



# Intro to Decoder Programming with JMRI/DecoderPro

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JMRI (Java Model Railroading Interface) is open source (no cost) software for connecting a model railroad layout to a computer, and performing various model railroading tasks via the computer.

- JMRI was/is developed by a group of volunteer programmers under the leadership of Bob Jacobsen.
- JMRI uses the Java programming language.

JMRI continues to grow . . .



- JMRI has of an extensive library of model railroading software, and several front-end applications focusing on different areas of model railroading.
- All JMRI applications use this common library.
- JMRI Applications include:
  - DecoderPro Programming DCC decoders.
  - PanelPro Layout display for running trains.
  - Other applications (JmriDemo, LocoTools, etc.)



# What Computer Systems are Supported by JMRI?

### Windows - Vista, XP, 2000, 98SE

### Macintosh - MacOS X

Linux - several flavors



What Model Railroading Systems are Supported by JMRI?

Loconet - Digitrax (Chief, Empire Builder, Zephyr), Uhlenbrock - Intellibox Lenz - LI100, LI100F, LI101, LIUSB Atlas Commander NCE ZIMO MX-1 C/MRI Roco EasyDCC ZTC m-RPS Fleischmann Wangrow Hornby **SPROG** TMCC (Lionel) Protrak Grapevine XPA Modem Oak Tree Systems and More...



# What Model Railroading Tasks are Supported?

**Programming DCC decoders Computer Panel Displays (including full CTC Panel) Computer throttles** Consisting **Control of Turnouts (Including Optional Feedback) Routes (Controlling groups of Turnouts and/or Sensors)** Logix (Control and Automation Logic) **Control of Layout Lighting Fast Clock** and More ... **Control of Signals** 



How do I get started?

- 1. Connect your computer to your model railroad layout.
- 2. Download JMRI.

One download contains all JMRI applications. Large download - CD's are available.

- 3. Configure JMRI.
- 4. Test communications.

Detailed instructions for various computers and model railroading systems are on JMRI web site.

No computer programming is required.



Workshop system:

Digitrax DCS100 Locobuffer II Serial to USB adapter Macintosh PowerBook G4





# **Configuration Panel**

| \varTheta 🔿 🔿 Prefere         | ences                               |   |  |  |
|-------------------------------|-------------------------------------|---|--|--|
| Layout connection:            |                                     |   |  |  |
| LocoNet LocoBuffer-II         |                                     | • |  |  |
| Serial port:                  | (None)                              | - |  |  |
| Baud rate:                    | 19,200 baud (\$w1 off, \$w3 off)    | Ŧ |  |  |
| LocoBuffer-II connection uses | hardware flow control (recommended) | Ŧ |  |  |
| Command station type:         | DB150 (Empire Builder)              | Ŧ |  |  |
| GUI style:                    |                                     |   |  |  |
| ◯ CDE/Motif                   |                                     |   |  |  |
| Programmer defaults:          |                                     |   |  |  |
| Format: Comprehensive 🔹       |                                     |   |  |  |
| Show Advanced Preferences     |                                     |   |  |  |
|                               | Save                                | 1 |  |  |





# Select the type of layout connection from an extensive pull-down menu.

|  | Preferences                         |   |
|--|-------------------------------------|---|
| Layout connection:                                   |                                     |   |
| LocoNet LocoBuffer-II                                |                                     | • |
| C/MRbort   | (None)                              | ۲ |
| EasyDCC<br>Lenz LI100                                | 19,200 baud (Sw1 off, Sw3 off)      | = |
| Lenz LI100F   connection uses                        | hardware flow control (recommended) | 7 |
| Lenz LI101<br>Lenz LIUSB                             | DB150 (Empire Builder)              | Y |
| LocoNet LocoBuffer<br>LocoNet Intellibox Serial Port | tir 🔍 Metai 🕓 Mat OS X              | • |
| Programmer defaults:                                 |                                     |   |
| Format: Comprehensive                                |                                     | • |
| Show Advanced Preferences                            | Save                                |   |





Select the command station type from the menu of types compatible with the layout connection.

| \varTheta \varTheta Pref      | erences                             |   |
|-------------------------------|-------------------------------------|---|
| Layout connection:            |                                     |   |
| LocoNet LocoBuffer-II         |                                     | • |
| Serial port:                  | (None)                              | • |
| Baud rate:                    | 19,200 baud (Sw1 off, Sw3 off)      | • |
| LocoBuffer-II connection uses | hardware flow control (recommended) | Ŧ |
| Command station type:         | DB150 (Empire Builder)              | Ŧ |
| GUI style:                    | DB150 (Empire Builder)              |   |
|                               | DCS100 (Chief)                      |   |
| 🔾 CDE/Motif 🔅                 | DCS200 Mac OS X                     |   |
|                               | DCS50 (Zephyr)                      | _ |
| Programmer defaults:          | Intellibox                          |   |
| Format: Comprehensive         |                                     | • |
| Show Advanced Preferences     |                                     |   |
|                               | Save                                | 1 |





