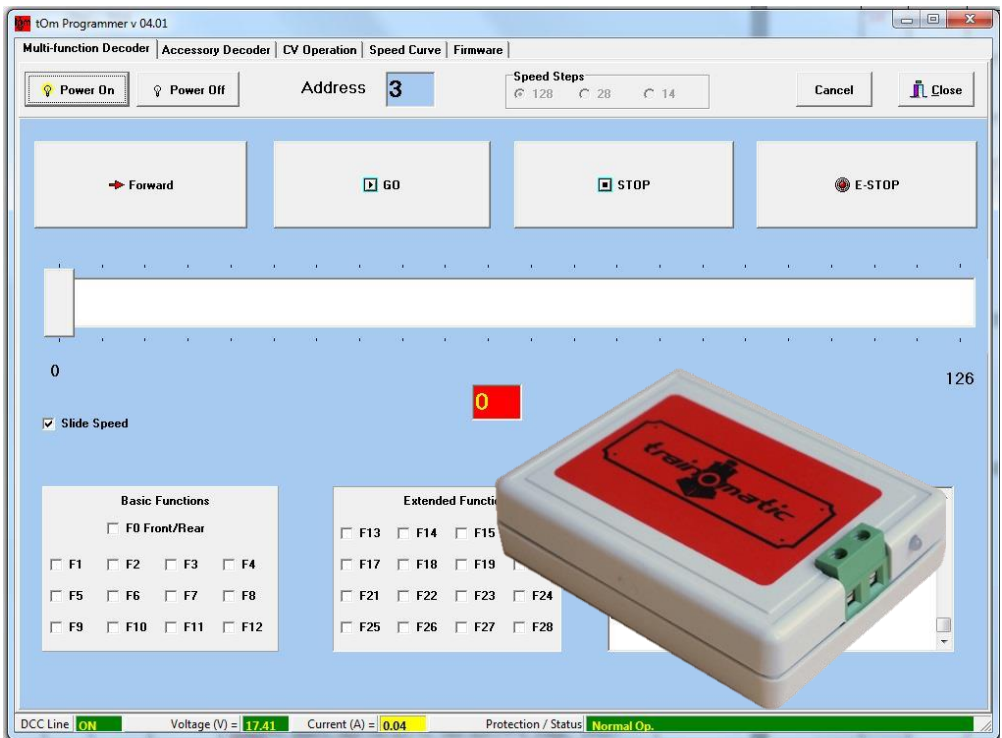




tOm Programmer

User Manual

- Software version 4.01 -





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Please read this manual carefully before carrying out the installation!!! Although our products are very robust, incorrect wiring may destroy the module!

During the operation of the device the specified technical parameters shall always be met. At the installation the environment shall be fully taken into consideration. The device must not be exposed to moisture and direct sunshine.

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1. Features

The tOm Programmer is a PC interface used for programming DCC mobile decoders. The programmer generates the standard DCC signal. The use of the programmer requires connecting to a personal computer on which runs the tOmprogrammer software. With MS Windows GUI the programming of the DCC decoders is very simple, even if you have no prior experience in programming system variables (CV). tOm Programmer provides access to all CVs both in a "programming track" (PT / Programming Track) and in operating mode (PoM, Programming on the Main). The virtual control panel allows the control of multiple locomotives simultaneously, and the access to various functions.

2. Operating System Requirements

To operate the tOmProgrammer software a personal computer with MS Windows 98/2000/XP or Windows7 operating system is needed, with an available USB port. The free space on the hard drive should be of at least 10 MB.

3. Content and accesories

tOmProgrammer is delivered packed in blister. When unpacking, check the contents: tOmProgrammer (tOm 02110101), USB cable.



Power Supply is not included.

4. Technical parameters

-power supply:	16-18 Vdc
-Maximum current consumption:	1A (contains protection)
-Dimensions:	80 x 60 x 25 mm
-Weight (no external cables):	60 g
-Class of protection:	IP00
-Operating temperature:	0 to +60 ° C
-Storage temperature:	-20 to +60 ° C
-Moisture:	max 85%

5. Connecting the programmer to PC

The installation of the USB drivers and the tOm Programmer software is described in the installation manual. Complete the installation of the software packages according to the manual.



The programmer has to be connected to the USB port of the computer before running the program. The programmer will be disconnected from the USB port of the computer only after the tOm program was closed.

The powering of the programmer has to be made with a 16-18 Vdc/1A stabilized DC power supply with positive inner terminal (+). Use a power supply with standard 2.1 mm connector. The bicolor status LED will light in RED color only after the programmer has been connected to the computer via the USB cable.



For the programmer connections please refer to the illustrations on the next page.

