



# Modular Evolution



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## Table of Contents

<b>1</b>	<b>GENERAL</b> .....	<b>4</b>
1.1	Preface .....	4
1.2	Modular Evolution at a Glance .....	4
1.3	Terms and Stylistic Conventions Used in this Manual .....	6
<b>2</b>	<b>INSTALLATION</b> .....	<b>7</b>
2.1	Package Contents .....	7
2.2	Software Installation .....	7
2.3	Connecting the Hardware Components .....	7
2.3.1	Modular Evolution 64 .....	8
2.3.2	Modular Evolution 88 .....	8
2.4	Connecting the Cable .....	8
2.5	Technical Specifications .....	9
2.5.1	Modular Evolution 88 .....	9
2.5.2	Modular Evolution 64 .....	9
2.5.3	Modular Keyboard .....	9
2.5.4	Modular Braille Keyboard .....	10
2.5.5	Modular Numbers Block .....	10
<b>3</b>	<b>START-UP</b> .....	<b>11</b>
3.1	Turning the Power On .....	11
3.2	Energy Saving Mode .....	11
3.3	Braille Display Operation .....	11
3.4	Braille Input with the Modular Evolution's Function Keys [L + B1 + B3 + B4] (Chord B) .....	12
3.4.1	Table of Key Commands for Controlling the PC .....	13
3.5	Configuration Mode .....	15
<b>4</b>	<b>OPERATIONS SETTINGS FOR HANDY TECH BRAILLE DISPLAYS</b> .....	<b>17</b>
4.1	Connection.....	17
4.2	ATC .....	18
4.3	Status Cells .....	18
4.4	Fast Keys .....	19
4.5	Repeat Keys .....	20
4.6	Miscellaneous .....	20

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<b>5</b>	<b>ACTIVE TACTILE CONTROL (ATC)</b> .....	<b>21</b>
5.1	ATC Assistant for Reading or Learning .....	22
5.2	Tips for Utilizing ATC to Learn Braille .....	23
5.3	Tips for Utilizing ATC for the Experienced Braille Reader .....	24
5.4	ATC-Monitor Settings .....	25
<b>6</b>	<b>OPERATING A PC WITH A SCREEN READER</b> .....	<b>26</b>
6.1	Screen reader under Windows, Example JAWS.....	27
6.1.1	General.....	Fehler! Textmarke nicht definiert.
6.1.2	Overview.....	27
6.2	Screen reader under Windows, Example Hal/SuperNova.....	29
6.2.1	General.....	Fehler! Textmarke nicht definiert.
6.2.2	Overview.....	30
6.3	Screen reader under Windows, Example Window-Eyes .....	31
6.3.1	General.....	Fehler! Textmarke nicht definiert.
6.3.2	Overview.....	32
<b>7</b>	<b>IMPORTANT INFORMATION</b> .....	<b>34</b>
7.1	Symbols .....	34
7.2	Safety Information Under the Standards for Medical Devices .....	34
7.3	General Safety Information.....	34
7.4	Handling the Braille Display .....	35
7.5	Warranty.....	36
7.6	Technical Support .....	36
<b>8</b>	<b>COPYRIGHT NOTICE</b> .....	<b>38</b>
<b>APPENDIX</b> .....		<b>39</b>
Guidance and manufacturer's declaration - electromagnetic emissions.....		39
Guidance and manufacturer's declaration – electromagnetic immunity .....		39
Guidance and manufacturer's declaration – electromagnetic immunity .....		40
Recommended separation distances between portable and mobile RF communications equipment and the Braille display.....		41

## **1 General**

Thank you for choosing the Modular Evolution. The Modular Evolution model is the first Braille display in the world with Active Tactile Control (ATC) technology. ATC recognizes your reading position on the Braille display, which opens up the possibility of innovative additional operating functions on PCs.

### **1.1 Preface**

Please take the time to read this User Manual carefully. We have tried to make using the Modular Evolution as easy and as intuitive as possible, but this manual will help you utilize your Modular Evolution's features even better.

It is very important that you read the safety information regarding the appropriate handling of the Modular Evolution before starting it up for the first time. You will find this information at the end of this manual.

In order to use the Modular Evolution as a Braille display under Windows, an output program called a screen reader is needed, which is also available from your Handy Tech dealer.

The Modular Evolution has been developed and tested with great care. However, if you have any ideas or suggestions for improvements, please do not hesitate to contact your Handy Tech customer service representative or write to us at [Idee@handytech.de](mailto:Idee@handytech.de). Your opinion is very important to us.

We hope you will enjoy using your Modular Evolution.

### **1.2 Modular Evolution at a Glance**

This section will help familiarize you with the Modular Evolution and its control elements. We recommend keeping the device handy, so that you can follow along with the instructions in this section.

Set up the Modular Evolution in front of you so that the control keys are towards the front. There are two long keys along the front edge of the unit, which are activated by your thumbs. These two keys, referred to as thumb keys, are used as the navigation keys, and also as space keys while writing text. The left thumb key navigates through text towards the left or up, and will be referred to by the symbol [L]. The right thumb key moves through text towards the right or down, and will be represented by [R].

Behind these two keys, you will find 8 function keys, which are also used as input keys. These function keys are labeled, from left to right, as B1 through B8. When these keys are used for Braille input, they correspond to the usual Braille keyboard layout:

7      3      2      1                      4      5      6      8

Thus, B1 is also Dot 7, B4 is also Dot 1, etc.

Behind the input keys are located either 64 or 88 ergonomic Braille display elements with integrated cursor routing keys. The cursor routing keys, referred to as CR keys, which are integrated as part of each Braille module, enable you to place the cursor directly at the text position of that Braille module.