# Select a serial port from the menu listing the serial ports that JMRI can detect.

| 00                            | Prefere | nces   |          |        |
|-------------------------------|---------|--|----------|--------|
| Help                          |         |  |          |        |
| Layout connection:            |         |  |          |        |
| LocoNet LocoBuffer-II         |         |  |          | -      |
| Serial port:                  |         | /dev/tty.modem   |          | •      |
| Baud rate:                    |         | /dev/tty.modem<br>/dev/cu.modem                        |          | Ē)     |
| LocoBuffer-II connection uses |         | /dev/tty.usbserial-FTBQLF2A                            |          |        |
| Command station type:         |         | /dev/cu.usbserial-FTBQLF2A<br>/dev/tty.Bluetooth-Modem | <b>₽</b> | )      |
| GUI style:                    |         | /dev/cu.Bluetooth-Modem                                |          |        |
| CDE/Mo                        | tif 🖲 🎙 | /dev/tty.Bluetooth-PDA-Sync                            |          | A<br>Y |
| Programmer defaults:          |         |  |          |        |
| Format: Comprehensive         |         |  |          | •      |
| Show Advanced Preferences     |         |  |          |        |
|                               |         | Save   |          |        |

#### Select a default programmer (Comprehensive is usually best).

| 😝 🖯 😁 Prefe                   | erences                             |
|-------------------------------|-------------------------------------|
| -Layout connection:           |                                     |
| LocoNet LocoBuffer-II         | -                                   |
| Serial port:                  | /dev/cu.usbserial-FTBQLF2A          |
| Baud rate:                    | 19,200 baud (Sw1 off, Sw3 off)      |
| LocoBuffer-II connection uses | hardware flow control (recommended) |
| Command station type:         | DCS100 (Chief)                      |
| -GUI style:                   |                                     |
| CDE/Motif (                   | ) Metal 🗢 Mac OS X                  |
|                               |                                     |
| Programmer defaults:          |                                     |
| Format: Comprehensive         | -                                   |
| Comprehensive                 |                                     |
| Custom                        |                                     |
| ESU                           |                                     |
| Registers                     |                                     |
| Sample Club                   |                                     |
| TrainShowBasic                |                                     |
| Tutorial                      |                                     |
| Zimo                          | <b>~</b>                            |





# Click the "Save" button to write the connection configuration to disk.

| 00                            | Preferences                         |
|-------------------------------|-------------------------------------|
| Layout connection:            |                                     |
| LocoNet LocoBuffer-II         | -                                   |
| Serial port:                  | /dev/cu.usbserial-FTBQLF2A          |
| Baud rate:                    | 19,200 baud (Sw1 off, Sw3 off)      |
| LocoBuffer-II connection uses | hardware flow control (recommended) |
| Command station type:         | DCS100 (Chief)                      |
| GUI style:                    |                                     |
| CDE/Mot                       | tif 🖲 Metal 🔾 Mac OS X              |
| Programmer defaults:          |                                     |
| Format: Comprehensive         |                                     |
| Show Advanced Preferences     |                                     |
|                               | Save                                |



Click the "Yes" button, to quit the program. Restart the JMRI application.



Notes: Restart is required anytime preferences are changed for the preferences to take effect.

**Preferences must be set for each JMRI application. They each have separate preferences files.** 



# The program is set up according to the saved preferences.



# Note: Startup window contains program version and Java version, in addition to connection information.



# **Connection Testing Example**

Select "Monitor LocoNet" to snoop on traffic.





- 1. Plug in a throttle, and select a locomotive.
- 2. Look for traffic on the Loconet.

| 00   | LocoNet Traffic   |   |  |  |
|--|---|---|--|--|
| Help                                       |   |   |  |  |
| perspeed or loco in sit                    | 10(2(019  |   |  |  |
| Set speed of loco in slo                   | lot 2 to 16   | - |  |  |
| Set speed of loco in slo                   | lot 2 to 15   |   |  |  |
| Set speed of loco in slo                   | lot 2 to 0  |   |  |  |
| Request data/status fo                     | for slot 123  |   |  |  |
| Read Fast Clock: (SYN)                     | VC reply)   |   |  |  |
| Runnin                                     | ng. rate is 4:1. Dav 28. 9:33.731. Last set by ID 0x0 (0) |   |  |  |
| Master                                     | r controller implements LocoNet 1, 1.                     |   |  |  |
| Track                                      | Status is On Running                                      |   |  |  |
| Progra                                     | amming Track is Available                                 |   |  |  |
| Set sneed of loco in slu                   | lot 2 to 0  |   |  |  |
|  |   | - |  |  |
| 4  |   |   |  |  |
|  |   | • |  |  |
| Clear screen                               | n Freeze screen Show raw data Show timestamps             |   |  |  |
| Choose log file Start logging Stop logging |   |   |  |  |
| Add Message                                |   |   |  |  |



### 1. Select Power Control...

#### 2. See if you can turn track power on/off.

| 00        |  | DecoderPro   |  |
|-----------|--|--|--|
| File Edit | Tools Roster Panels  | LocoNet Debug Help   |  |
|           | Programmers rF<br>Tables in<br>Throttles Consisting Tool             | Pro 2.1.6, part of the JMRI<br>nri.sf.net/DecoderPro<br>ed via LocoNet LocoBuffer-II | project<br>on /dev/cu.usbserial-FTBQLF2A |
|           | Clocks rs Power Control Turnout Control                              | sion 1.5.0_13 (en_US)<br>Programming Track) Progr                                    | rammer                                   |
|           | Simple Signal Logic<br>Sensor Groups<br>Speedometer<br>Light Control | Mode (Main Track) Program<br>Quit  | nmer                                     |
|           | Send DCC packet USS CTC Tools  |  | e O O Power Panel                        |
|           |  |  | Layout power:On                          |





If traffic looks reasonable and power goes on/off.