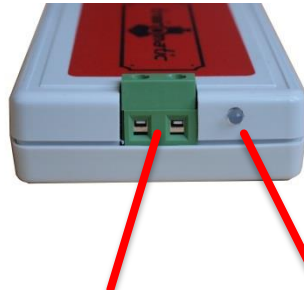


Programmer connections



Power Supply
connector

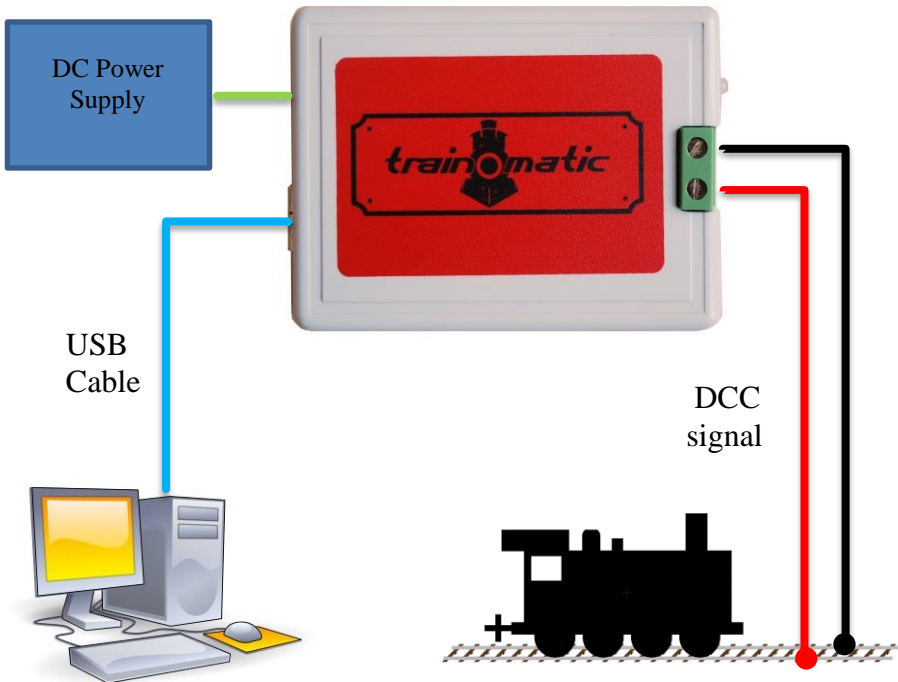
USB



Track
Connection

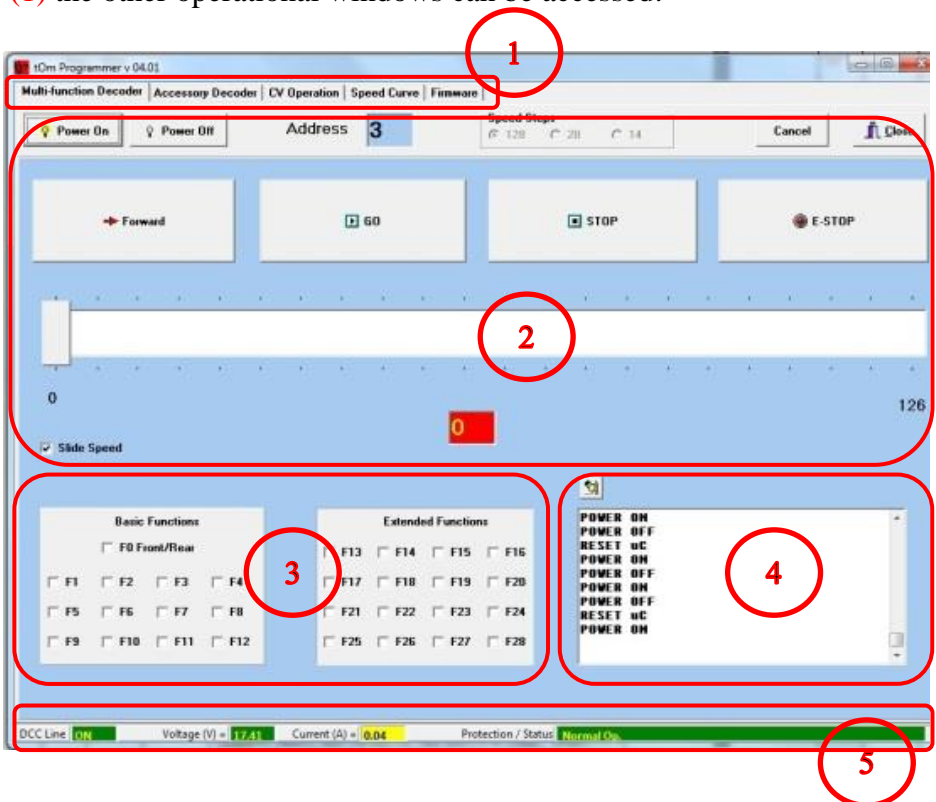
Status
LED

Programmer wiring connections



6. The main window of the program

The program starts up with the Multi- function Decoder main window, which can be used as a virtual control panel. In the TAB bar (1) the other operational windows can be accessed.

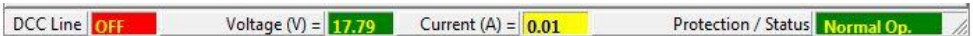


- (1) TAB bar
(2), (3) Virtual control panel
(4) Message window
(5) Status Bar

The message window (4) displays all messages sent by tOm Programmer to the DCC devices attached to the rail connections.



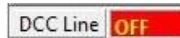
The status bar (5) is present in all of the TAB windows , and displays the DCC signal status (On/Off), the supply voltage of the programmer (numerical value in [V]) , current draw of the DCC devices connected to the rail outputs (value shown in [A]) , and the protection circuit status (Normal Op . / High Load).



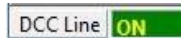
Turning on and off the DCC signal is done by pressing the Power On / Power Off buttons.



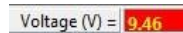
The DCC signal off is displayed with the RED color of the programmer status LED, and DCC Line OFF label in the status bar.



After switching the DCC signal on with the Power On button, the status LED on the programmer will lit in GREEN, and the status bar will display the Line DCC ON.



If the supply voltage drops below 12V, the status bar will display the value in RED.



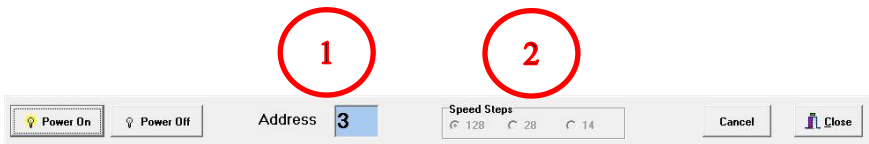
In the event of a short circuit on the DCC line, the electronic protection circuit switches off the DCC signal generation, event signaled on the programmer with the status LEDs flashing in GREEN, and the status bar will display High Load .



After removing the short-circuit, to return to normal operating mode, consecutive switching of the Power Off and Power On buttons is necessary.

7. The Multi-function Decoder TAB

After starting the tOmProgrammer software it will handle decoders with the default address 3. The address of the decoder which will be controlled can be changed by introducing its numerical value in the Address box (1). All direction, speed and function control commands are transmitted only to this address.



The tOm Programmer can use 14/28/128 speed steps (Speed Steps, SS). The program starts with the default 128 speed steps. The selection of the speed steps number can be made with the speed step selector (2).



Change of the speed steps can be performed only when the DCC Line is OFF (Power Off).



Mobile decoders makes automatically difference between operating modes of 28/128 speed steps, but operating the decoder with 14 speed steps must be configured in the in CV29 of the decoder. Without proper configuration, execution of functions will be erroneous.

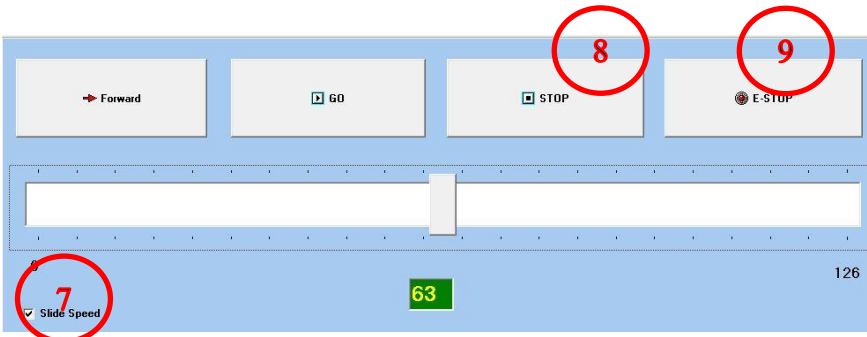
The buttons on the virtual control panel allow the user to select the direction, speed and activate functions. The speed or direction of travel is validated after pressing the GO button (3). Speed can be set by dragging the cursor / slider (4) in the desired position, either by

clicking on the cursor and using the middle mouse roller wheel button for incrementing / decrementing .

