Inhibits Auto-Throw		
2 = Inhibits Manual Throw		
4 = Unknown as not documented???		
Default = Inhibited in Dispatch Mode???		
Auto-Throw Timer: Seconds desired from 0 to 255	67	
Semaphore OPS Mode	68	
0 = Default		
1 = Semaphore Mode Activated		
Auto-Return Enabled	69	
1 = After DCC command		
2 = After an Auto-Throw		
4 = After manual pushbutton command		
8 = After semaphore position change		
Auto-Return Delay: Seconds desired from 0 - 255	70	
WABBIT ONLY: Manual Switch Ops (Toggle or Push Button) Values = 0 or 1	71	
Number of Routes served by this Hare from 0 - 28	72	

> Although not always necessary, make the double entry of values shown for CV63. First enter the CV63 value of 42, next enter the CV63 value of 0, and continue entering your remaining CV values.

> Early production models might not handle these 3 functions. There is no harm in trying to see if these functions will work on older models.

	Primary-Address & Route-Addresses Served by This Hare	For each route that uses this turnout, state whether the turnout should be set to "Clear" or "Throw"		Record Applicable CV Value Use Either Left or Right Column (Factory Default Setting for CVs = 0)	
				When Facing Tortoise Arm	
				If Arm to Right CV49 = 0	If Arm to Left, CV49 = 1
				Routes Use These CV Values	
				0 = Follow	0 = Follow
				1 = Reverse	1 = Reverse
			CV Number	2 = Always Throw	2 = Always Clear
Type of Address	Address Number			3 = Always Clear	3 = Always Throw
Primary		N/A	49		
Route #1			50		
Route #2			51		
Route #3			52		
Route #4			53		
Route #5			54		
Route #6			55		
Route #7			56		
Route #8			57		
Route #9			58		
Route #10			59		
Route #11			60		
Route #12			61		
Route #13			62		
Route #14			73		
Route #15			74		
Route #16			75		
Route #17			76		
Route #18			77		
Route #19			78		
Route #20			79		
Route #21			80		
Route #22			81		
Route #23			82		
Route #24			83		
Route #25			84		
Route #26			85		
Route #27			86		
Route #28			87		

If using the Hare to "Route Switch Point Power," set the dip-switches in the Hare's S-1 area as shown below. Circle the column you used.

S1, Switch Number	When Facing Tortoise Arm	
	Arm To Right	Arm To Left
1	ON	ON
2	ON	ON
3	OFF	ON
4	ON	OFF
5	OFF	ON
6	ON	OFF
7	OFF	ON
8	ON	OFF
9	OFF	ON
10	ON	OFF

> Early production models might not handle Routes 14 through 28. There is no harm in trying on older models.

Note: For neat and easy updating purposes, record your data on this form in pencil.
    To download this form as a Microsoft Excel Spreadsheet, go to http://www.mgbrr.org/ --- at the menu bar, click on "Tips."

File:
Version-4

Settings for Primary-Address # __825__

If slave-Tortoise, note its Location-Address and brief description:____(e.g. #831 In yard near north yard tower)_____

Configuration Variable (CV) Choices	CV Number	Record CV Value
42 = Reset to Factory Default (always do it)	63	42
0 = Reset Smart Route Addresses (always do it)	63	0
At Power-On, turnout points go to	64	2
0 = Last Operator Command		
2 = Clear		
3 = Throw		
Programmable Point Speed	65	
Play with values 0 thru 15 --- 15 is fastest		
Dispatcher Over-Ride (Auto-Throw Lock-Out)	66	
0 = Inhibits DCC Operation		
1 = Inhibits Auto-Throw		
2 = Inhibits Manual Throw		
4 = Unknown as not documented???		
Default = Inhibited in Dispatch Mode???		
Auto-Throw Timer: Seconds desired from 0 to 255	67	
Semaphore OPS Mode	68	
0 = Default		
1 = Semaphore Mode Activated		
Auto-Return Enabled	69	
1 = After DCC command		
2 = After an Auto-Throw		
4 = After manual pushbutton command		
8 = After semaphore position change		
Auto-Return Delay: Seconds desired from 0 - 255	70	
WABBIT ONLY: Manual Switch Ops (Toggle or Push Button) Values = 0 or 1	71	
Number of Routes served by this Hare from 0 - 28	72	7

Green Font: "Pencil notations" relating to filling in (1) the top two-lines of the form, and (2) the position of the turnout (clear or throw) for each route that will have a train passing over this turnout.

Red Font: The CV lines/rows applicable to this Hare.

Blue Font: "Pencil notations" of the CV values being programmed into this Hare.

Although not always necessary, make the double entry of values shown for CV63. First enter the CV63 value of 42, next enter the CV63 value of 0, and continue, entering your remaining CV values

Early production models might not handle these 3 functions. There is no harm in trying to see if these functions will work on older models.

			Record Applicable CV Value		
			Use Either Left or Right Column		
			(Factory Default Setting for CVs = 0)		
			When Facing Tortoise Arm		
			If Arm to Right CV49 = 0	If Arm to Left, CV49 = 1	
Primary-Address & Route-Addresses Served by This Hare			**Routes Use These CV Values**		
			0 = Follow	0 = Follow	
			1 = Reverse	1 = Reverse	
			2 = Always Throw	2 = Always Clear	
			3 = Always Clear	3 = Always Throw	
Type of Address	Address Number	For each route that uses this turnout, state whether the turnout should be set to "Clear" or "Throw"	CV Number		
Primary	825	N/A	49		1
Route #1	22	Throw	50		3
Route #2	23	Clear	51		2
Route #3	24	Clear	52		2
Route #4	25	Clear	53		2
Route #5	26	Clear	54		2
Route #6	27	Clear	55		2
Route #7	28	Clear	56		2
Route #8			57		
Route #9			58		
Route #10			59		
Route #11			60		
Route #12			61		
Route #13			62		
Route #14			73		
Route #15			74		
Route #16			75		
Route #17			76		
Route #18			77		
Route #19			78		
Route #20			79		
Route #21			80		
Route #22			81		
Route #23			82		
Route #24			83		
Route #25			84		
Route #26			85		
Route #27			86		
Route #28			87		

If using the Hare to "Route Switch Point Power," set the dip-switches in the Hare's S-1 area as shown below. Circle the column you used.

S1, Switch Number	When Facing Tortoise Arm	
	Arm To Right	Arm To Left
1	ON	ON
2	ON	ON
3	OFF	ON
4	ON	OFF
5	OFF	ON
6	ON	OFF
7	OFF	ON
8	ON	OFF
9	OFF	ON
10	ON	OFF

Early production models might not handle Routes 14 through 28. There is no harm in trying on older models.

Note: For neat and easy updating purposes, record your data on this form in pencil.
    To download this form as a Microsoft Excel Spreadsheet, go to http://www.mgbrr.org/ --- at the menu bar, click on "Tips."

File:
Version-4