Open a JMRI throttle to test further.

| 0      | 0   |                         |                                     |         | Decode                                | erPro  |         |                           |
|--------|-----|-------------------------|-------------------------------------|---------|---------------------------------------|--|---------|---------------------------|
| File E | dit | Tools                   | Roster                              | Panels  | LocoNet                               | Debug Help   | •       |                           |
|        | 5   | Progra<br>Table         | ammers<br>s                         | )<br>   | rPro 2.1.6, j                         | part of the JM                                       | IRI pro | ject                      |
| Þ      |     | Consi<br>Clock<br>Power | ties<br>isting To<br>s<br>r Control | ol<br>• | Save Throt<br>Load Thro<br>Edit Throt | ttle<br>ttle Layout<br>ttle Layout<br>tle Preference |         | dev/cu.usbserial-FTBQLF2A |
|        |     | Turno                   | ut Contr                            | ol      | Programm                              | ing Track) Pr  | ogram   | mer                       |
|        |     | Simpl                   | e Signal                            | Logic   | Mode (Mai                             | n Track) Prog  | ramm    | er                        |
|        |     | Speed<br>Light          | lometer .<br>Control .              | ·<br>   | Qu                                    | it   |         |                           |
|        |     | Send                    | DCC pac                             | ket     |                                       |  |         |                           |
|        |     | USS C                   | TC Tools                            | 5 Þ     |                                       |  |         |                           |



Select a train from the Roster.

- or -

Type in a locomotive address.

Click the "Set" button.

| 00          | Throttle                               |
|-------------|--|
| View Edit P | wer: 🔿 Help                            |
| 🗂 🗗 🖂       | 🔲 Function Panel 🛛 🗗 🖂                 |
| -100%       | F1 F2 F3                               |
|             | F4 F5 F6                               |
|             | F7 F8 F9                               |
| -50%        | F10 F11 F12                            |
|             | F13 F14 F15                            |
|             | * F0 #                                 |
| 🖒 – Stop    |  |
| ○ Forward   | Address Panel 🗗 🛛                      |
| O Reverse   | Set                                    |
| STOP!       | <no loco="" selected=""> 💌</no>        |
| Idle        | <no loco="" selected="">  CPE 742</no> |
|             | CPE 934                                |
|             | FA-11500                               |
|             | John W Shay                            |
|             | John W. Shay                           |
|             | Penn 8702                              |



Run a train from the computer.

If all works OK, then JMRI is successfully communicating with your command station.





# Configuration preferences may be accessed at any time via the Edit menu.





Advanced Preferences

->

Allow many useful options including:

A second layout connection.

Automatic loading files at startup.

Running scripts at startup.

| 00                            | Prefere              | nces                                |    |
|-------------------------------|----------------------|-------------------------------------|----|
| Help                          |                      |                                     |    |
| Layout connection:            |                      |                                     |    |
| LocoNet LocoBuffer-II         |                      |                                     | -  |
| Serial port:                  |                      | /dev/cu.usbserial-FTBQLF2A          | •  |
| Baud rate:                    |                      | 19,200 baud (Sw1 off, Sw3 off)      | •  |
| LocoBuffer-II connection uses | 5                    | hardware flow control (recommended) | \$ |
| Command station type:         |                      | DCS100 (Chief)                      | •  |
| GUI style:                    |                      |                                     |    |
|                               | 🔾 CDE/Motif 🔘 M      | letal 🔘 Mac OS X                    |    |
| Programmer defaults:          |                      |                                     |    |
| Format: Comprehensive         |                      |                                     | •  |
| Show Advanced Pr              | references           |                                     |    |
| Aux layout connection 2:      |                      |                                     |    |
| (none selected)               |                      |                                     | ·  |
| Aux layout connection 3:      |                      |                                     |    |
| (none selected)               |                      | -                                   | ·  |
| -Aux layout connection 4:     |                      |                                     | =  |
| (none selected)               |                      | -                                   | -  |
| Brogrammer defaults           |                      |                                     |    |
| riogrammer derautis.          |                      |                                     |    |
|                               | Show em              | pty tabs                            |    |
| Locale:                       |                      |                                     |    |
| -<br>-                        | English (United Stat | es) 🔻                               |    |
|                               |                      |                                     | _  |
| Do action at startup:         |                      |                                     |    |
|                               | Add Ac               | tion                                |    |
| Create buttons:               |                      |                                     | Ļ  |
| •                             |                      |                                     |    |
|                               |                      | Save                                |    |



How do I get help?

- 1st Most JMRI windows have a Help menu.
  Window Help ... Documentation related to that window
  General Help ... Overall JMRI documentation
- 2nd The JMRI web site http:// jmri.sourceforge.net/

Documentation and detailed instructions

3rd - JMRI Yahoo discussion group. jmriusers
Monitored by JMRI 'experts', eager to provide help.
Information on JMRI web site on how to sign up.