Alternatively, the desired speed can be set by introducing its numerical value in the current speed box (5) followed by the ENTER key. The speed limits of the slider and the current speed are shown scaled to the previously set speed steps. Direction of travel is selected by clicking on the Forward / Reverse button (6), which toggles its state (Forward / Reverse) at each click.



By checking the Slide Speed box (7) every speed command is transmitted to the decoder instantly, without the need to use the GO (3) button, but changing the direction of travel must still be confirmed with a click on the GO button.



The STOP button (8) sends a stop command to the mobile decoders with the parameters defined in the decoder CVs. After this command, the locomotive decoders will stop in accordance with the defined speed characteristics. For Emergency Stop use the E - STOP button (9). In this case the locomotives will stop instantly and the engine power will be disabled. The E- STOP command does not stop the DCC signal generation, and all the active functions of the addressed decoder will remain active. After a new speed command the decoder will enable the engine and the locomotive will drive again.

For disabling the DCC signal generation use the Power Off button. This command disables also any active function, so after a Power On command all the functions will be inactive.

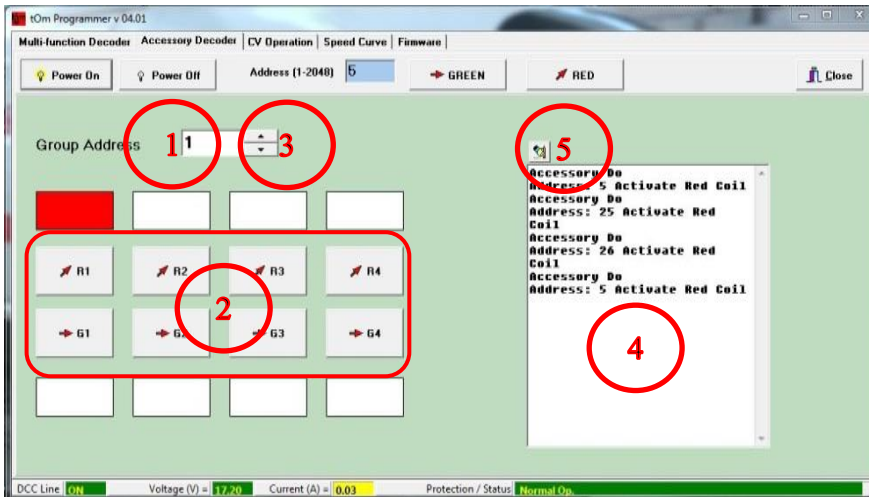
Functions are activated/deactivated by clicking on the relevant check boxes (10), their status is being displayed by the checkmark in the respective boxes.



The functions can be accessed from the PC keyboard by using the following keys: function F0 (generic lights function) can be switched with the use of the CAPSLOCK key (ON / OFF). F1- F12 functions can be switched by the function keys F1- F12 and F13 - F24 functions can be switched by the function keys F1- F12 while the Shift key is pressed. The E-STOP can be activated with the Pause/Break key.

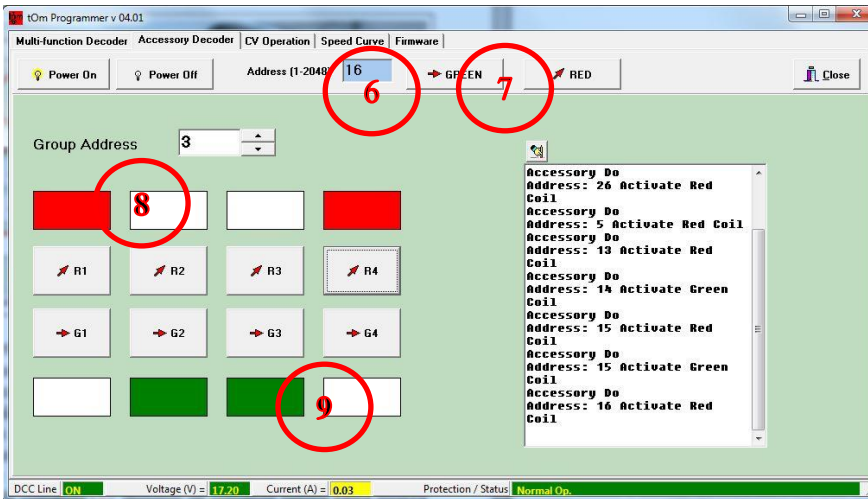
8. The Accessory Decoder TAB

This window emulates a virtual control panel for controlling accessory decoders.



At startup tOm Programmer uses the default accessory decoder group address 1, displayed in the box (1). Four output ports belongs to this group address, each represented by two command buttons, one for the straight and one for the branch line (2). Group addresses can be specified either by entering the numeric value in the box (1) or by incrementing / decrementing them using the arrows (3). The commands to the accessory decoders are transmitted when the control buttons (2) are pressed. The command button for the straight line command is frequently called the **Green** button, and for the branch line the **Red** Button.

All commands sent to the accessory decoders are displayed in the message window (4). The content of the messages window can be cleared using the Clear button (5). The switched individual port address is displayed in the individual port address box (6). Direct addressing of a port can be done by entering its individual address in the box (6) followed by clicking the straight or branch command buttons (7). The group address of the decoder corresponding to the individual port address will be displayed in the box (1). The last command and status sent to a decoder port will be displayed in the 4 **RED** boxes above the command buttons for the Branch line command (8) or in the 4 **GREEN** colored boxes under the straight command buttons (9). The colored boxes displays the port status only after a command has been performed (straight/branch) to a port. In the absence of transmission of commands, both boxes will be displayed in white color.



After sending a command to the decoder port, the individual port address (6) and group address (1) will be updated , thus maintaining the correspondence between the two addresses.



According to NMRA standards, accessory decoder addresses are organized into groups of four addresses, called block addresses (often called “decoder address”). There are a total of 512 block / decoder addresses so we can drive a maximum of 2048 (512 x 4 = 2048) turnouts.

Although most digital command stations (including the Roco), displays the individual address of the decoder, for correct addressing we should keep in mind the relationship between the block / decoder address and individual turnout address. According to NMRA standards the block addresses of the accessory decoders are determined using CV1 and CV9 (in binary CV1 uses 6-bit, resulting decimal values in the range 0-63 and CV9 uses 3 bits, resulting decimal values in the range 0-7). Most decoders contain control circuits for 4-8 turnouts, and the block/decoder address implicitly assign addresses for the 4-8 outputs in consecutive order.

The formulas for the block/decoder addresses are:

$$\text{block address} = \text{CV1} + 64 * \text{CV9} \quad (1)$$

$$\text{individual port address} = 2^{(n-1)} + i \quad (2)$$

where n is the port address and i is the port number (in the range of 1-4 or 1-8).