DecoderPro is a JMRI application.

- DecoderPro is a better tool for programming DCC decoders.
- DecoderPro simplifies the job of configuring complicated DCC decoders.
- DecoderPro supports mobile decoders (decoders in locomotives).
- DecoderPro supports some static decoders.





**Decoder** - small microcomputer based control unit **Mobile Decoder** - Decoder in a locomotive, "decodes" DCC commands to control locomotive. **CV** (**Control Variable**) - 8-bit data byte in a decoder that specifies user options. **Programming a Decoder** - setting the values of the CV's to user's options. Decoders have many CV's. Many CV's follow **NMRA Standards**, but some are vendor specific. Each mobile decoder has an Address - a number that allows the locomotive to be uniquely identified.



Decoder (locomotive) addresses can be 2 digits or 4 digits on modern decoders and DCC throttles.

Usually set the address to the locomotive number.

Most decoders are set to address 03 on arrival.

A locomotive will respond to speed control and function commands that bear its address.

Setting the address is usually the first (and sometimes the only) programming needed.

It's easy to set up an address in DecoderPro.



### **Example - Setting the address** of a new decoder

Put the locomotive with the new decoder on the programming track.

Start Decoder Pro. When the window below comes up, click "Service Mode (Programming Track) Programmer"









DecoderPro identified the decoder as a Digitrax DH121 with others possible.

(Sometimes the user has to choose among several possibilities.)

Click on DH121, to select it, and click "Open Programmer". <-

Multiple possible Decoders detected - Manually select from highlighted Decoders or Family



#### Fill in Roster information and click "Save".

| 0 0                       | Program <   | new loco> ii   | n Service Mode (Pro | ogramming Track) |                  |
|---------------------------|-------------|--|---------------------|------------------|------------------|
| File Reset                |             |  |                     |                  |                  |
| Analog Controls           | Consist Ac  | lvanced S  | ound Sound Lev      | els CVs          |                  |
| Roster Entry              | Basic       | Motor  | Speed Control       | Function M       | ap Lights        |
| ID:                       |             | <new loco:<="" td=""><td>&gt;</td><td></td><td></td></new> | >                   |                  |                  |
| Road N                    | lame:       |  |                     |                  | N.               |
| Road N                    | lumber:     |  |                     |                  |                  |
| Manufa                    | acturer:    |  |                     |                  |                  |
| Owner                     | :           |  |                     |                  |                  |
| Model:                    |             |  |                     |                  |                  |
| DCC A                     | ddress:     |  |                     |                  |                  |
| Comm                      | ent:        |  |                     |                  |                  |
|                           |             |  |                     |                  |                  |
|                           |             |  |                     |                  | <b>•</b>         |
| Decode                    | ar Eamila   | Pacic STD  |                     |                  |                  |
| Decode                    | er Model:   | DH121  |                     |                  |                  |
| Decode                    | er Comment: |  |                     |                  | <b>A</b>         |
|                           |             |  |                     |                  |                  |
|                           |             |  |                     |                  | <b>▼</b>         |
| Filenar                   | ne          | •  |                     |                  |                  |
| Thena                     |             | Save   | Reset to default    | c .              |                  |
|                           |             | Jave   | Reset to default    | 3                |                  |
|                           |             |  |                     |                  |                  |
| Read changes on a         | ll sheets   | Write chang  | jes on all sheets   | Read all sheets  | Write all sheets |
| Page mode programming Set |             |  |                     |                  |                  |
| idle                      |             |  |                     |                  |                  |



#### Click the Basic tab.

| Program <new loco=""> in Service Mode (Programming Track)</new> |            |                   |                 |                  |  |  |
|---|------------|-------------------|-----------------|------------------|--|--|
| File Reset  |            |                   |                 |                  |  |  |
| Analog Controls Consist Adv                                     | /anced S   | Sound Sound Leve  | els CVs         |                  |  |  |
| Roster Entry Basic  | Motor      | Speed Control     | Function M      | lap Lights       |  |  |
| ID:   | FA-1 150   | 0                 |                 |                  |  |  |
| Road Name:  | UP 1500    |                   |                 |                  |  |  |
| Road Number:  | 1500       |                   |                 |                  |  |  |
| Manufacturer:   | Walthers 1 | Frainline         |                 |                  |  |  |
| Owner:  | Dave Duci  | hamp              |                 |                  |  |  |
| Model:  | ALCO FA-   | 1                 |                 |                  |  |  |
| DCC Address:  | 3 S        | hort 💌            |                 |                  |  |  |
| Comment:  |            |                   |                 |                  |  |  |
|   |            |                   |                 |                  |  |  |
|   |            |                   |                 | <b>▼</b>         |  |  |
| Decoder Family  | Rasic STD  | 1                 |                 |                  |  |  |
| Decoder Model: DH121  |            |                   |                 |                  |  |  |
| Decoder Comment:  |            |                   |                 |                  |  |  |
|   |            |                   |                 |                  |  |  |
|   |            |                   |                 |                  |  |  |
| Filename:   |            |                   |                 |                  |  |  |
| Save Reset to defaults  |            |                   |                 |                  |  |  |
|   |            |                   |                 |                  |  |  |
|   |            |                   |                 |                  |  |  |
| Read changes on all sheets                                      | Write chan | ges on all sheets | Read all sheets | Write all sheets |  |  |
| Pag   | ge mode pi | rogramming        | Set             |                  |  |  |
| Poster file E4, 1, 1500 yml saved OK                            |            |                   |                 |                  |  |  |



# Click "Read full sheet". Yellow items are replaced with factory default values.

| \varTheta 🔿 🔿 Program <new loco=""> in Service Mode (Programming Track)</new> |  |            |              |                 |          |
|---|--|------------|--------------|-----------------|----------|
| File Reset  |  |            |              |                 |          |
| Analog Controls Consist   | Advanced Sound Sound                           | Levels (   | CVs          |                 |          |
| Roster Entry Basic  | Motor Speed Con                                | trol       | Function M   | ap Li           | ghts     |
| Active DCC Address: 3   | One byte (short) addres Two byte (extended) ad | s<br>dress |              |                 |          |
| Primary Address 3   |  |            | User P       | rivate ID #1    | 0        |
| Long Address 0  |  | _          | User P       | rivate ID #2    | 0        |
| Address Format C  | ine byte (short) address                       | •          |              |                 |          |
| Normal direction of motion f  | orward 🔻                                       |            | Man          | ufacturer ID    | 0        |
| Speed steps 2   | 8 speed step format 💌                          |            | Manulacturer | version no      | <b>,</b> |
| Analog (DC) Operation [   | C conversion enabled 💌                         |            |              |                 |          |
|   |  |            |              |                 |          |
| Read changes on sheet   | Write changes on sheet                         | Read ful   | l sheet M    | /rite full shee | t        |
| Read changes on all sheets  | Write changes on all sheet                     | s Rea      | d all sheets | Write all s     | heets    |
|   | Page mode programming                          | Set        |              |                 |          |
| Roster file FA_1_1500.xml saved OK  |  |            |              |                 |          |



### Switch off analog, and set new two-byte address.

Click "Write changes on sheet" to send to loco.

| Program <new loco=""> in Service Mode (Programming Track)</new>   |  |                |                    |                                  |     |
|---|--|----------------|--------------------|----------------------------------|-----|
| File Reset  |  |                |                    |                                  |     |
| Analog Controls Consist   | Advanced Sound Soun  | d Levels CVs   |                    |                                  |     |
| Roster Entry Basic  | Motor Speed Co   | ontrol I       | Function Ma        | ap Ligh                          | ts  |
| Active DCC Address: 1500  | <ul> <li>One byte (short) addr</li> <li>Two byte (extended)</li> </ul> | ess<br>address |                    |                                  |     |
| Primary Address 3<br>Long Address 1<br>Address Format 1   | 500<br><b>(wo byte (extended) addres</b>                               | s 🕶            | User Pi<br>User Pi | rivate ID #1 0<br>rivate ID #2 0 |     |
| Normal direction of motionforwardManufacturer ID129Speed steps28 speed step formatManufacturer Version No34 |  |                |                    |                                  |     |
| Analog (DC) Operation   | MRA Digital only   |                |                    |                                  |     |
| Read changes on sheet   | Write changes on sheet   | Read full sl   | neet W             | rite full sheet                  |     |
| Read changes on all sheets  | Write changes on all she   | ets Read al    | l sheets           | Write all she                    | ets |
| Page mode programming Set   |  |                |                    |                                  |     |
|   | OK   |                |                    |                                  |     |



### Return to Roster Entry and "Save" the Roster file to disk.

### All done!

| Program <new loco=""> in Service Mode (Programming Track)</new> |                             |                 |                  |  |  |  |
|---|-----------------------------|-----------------|------------------|--|--|--|
| File Reset  |                             |                 |                  |  |  |  |
| Analog Controls Consist Adv                                     | anced Sound Sound Leve      | els CVs         |                  |  |  |  |
| Roster Entry Basic  | Motor Speed Control         | Function Map    | Lights           |  |  |  |
| ID:   | FA-1 1500                   |                 |                  |  |  |  |
| Road Name:  | UP 1500                     |                 |                  |  |  |  |
| Road Number:  | 1500                        |                 |                  |  |  |  |
| Manufacturer:   | Walthers Trainline          |                 |                  |  |  |  |
| Owner:  | Dave Duchamp                |                 |                  |  |  |  |
| Model:  | ALCO FA-1                   |                 |                  |  |  |  |
| DCC Address:  | 3 Short 🔻                   |                 |                  |  |  |  |
| Comment:  |                             |                 |                  |  |  |  |
|   |                             |                 |                  |  |  |  |
|   |                             |                 |                  |  |  |  |
| Deceder Family  | A Pacia STD                 |                 |                  |  |  |  |
| Decoder Model:  | DH121                       |                 |                  |  |  |  |
| Decoder Comment:  |                             |                 |                  |  |  |  |
|   |                             |                 |                  |  |  |  |
|   |                             |                 |                  |  |  |  |
| Filename:   |                             |                 |                  |  |  |  |
| Save Reset to defaults  |                             |                 |                  |  |  |  |
| Save Reset to defaults  |                             |                 |                  |  |  |  |
|   |                             |                 |                  |  |  |  |
| Read changes on all sheets                                      | Write changes on all sheets | Read all sheets | Write all sheets |  |  |  |
| Pa  | je mode programming         | Set             |                  |  |  |  |
| Roster file EA 1, 1500 yml saved OK                             |                             |                 |                  |  |  |  |