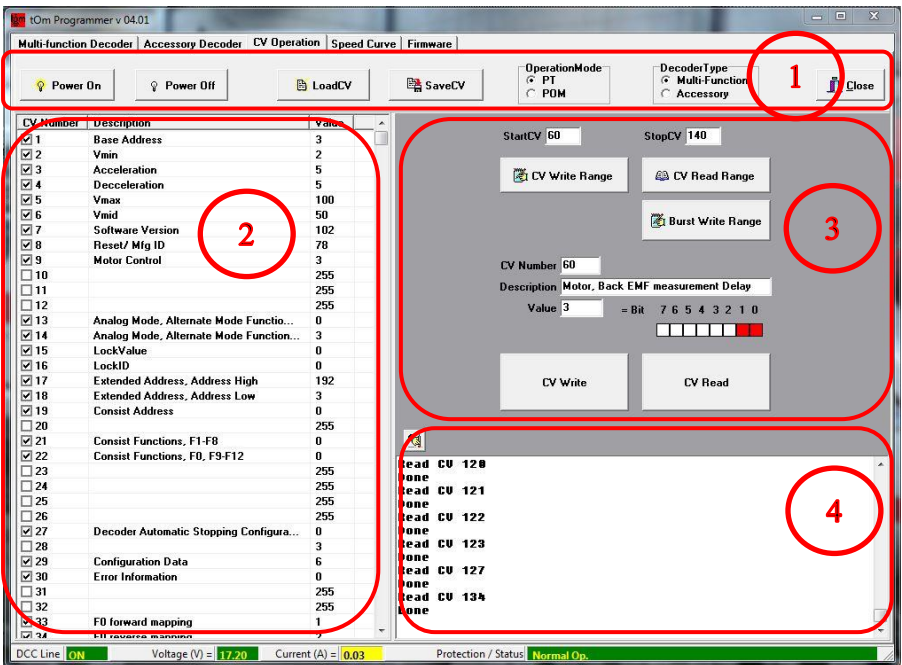
The Roco system allows the use of block address “0” and for this reason there is an offset of 4 individual addresses. On the next page we have presented a partial table with individual addresses by CV1 and CV9. The full table can be found on our website.



Block/ Decoder Address	CV9 Value	CV1 Value	Individual turnout addresses of the TD Maxi ports			
			Port 1	Port 2	Port 3	Port 4
			individual addresses			
1	0	1	1	2	3	4
2	0	2	5	6	7	8
3	0	3	9	10	11	12
4	0	4	13	14	15	16
5	0	5	17	18	19	20
6	0	6	21	22	23	24
.....
60	0	60	237	238	239	240
61	0	61	241	242	243	244
62	0	62	245	246	247	248
63	0	63	249	250	251	252
64	0	64	253	254	255	256
65	1	1	257	258	259	260
66	1	2	261	262	263	264
67	1	3	265	266	267	268
68	1	4	269	270	271	272
69	1	5	273	274	275	276
70	1	6	277	278	279	280
.....
125	1	61	497	498	499	500
126	1	62	501	502	503	504
127	1	63	505	506	507	508
128	1	64	509	510	511	512

9. The CV Operation TAB

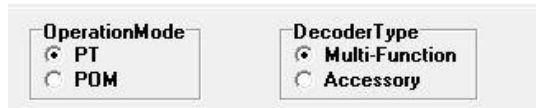
With the features outlined, in this window we can read, modify and write configuration variables (CVs) of mobile and accessory decoders.



- (1) Configuration Bar (2) CV Table
(3) Operating Functions (4) Message Window

The Power On/Power Off buttons, and also the Load CV and Save CV buttons are contained in the Configuration Bar (1). The operation mode selection buttons are also situated here. tOm Programmer starts up configured as default for **Programming Track** operation (PT) for Multi-Function (mobile) decoders.

Selection of the operation mode and the decoder type (if they are different from the default) should be performed prior any CV read / write operation. PT mode allows both reading and writing CVs. All DCC decoders connected to the track output of the programmer will be affected when writing CV's in PT mode.



PoM mode programming (**P**rogramming **o**n the **M**ain) cannot read CVs , just write , and the programming is taking place only to the decoder with its address specified in the Multi- Function Decoder TAB . Operating the programmer in this mode allows you to change certain parameters (CVs) during the operation of the decoders. (Of course, the decoder must be able to operate in PoM programming mode). This mode is useful for tuning PID loops during the setup of the locomotive driving characteristic, to adjust the acceleration / deceleration behavior, to setup the speed steps of the decoder, to enter and exit a decoder in consist, for changing the light intensity of the function outputs, etc.

PoM mode can be accessed while the decoder is controlled in the Multi-Function Decoder TAB; the CV values can be changed in the CV Operation Tab, and may return again to the Multi-Function Decoder TAB. All this can be performed without stopping the DCC signal generation and without stopping the operation of the decoder. If the operations are performed in PT mode, the DCC signal will be interrupted during the reading and writing the CVs of the decoders, and decoders will resume their operation after each read / write operation.



The PoM mode is different for mobile decoders and for accessory decoders. Select the right decoder type and programming mode.

The CV Table (2) contains three columns. The first column labelled CV Number contains the number (in ascending order from 1 to 1024) of the decoders CVs (configuration variables) and a checkbox (5).

CV Number	Description	Value	
<input checked="" type="checkbox"/> 1	Base Address	3	<input type="text"/>
<input checked="" type="checkbox"/> 2	Vmin	2	
<input checked="" type="checkbox"/> 3	Acceleration	5	
<input checked="" type="checkbox"/> 4	Deceleration	5	
<input checked="" type="checkbox"/> 5	Vmax	100	
<input checked="" type="checkbox"/> 6	Vmid	30	
<input checked="" type="checkbox"/> 7	Software Version	1027	
<input checked="" type="checkbox"/> 8	Reset/ Mfg ID	78	

The second column (6) contains the name (description), the third Value column (7) contains the numerical value of the CVs. The Value column is updated at every reading operation, or when a previously saved CV table is loaded. The CV tables are saved in tabular files, the content of the columns are updated while reading a previously saved file.

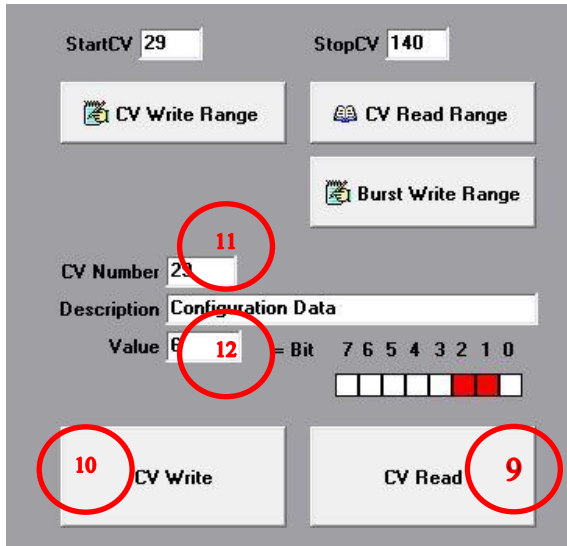


Warning! Do not edit the saved CV files content.