### What are Roster Files?

DecoderPro stores the final information for each decoder in a Roster File.
These Roster Files are used to construct a Roster menu for JMRI applications.
A Roster file allows easy reprogramming if decoder needs to be reset.
The Roster menu allows easy

The Roster menu allows easy selection of a loco in JMRI tools--decoder programmer, throttle, consist, etc.





### The Roster Menu

Provides useful functions when working with your Rosters.

Accessed in Programmer Setup window and in main DecoderPro window.

| File       Edit       Tools       Roster       Panels       LocoNet       Debug       Help         Import       Copy       Entry       Import       Intry       Intry <td< th=""><th>0 0</th><th>DecoderPro</th><th></th></td<> | 0 0             | DecoderPro   |   |
|---|-----------------|--|---|
| Dect       Copy Entry       rt of the JMRI project         Import Entry       Export Entry       rt of the JMRI project         Delete Entry       Delete Entry       t LocoBuffer-II on /dev/cu.usbserial-FTBQLF2A         Print Summary       B (en_US)         Service Mode (Programming Track) Programmer   | File Edit Tools | Roster Panels LocoNet Debug He   | lp  |
| Service Mode (Programming Track) Programmer   |                 | Copy Entry Reference of the JecoderPro<br>Export Entry Reference of the JecoderPro<br>Export Entry t LocoBuffe<br>Print Summary B (en_US)<br>Print Preview Summary | JMRI project<br>er-II on /dev/cu.usbserial-FTBQLF2A |
| Operations Mode (Main Track) Programmer Quit  |                 | Service Mode (Programming Track)<br>Operations Mode (Main Track) Pro<br>Quit   | Programmer<br>ogrammer                              |



### Changing a decoder's programming

<-

| 🤭 🔿 🚫  Se                              | ervice Mode (Programming Track) Programmer Setup  |           |
|--|---|-----------|
| File Roster                            |   |           |
|  | Page mode programming Set   |           |
| Use locomotive se                      | ttings for: <none -="" loco="" new=""></none>   | ▼ Ident   |
| Decoder installed:<br>Programmer forma | <ul> <li>NMF <none -="" loco="" new=""></none></li> <li>Atla CPE 742</li> <li>GPE 934</li> <li>Bact FA-1 1500</li> <li>John W Shay</li> <li>CT John W Shay</li> <li>CT John W. Shay</li> <li>CT Digit Ray</li> <li>CVP</li> <li>Penn 8702</li> <li>Digit Ray</li> <li>Electronic Solutions UIm GmbH</li> <li>Haber and Koenig Electronics Grr</li> <li>Hornby</li> <li>Kuehn</li> <li>Lenz</li> <li>MERG</li> <li>Public-domain and DIY</li> <li>MRC</li> <li>Massoth Elektronik, GmbH</li> <li>North Coast Engineering</li> <li>New York Byano Limited</li> <li>Mersion</li> <li>New York Byano Limited</li> </ul> | m decoder |
|  | Onen Pi   | rogrammer |
|  | Openti  | - granner |
|  | idle  |           |

Select loco from Roster - or -<- Click "Ident" to have DecoderPro read the loco address and find it in the Roster.

After loco is identified, click "Open Programmer"

Note: "Open Programmer" is not active until a decoder is identified.



### The saved information is back!

### Click "Speed Control".

| Program FA-1 1500 in Service Mode (Programming Track) |  |  |  |  |  |
|---|--|--|--|--|--|
| File Reset  |  |  |  |  |  |
| Lights Analog Controls Cons                           | sist Advanced Sound Sound Levels CVs                         |  |  |  |  |
| Roster Entry Basic                                    | Motor Speed Control Function Map                             |  |  |  |  |
| ID:   | FA-1 1500  |  |  |  |  |
| Road Name:  | UP 1500  |  |  |  |  |
| Road Number:  | 1500   |  |  |  |  |
| Manufacturer:   | Walthers Trainline   |  |  |  |  |
| Owner:  | Dave Duchamp   |  |  |  |  |
| Model:  | ALCO FA-1  |  |  |  |  |
| DCC Address:  | 1500 Long 👻  |  |  |  |  |
| Comment:  |  |  |  |  |  |
|   | ▼  |  |  |  |  |
| Decoder Family:                                       | Basic STD  |  |  |  |  |
| Decoder Model: DH121                                  |  |  |  |  |  |
| Filename: FA_1_1500.xml                               |  |  |  |  |  |
| Read changes on all sheets                            | Write changes on all sheets Read all sheets Write all sheets |  |  |  |  |
| Page mode programming Set                             |  |  |  |  |  |
| albi  |  |  |  |  |  |



Yellow color indicates the values are from the Roster file. Orange - changed, but not written to decoder.