Filling the second column (description / labels) with manufacturer specific data, you can define templates for various families of decoders for future use.

The checkbox in the CV Number column has significance only while a group (range) read / writes operation is performed with the CV Read Range and CV Write Range buttons. During the reading and writing of individual CVs this checkbox is not taken in consideration. CVs can be read and write either individually or in groups (range). For individual CV operations the CV Read (9) and CV Write (10) buttons have to be used. The selection of a CV for read / write operation can be done either by clicking with the left mouse over the

corresponding CV in the CV Table (6), either by entering the numerical CV value in the CV Number box (11) followed by the ENTER key.

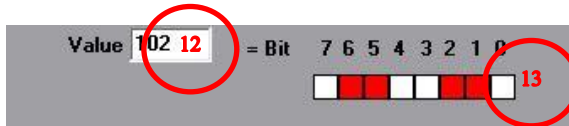


In case of a read operation (CV Read) (9) the content of the Value box (12) will be updated with the readout numerical value of the CV. Before completing a write operation, fill the desired numerical value in the Value box (12) followed by the ENTER key, then press the CV Write button (10). The Value column in the CV Table (7) will be updated after each read / write. Updating also occurs each time you enter numerical values in the Value box (12) followed by the ENTER key even if read / write operations were not performed.



In the Value box numerical values in the range of 0-255 are accepted (CVs are defined as 8-bit binary numbers). Some configuration variables require calculating the numerical value depending on the options that are intended to be activated (such as CV29). To facilitate the transition from binary to decimal values, CV values can be established bit by bit with the graph bar (13). With a

clicking on one of the 8 white / red boxes, the CV values can be changed directly in binary. The decimal values are displayed directly in the Value box (12).



If you enter a decimal value in the Value box (12) its binary value will be displayed instantly on the bit bar (13). From the 8 bits, the rightmost is the least significant bit (D0, or Bit0), while on the left is the most significant bit (D7 or bit7). White colored box denotes 0 bit value; red colored box signifies 1 bit value.



In the CV tables of various manufacturers, for the bit wise CVs, the 8 bits are usually numbered from 0 to 7 , but there are manufacturers that use numbering from 1 to 8.



For reading / writing a group (range) of CVs, specify the number of the first CV in the group in the Start CV box (14) and the number of the last CV in the group in the Stop CV box (15). The reading is performed after pressing the CV Read Range (17) button. As a result, all CVs between the Start CV and Stop CV are read in from the decoder, and the CV Table will be updated with their values. If a group write is performed using the CV Write Range (16), the values from the CV Table are programmed to the decoder. These operations are useful if we want to program a complete CV table (or a fraction



of a table) saved previously. During a group read or write operation, in the CV Number box (11) and Value box (12) the current CV over which the operation is performed is displayed.

When reading / writing a CV group in the range specified by the Start CV and Stop CV, only CVs with the checkbox marked will be handled. This selection is useful in the case of relatively high number of CV (for example all CVs of a decoder) from which some are unused. The simplest solution would be to select all the range and then deselect the unused. The deselected CVs will not be processed during reading and writing operations. In this way CVs that are interested will be read or written.

The checkbox can be selected or deselected with the left mouse button click. Selecting a row with the left mouse button, and continuing selection on another row holding down the SHIFT key, selects all rows between the first and last selection. Selected rows will be highlighted by changing the color of the background to blue.

<input type="checkbox"/>	11	
<input type="checkbox"/>	12	
<input checked="" type="checkbox"/>	13	Analog Mode, Alternate Mode Fur
<input checked="" type="checkbox"/>	14	Analog Mode, Alternate Mode Fur
<input checked="" type="checkbox"/>	15	LockValue
<input checked="" type="checkbox"/>	16	LockID
<input checked="" type="checkbox"/>	17	Extended Address, Address High
<input checked="" type="checkbox"/>	18	Extended Addr
<input checked="" type="checkbox"/>	19	Consist Addr
<input type="checkbox"/>	20	
<input checked="" type="checkbox"/>	21	Consist Functions, F1-F8
<input checked="" type="checkbox"/>	22	Consist Functions, F0, F9-F12
<input type="checkbox"/>	23	

A context menu is open over row 19, showing options: "Check Range" and "Uncheck Ran".

With a right mouse button click after the selection the status of the checkbox can be changed for the whole range (Check Range Uncheck Range) of selected rows.

Burst Write is used in the second generation of tOm decoders. If Burst Write is performed over decoders with earlier firmware versions, an error message is generated.

The Burst Write allows writing of the CVs in a fraction of the second.



In Burst Write mode, only the CVs with the checkbox activated are handled.



The Burst Write mode cannot be applied on decoders from other manufacturers.

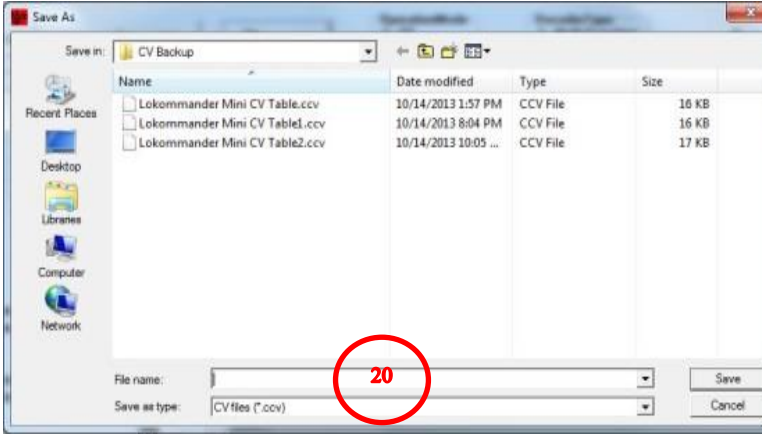
Editing names / labels can be done in the field (19) after their row is being selected with the left mouse button in the CV Table (6).



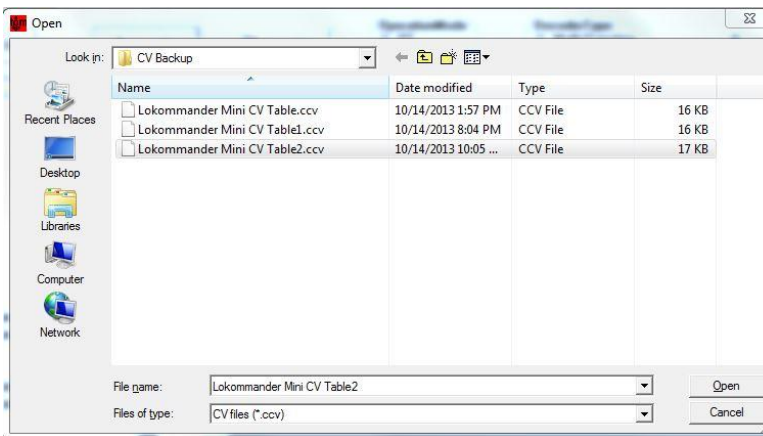
After entering / editing the CV label in the Description box (19), pressing the ENTER key will update the table. There are no restrictions on the type of fonts used.