| 😝 🔿 🔿 Program F/  | A-1 1500 in Service Mode (P      | rogramming Track)                       |                  |                            |
|---|----------------------------------|---|------------------|----------------------------|
| File Reset<br>Lights Analog Controls Cons<br>Roster Entry Basic | sist Advanced Sound<br>Motor Spe | Sound Levels CVs                        | Function Map     | Enter a                    |
|   | Use Vstart 7 Vmid 0 Visian       | Vstart, Vmid, Vhigh                     |                  | value in<br>"Vstart".      |
|   | Forward Trim C<br>O Use tabl     | ) Reverse Trim<br>e in CVs 66 through 9 | <mark>○</mark>   | Click<br>"Write<br>changes |
| Speed Table 9 18 28 37 47 56                                    | 66 75 85 94 103 113              |   |                  | on sheet"                  |
| Read changes on sheet   | Write changes on sheet           | Read full sheet                         | Write full sheet | <-                         |
| Pa  | ige mode programming             | Set                                     | write an sneets  | •<br>•                     |



Changed Vstart was written to the decoder.

Select File>Save... to save the change to disk.

| 😝 🔿 🔿 🛛 Program            | n FA-1 1500 in Service Mode | e (Programming Track)   |                       |                   |
|----------------------------|-----------------------------|-------------------------|-----------------------|-------------------|
| File Reset                 |                             |                         |                       |                   |
| Save 🕨 🤉 Controls 🛛 C      | onsist Advanced Sound       | I Sound Levels CV       | s                     | It's done         |
| Print <b>by</b> Bas        | ic Motor S                  | peed Control            | Function Map          |                   |
| Print Preview 🕨            |                             |                         | ▲                     |                   |
| Import 🕨                   | <u>Ο ι</u>                  | Jse Vstart, Vmid, Vhigh |                       |                   |
| Export •                   |                             |                         |                       | <b>Go run the</b> |
|                            | Vstart 7                    |                         |                       |                   |
|                            | Vmid <mark>0</mark>         | X                       |                       | IOCO!             |
|                            | Vhigh <mark>0</mark>        | $\vee$                  | ' =                   |                   |
|                            | Forward Trir                | n O Reverse Trir        | n 0                   |                   |
|                            |                             |                         |                       |                   |
|                            |                             |                         |                       |                   |
|                            | 🔘 Use ti                    | able in CVs 66 through  | <mark>95</mark>       |                   |
|                            |                             |                         |                       |                   |
| Speed lable                | 66 75 85 94 103 1           | 13 122 132 141 151      | 160 170 179 188       |                   |
|                            |                             |                         |                       |                   |
|                            |                             |                         |                       |                   |
|                            |                             |                         |                       |                   |
|                            |                             |                         |                       |                   |
|                            |                             | Dead faill also as      | Million faill also as |                   |
| Read changes on sheet      | write changes on sheet      | Read Tull Sheet         | write full sneet      |                   |
| Read changes on all sheets | Write changes on all shee   | ets Read all sheets     | Write all sheets      |                   |
|                            | Page mode programming       | Set                     |                       |                   |
|                            | 0K                          |                         |                       |                   |



# Miscellaneous Info and Tips

Support for new decoders is continuously added to DecoderPro.

- DecoderPro works through the command station, so it's usually limited to what you can do with your throttle. Think of DecoderPro as a smart throttle
- DecoderPro supports other modes of programming. Access these other modes using the "Set..." button to get the dialog shown at the right. **Some decoders need a different mode for programming.**



Some new sound decoders need a programming track booster to communicate with some command stations.



**Example: Procedure for Speed Matching Engines for Consists** 

Object: To match the speed of two or more engines.

- Preliminary: Determine which engine runs slowest. Warm up engines (3-4 minutes). Make sure wheels and track are clean!
- 2. Make sure all engines have DecoderPro roster files, and start speeds are set.
- 3. Make a consist with your slowest engine as the lead engine. **Do not couple the engines.**



### Select the JMRI Consisting Tool.

| 00        | DecoderPro   |
|-----------|--|
| File Edit | Tools Roster Panels LocoNet Debug Help   |
|           | Programmers       ,         Tables       ,         Throttles       ,         Consisting Tool       ,         Clocks       ,         Power Control       ,         Power Control       ,        |
|           | Turnout Control       Programming Track) Programmer         Simple Signal Logic       Mode (Main Track) Programmer         Sensor Groups       Quit         Light Control       Image: Control |
|           | Send DCC packet USS CTC Tools  |



Give the new consist a two-digit address, and add the two engines to the table for the new consist, the slowest first.

| 00   |                                  | Consist Co                             | ontro     | l                 |        |     |
|--|----------------------------------|--|-----------|-------------------|--------|-----|
| Consist: 99 99(5) 💌 🖲 Advanced Consist 🔿 Command Station Consist |                                  |  |           |                   |        |     |
| New Locomotive   | 9735 <b>GP6</b>                  | 0 9735                                 | -         | 🗹 Direction I     | Normal | add |
| Address<br>9717(L)   | Ros GP30<br>GP40<br>GP60<br>GP60 | 3-2 2371<br>) 3059<br>) 9717<br>) 9735 |           | tion Normal?<br>₽ |        | DEL |
|  | SD4<br>SW8<br>SW8                | D-2 6799<br>1112<br>-1112              | =<br>Thro | ttle              |        |     |
| Tower TC-64  Operation Completed Successfully                    |                                  |  |           |                   |        |     |