Saving and reading CV files can be done with SaveCV and LoadCV buttons situated on the configuration bar (1).

When saving the file, the file name must be specified in the box (20). The saved file extension will be *.ccv. (* denotes the file name)



LoadCV will list by default files with the extension *.ccv



All DCC command sent by the programmer, and all answers received from the decoders are listed in encoded form in the message window (5). Their role is rather to track the command sent and the acknowledgement received from the decoder, particularly useful in case of a strange behavior of the decoders.



The content of the messages window can be cleared using the Clear button (20).

The Close button exits from the program. A Power Off command is sent to the programmer automatically.



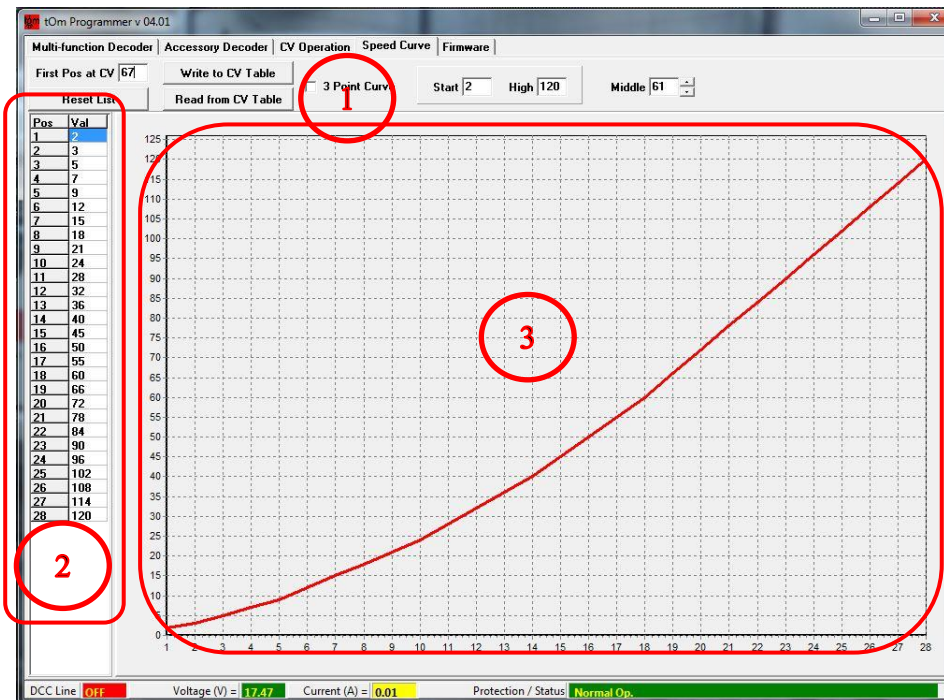
CV tables are not automatically saved. To not lose the CV table content a save operation is necessary. To avoid overwriting, the file name must be specified for each save operation.



Several CV files can be found in the tOm Programmer zip archive (file extension is *.ccv). They can be used as a template for creating custom files. The sample files contain labeled description for the CVs.

10. The Speed Curve TAB

According to the NMRA standards, the speed characteristic of the mobile decoders can be specified either by 3 points (V_{min} , V_{max} and V_{mid} in CV2, 5, and 6) or in tabulated format, using the values specified by the 28 CVs in the range CV67-94. The decoder will use one of two methods, as specified in CV29. tOm Programmer allows the definition and simulation of the characteristic in graphical form.



The Speed Curve TAB starts with a default table (the 3 Point Curve box is unchecked (1)). In tabular mode the speed characteristic can be set either by entering numerical values in the table (2) for each of

the 28 speed steps or graphically with a left mouse click in the graph (3) specifying the values for each speed step properly.

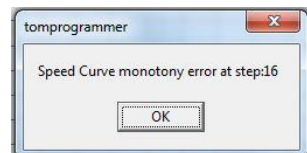
On the horizontal axis of the graph (3), the 28 speed steps are represented (the corresponding to CVs 67-94 according to NMRA). The vertical axis is represents the decoder speed step values in the range of 0 to 127 (with minimum and maximum defined in CV2 and CV5). With the left mouse button you can set new points in the characteristic. Graphical characteristics are accepted if the graph is monotone.

Correct
characteristic
monotonous



Incorrect
characteristic
monotony is
not preserved

In case when the monotony is not preserved, when transferring CVs to the CV table, we will be notified about a monotony error, and the first speed step where the error appears will be specified.

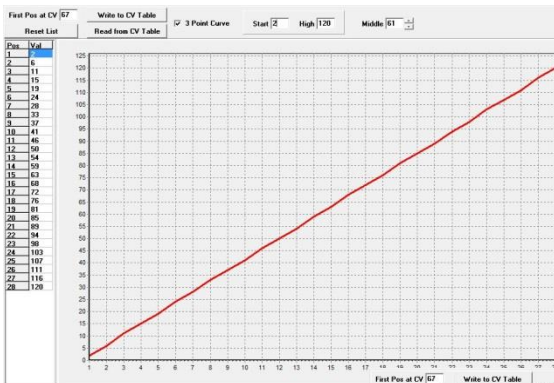




If use of the 3 point characteristic is desired, this has to be activated by checking the box (1).

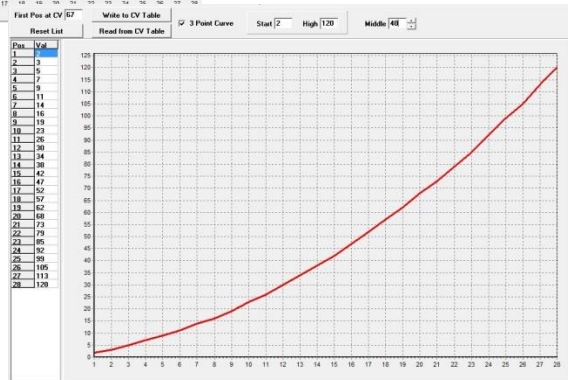


With this selection, the speed characteristic will be determined by the three parameters (minimum speed = Vmin (4), maximum speed = Vmax (5) and average speed = Vmid (6) specified in CVs 2, 5 and 6). For a linear characteristic $V_{mid} = (V_{max} + V_{min}) / 2$. After entering numerical values in boxes (4), (5) and (6) the ENTER key has to be pressed.



Characteristic with $V_{mid} < (V_{max} + V_{min})/2$

$V_{min}= 2$
 $V_{max}=120$
 $V_{mid}= 40$





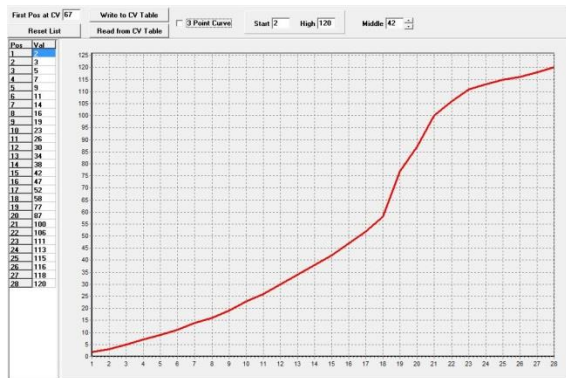
Characteristic with $V_{mid} > (V_{max} + V_{min})/2$

$V_{min}= 2$
 $V_{max}=120$
 $V_{mid}= 80$

After changing the three parameters, the 28 values in table (2) are updated. To obtain the desired speed characteristic, we can start from a three-point characteristic defined by V_{min} , V_{max} and V_{mid} and activating the tabular definition, the speed characteristic can be adjusted in graphical mode.

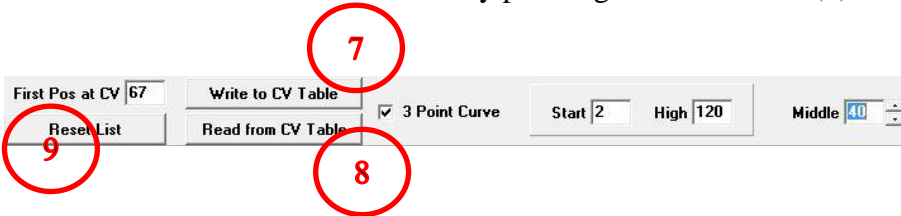
Characteristic defined in tabular mode starting with 3 point definition with values:

$V_{min}= 2$
 $V_{max}=120$
 $V_{mid}= 40$



The values determined for V_{min} , V_{max} in V_{mid} CVs 2, 6 and 5) and for the 28 speed step values (CVs 67 to 94) has to be transferred to the CV table prior to be programmed in decoder.

The transfer of these values is done by pressing Write to Table (7).




Depending on the selection made (3 points or tabular characteristic) the CV transfer is applied only for CV2, CV5, CV6 (for 3-point curve) or for CV65 to CV94 (for tabular characteristic).

Setup of the speed characteristic can be made starting with the tabular values read from a decoder. With the Read button (8) we can transfer CVs from the CV Table in CV Operations TAB, apply changes over them and transfer them back.


After transferring the CVs to the CV table with the Write to CV Table button (7), programming them in the decoder is done with one of the two methods presented in the CV Operation chapter (either individual CV write operations or CV Range operations. For tOm decoders the Burst mode is also usable).

The Reset List button (9) removes the numerical values from the table (2). To load the table with numeric values, choose the 3 points characteristic (1), click on one of the boxes (4), (5) or (6), followed by the ENTER key. The graph will be redrawn, and the table will be filled with numerical values.

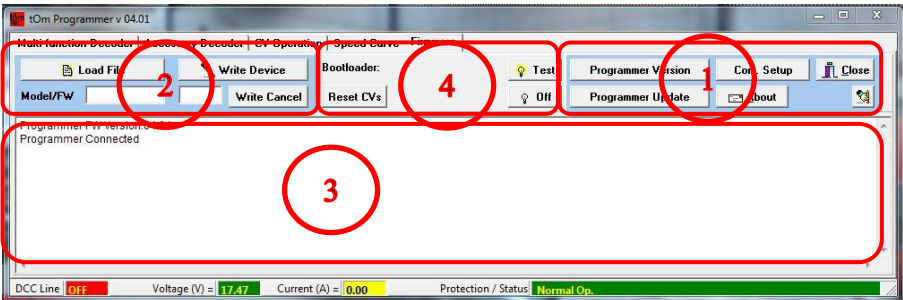
 Changing the CVs 2, 5, 6 or 67-94 does not influence the number of speed steps used by the decoder, neither the characteristic definition (3 points vs. tabular form). These settings are made through the appropriate configuration of CV29 of the decoder.

11. The Firmware TAB

The Firmware TAB is dedicated for performing firmware upgrades of the programmer and the tOm decoders. Access and use these functions only for this purpose.

 **Warning!** During decoder and programmer upgrade, a power supply failure can cause them damage. Please ensure that while performing the upgrade, the equipments are powered!!

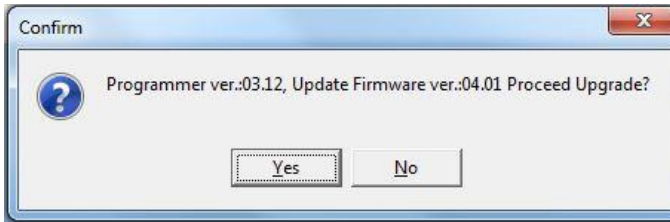
When the Firmware TAB is accessed the DCC signal generation is stopped, and the tOm Programmer enters in a special mode dedicated for firmware upgrades.



- (1) Programmer firmware upgrade functions
- (2) Decoder firmware upgrade functions
- (3) Message window
- (4) Test functions

To install the drivers and configure the USB port, please refer to the installation manual. Further, we assume that the installation and configuration was made as described in the manual.

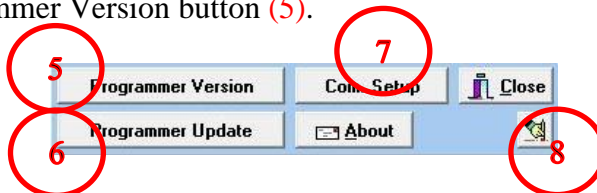
If at startup the tOmProgrammer detects an earlier firmware of the programmer (ex. version 3.12), a notification window will propose a firmware upgrade to the current version.



In case of acceptance with the YES button, the firmware upgrade of the programmer will be performed. In the message window the current version number will be listed, and after the upgrade has been performed successfully, we will be notified that the programmer is ready for use.

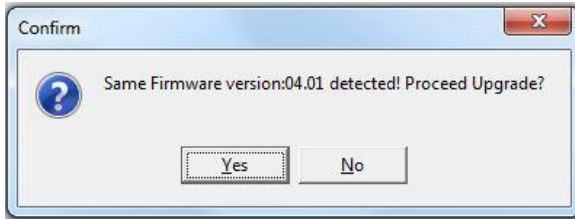
Update file for Model:00000000 Firmware Ver.:04.01
Total Bytes 11714
Start Address 0
Page Write OK0001
Page Write OK0002
.....
Page Write OK005B
Page Write OK005C
Write DONE !!!
Programmer Ready to Use

The programmer version can be interrogated manually by pressing the Programmer Version button (5).



Firmware upgrade also can be initiated manually with the Programmer Update button (6).