After locomotives are in the table, hit the "Throttle" button to make the consist and open a new JMRI Throttle to control it.

| 😝 🖯 🕤 Consist Control   |                 |                   |    |  |  |  |
|---|-----------------|-------------------|----|--|--|--|
| Consist: 99 996) 🔻 🖲 Advanced Consist 🔿 Command Station Consist |                 |                   |    |  |  |  |
| New Locomotive 🔄 🔽 🗹 Direction Normal 🔄                         |                 |                   |    |  |  |  |
| Address   | Roster Entry    | Direction Normal? |    |  |  |  |
| 9717(L)   | DEL             |                   |    |  |  |  |
| 9735(L) V DEL   |                 |                   |    |  |  |  |
|   |                 |                   |    |  |  |  |
| Delete Throttle   |                 |                   |    |  |  |  |
|   | Operation Compl | eted Successfully | 1. |  |  |  |



You can now run the consist using this throttle.

Remember: Do not couple the locos. Space them about 12 inches apart.





# 4. Open a programmer for the faster loco in DecoderPro using "Ops mode".

#### Select "Operations Mode (Main Track) ...."





Select the roster entry for the faster loco, and click "Open Programmer".

| \varTheta 😑 😁 Ops-mode Programmer Setup |               |     |  |  |  |  |
|---|---------------|-----|--|--|--|--|
| Roster                                  |               |     |  |  |  |  |
| Select from roster:                     |               |     |  |  |  |  |
| GP60 9735                               |               |     |  |  |  |  |
| Programmer format:                      | Comprehensive | -   |  |  |  |  |
| Open programmer                         |               |     |  |  |  |  |
|   |               | //, |  |  |  |  |



# 5. Slow the faster loco using the decoder speed table.

#### Select the "Speed Control" pane.

| $\bigcirc \bigcirc \bigcirc \bigcirc$ | Program GP60 9735 on main track |   |                 |          |          |  |  |
|---------------------------------------|---------------------------------|---|-----------------|----------|----------|--|--|
| File                                  |                                 |   |                 |          |          |  |  |
| Analog Controls Consist A             | dvanced S                       | Sound Sound Level                       | s CVs Digitra   | x        |          |  |  |
| Roster Entry Basic                    | Motor                           | Speed Control                           | Function M      | ap       | Lights   |  |  |
| ID:                                   | GP60 973                        | 35                                      |                 |          |          |  |  |
| Road Name:                            | SP 9735                         |   |                 |          |          |  |  |
| Road Number:                          | 9735                            |   |                 |          |          |  |  |
| Manufacturer:                         | Lifelike Pr                     | Lifelike Proto 2000                     |                 |          |          |  |  |
| Owner:                                | Dave Duc                        | Dave Duchamp                            |                 |          |          |  |  |
| Model:                                | GP60                            | GP60                                    |                 |          |          |  |  |
| DCC Address:                          | 9735 L                          | ong 💌                                   |                 |          |          |  |  |
| Comment:                              |                                 |   |                 | <b></b>  |          |  |  |
|                                       |                                 |   |                 |          |          |  |  |
|                                       | 4                               |   |                 | •        |          |  |  |
| Decoder Family:                       | Series 3 v                      | vith FX3. silent. readb                 | ack             |          |          |  |  |
| Decoder Model:                        | DH163L0                         | , |                 |          |          |  |  |
| Decoder Comment:                      | Number b                        | ioard light hooked to Fi                | 1               | <b></b>  |          |  |  |
|                                       |                                 |   |                 | _        |          |  |  |
|                                       | 4                               |   |                 |          |          |  |  |
| Filename:                             | GP60_973                        | 35.xml                                  |                 |          |          |  |  |
|                                       |                                 | Save                                    |                 |          |          |  |  |
| Peset to defaults                     |                                 |   |                 |          |          |  |  |
| Reset to defaults                     |                                 |   |                 |          |          |  |  |
| Read changes on all sheets            | Write chan                      | ges on all sheets                       | Read all sheets | Write al | l sheets |  |  |
| idle                                  |                                 |   |                 |          |          |  |  |



### Select "Use Table", and reduce the value in the 28th (last) step of the speed table. Click "Match Ends" to adjust all steps.





# Click "Write changes on sheet" to send the new table to the decoder.





# As each step is written, DecoderPro indicates progress as shown below.





### 6. Continue to adjust speed table until loco runs the same speed as the lead engine.

Run consist the same speed each trial (50% works well).

Stop consist between speed table adjustments if the speeds are much different.

Note: When programming on the main, CV's usually cannot be read--only written!

**Remember to Save the roster file when done.** 



Decoder was programmed to match the speed of the two engines, and engines were consisted without having to know anything about individual CV's.



### Isn't that a great way to program DCC decoders!



## **Sound Decoder Demo**

### **DecoderPro Animated Demos:**

### Peter Ulvestad (Edmonton Model Railroad Association)

### http://www3.telus.net/public/ulvestad/DecoderProDemos.html