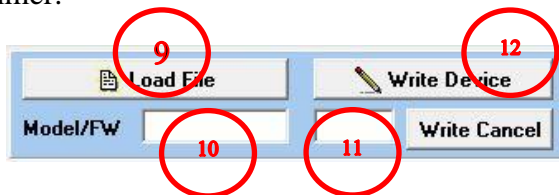
While initiating an upgrade for a programmer which has already up to dated firmware, we will be notified, that the programmer has the current version, and the upgrade is not necessary.





The Com Setup button (7) accesses the serial port setup menu described in the installation manual. The Clear button (8), as it is described in the case of other windows, clears the contents of the message window.

For upgrading the firmware of the mobile and accessory decoders, first the firmware file has to be loaded. Firmware files have the extension *.cod (* denotes the file name).

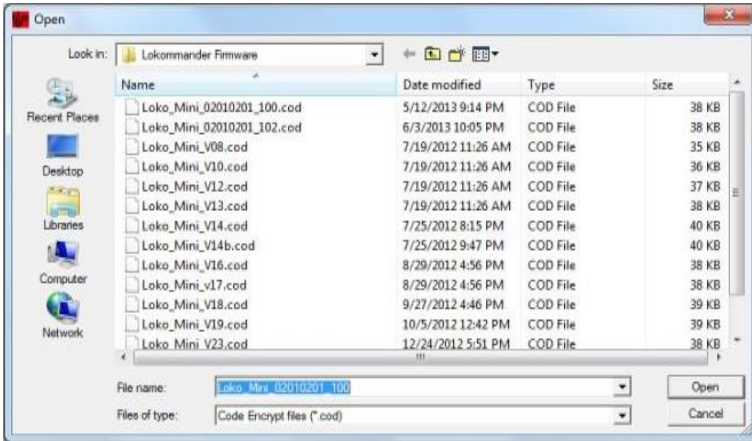
Using the Load File button (9) we will load the firmware files to the tOmProgrammer.



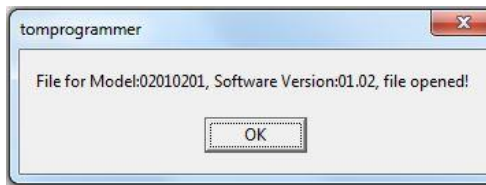
 tOmProgrammer also can perform so called “downgrade”, in other words transferring to the decoders a firmware previous to the current one.

 Generation II decoders are delivered with a Model identifier, the firmware upgrades/downgrades are possible only for the corresponding models.

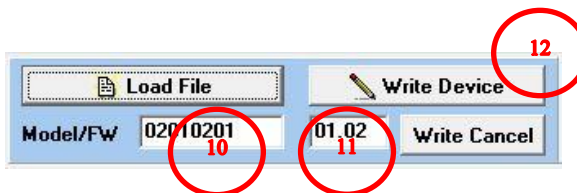
In the Open menu the firmware file for upgrade / downgrade has to be selected.



After loading the file, tOmProgrammer informs us about the decoder model and firmware version of the loaded firmware.



The information is updated also in the fields for model and firmware version (10) and (11).



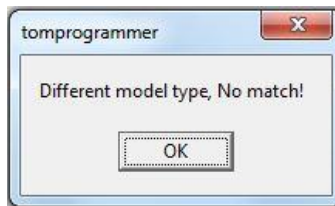
In case of generation I decoders these fields are filled with 0 numerical values.



The firmware upgrade can be initiated by pressing the Write Device (12) button. The programmer interrogates the decoder, and if the decoder model corresponds to the model specified in the *.cod file the upgrade occurs.

```
Reading Model ...
Attached device Model:02010201
Update file for Model:02010201 Firmware Ver.:01.02
Total Bytes 13732
Start Address 0
Wait For Bootloader start
Page Write OK0001
Page Write OK0002
.....
Page Write OK0107
Page Write OK0108
Write DONE !!!
Wait CV's Reset
Reseting CV values ...
Reset Done
```

If the decoder model does not match the model specified in the *.cod file an error message is displayed, and the upgrade / downgrade is not performed.



After performing a firmware upgrade, the decoder CVs are reset to factory default values. If you want to preserve some configurations (different from the default), they must be read and saved in the CV Operations window prior the firmware upgrade.

In the Firmware TAB some test functions are available (4) as follows:



The command sent with the Reset button (13) is equivalent with the writing in CV8 any numerical value (in case of tOm decoders) and resetting the decoder to factory default values. The test Button (14) is used to initiate the testing of the special firmware upgrade mode of the tOmProgrammer. The Off button (15) will quit from the special firmware upgrade mode, and perform a programmer Power Off.



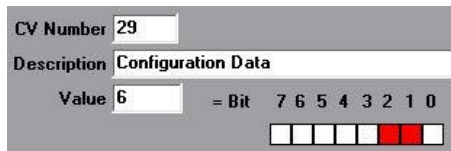
The Firmware TAB is dedicated to train-O-matic decoders. The signal generated in this mode is not a standard DCC signal. Make sure that while accessing this operation mode, only a single decoder is connected to the programmer rail output. Connecting several decoders in Firmware mode can result in erratic behavior of them.



Avoid firmware upgrade attempts made to decoders from other manufacturers. Their behavior in tOm Programmer Firmware mode is not known. We are not responsible for any malfunction of these decoders caused by the use of the firmware upgrade mode.

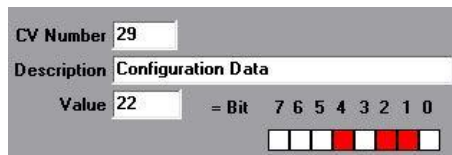
12. Recommendations

Setting the number of the speed steps (14, 28/128) and the speed characteristic definition (3 points vs. tabular form) in accordance with the NMRA standard is achieved through proper configuration of the decoders CV29.



CV Number 29
Description Configuration Data
Value 6 = Bit 7 6 5 4 3 2 1 0

In the picture above, bit 1 of CV29 is set to 1, which means the activation of 28/128 speed steps. The decoder is configured also for DC (analog) operation since bit2 is set to 1. The speed characteristic is configured for 3 point operation (Vmin , Vmax in Vmid set in CV 2, 6 , and 5) since the bit4 is 0. To configure the tabular speed definition using CVs 67 to 94, the bit4 of CV29 must be set to 1 (see image below).



CV Number 29
Description Configuration Data
Value 22 = Bit 7 6 5 4 3 2 1 0

Transformation from binary to decimal and vice versa is done automatically. In the first case, the decimal value of the CV29 is 6, and in the second case 22. Calculation of the decimal value of a CV with binary definitions and vice versa, knowing the decimal value and calculating the bit values can be made without attaching the programmer to the PC, only using the GUI of the tOmProgrammer.



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www.train-o-matic.com
www.tehnologistic.ro

Tehnologistic SRL
Str. Libertatii Nr. 35A
407035 Apahida, Cluj
Romania
Tel +40-264-556454
Fax +40-264-441275