To the left and right of the Braille modules are the so-called Triple Action Keys. They are mounted in the housing such that they are flush with the Braille modules. These keys can be activated at the top, in the center, and at the bottom.

The Triple Action Keys have the following functions:

Either the left or right Triple Action Key's Up position also serves as a reading key – just like the left thumb key [L] – to move backward within the text, and will be referred to as [TLU] or [TRU] below.

Either the left or right Triple Action Key's Down position also serves as a reading key – just like the right thumb key [R] – to move backward through the text, and is referred to as [TLD] or [TRD] below. This means you can use either the thumb keys or the Triple Action keys to navigate through text.

The Center position of either the left or right Triple Action Key is used for additional functions. First, here is an overview of the symbols used in this manual to represent the Triple Action Keys:

Left Triple Action Key, up:            [TLU]  
Left Triple Action Key, center:        [TLC]  
Left Triple Action Key, down:         [TLD]

Right Triple Action Key, up:           [TRU]  
Right Triple Action Key, center:       [TRC]  
Right Triple Action Key, down:        [TRD]

Past the Braille modules is the Modular Evolution's base for attaching a modular keyboard or a modular Braille keyboard.

If your model is the Modular Evolution 88, a modular numbers block can also be snapped on to either the left or right side of the unit. The 16 keys on the modular numbers block are arranged in four rows of four keys each. Their designations are as follows:

Top row	B9	1	2	3
Second row	B10	4	5	6
Third row	B11	7	8	9
Bottom row	B12	B13	0	B14

Move your hand along the right side of the housing towards the back, and you will feel the main power switch. When you flip it towards you, the device is turned on. Behind the power switch is an additional USB interface, which permits connecting any peripheral to your computer.

Along the back face of the unit, there is another USB interface all the way on the left. The small sliding switch immediately on its right is used to turn internal memory on and off. Your Modular Evolution comes with 4 GB internal memory. When the sliding switch is in its left position when viewed from the front, you can access the internal memory from the PC and save your data on the Modular Evolution. The Modular Evolution's internal memory is recognized by the PC as a drive named "Modular." When the sliding switch is positioned to the right, then the PC cannot access the Modular Evolution's internal memory.

To the right of the sliding switch is the round outlet for the power supply plug. On its right is the USB Type B interface where you can connect the computer. This interface is the one with a square shape.

There is another free USB connection on the left side of the housing, where you can also connect any USB-peripheral.

### 1.3 Terms and Stylistic Conventions Used in this Manual

In this manual, the following conventions are used for inputs and outputs on the Modular Evolution:

Single keystrokes on the Modular Evolution:	[Key], e.g., [TLD]
Key/dot combination on the Modular Evolution:	[L + B2 + B3] or [L + 2 3]
Display on the Modular Evolution:	<b>'Display Text'</b> , e.g., <b>'File'</b>

## 2 Installation

This section contains helpful information about how to install your Modular Evolution. Please read it carefully to prevent difficulties while setting up.

### 2.1 Package Contents

Please verify that your package contains all of the parts listed below. If one of the components is missing or damaged, please contact your customer service representative in order to request the missing part or a replacement. Never turn the power on if any component is damaged.

You should find enclosed the following:

- Modular Evolution Braille display with 64 or 88 Braille display elements
- 1 USB interface cable with attached power supply (100 through 240 V AC; 5 V DC / 2.4 A; FW 7555M/05) for connecting the unit to a power outlet and to a PC
- Set of software on CD
- This User Manual in "Daisy" format on CD
- Quick Reference in Braille
- Dust cover

Optional:

- Modular keyboard
- Modular Braille input
- Modular numbers block

### 2.2 Software Installation

Before you can connect the Modular Evolution to your computer, you should first install the enclosed software package. Please make sure that the screen reader program you intend to use has been installed on the PC. Next, insert the CD containing the installation software into your computer's CD-ROM drive. Run the "Setup.exe" program that is on the CD. This installation program will install the latest available driver for your screen reader as well as this User Manual. Please follow the installation program's prompts in order to install all needed software components. Once installation has been successful, you may connect the Modular Evolution to your computer.

### 2.3 Connecting the Hardware Components

You can attach either a standard PC keyboard or a Braille keyboard to your Modular Evolution, as desired. In addition, the Modular Evolution 88 also features an option for attaching a 16-key numbers block. These components are mated securely to the housing of the Modular Evolution, creating a stable mechanical and electric

connection. Please use only the original hardware components you received with your Modular Evolution for these connections. Also, please note that the power must be turned off before installing any hardware components.

### **2.3.1 Modular Evolution 64**

The top face of the Modular Evolution 64 housing includes a recessed keyboard base with integrated snap-on connections on both the left and right side. Position the keyboard above the recessed area on the Modular Evolution so that the ridges on the right and left edge of the base are beneath the sides of the keyboard, which will extend sideways beyond the base. Lower the front edge of the keyboard first. Once the front edge has mated evenly with the Modular Evolution, press down the far edge of the keyboard onto the base. You should feel the keyboard snap into the connections.

### **2.3.2 Modular Evolution 88**

The top face of the Modular Evolution 88 housing includes a recessed keyboard base with integrated snap-on connections on both the left and right side. You have the choice of attaching the keyboard on either the left or the right side. Position the keyboard above the recessed area on the Modular Evolution so that the ridge on either the right or left edge of the base is beneath the side of the keyboard, which will extend sideways beyond the base. Lower the front edge of the keyboard first. Once the front edge has mated evenly with the Modular Evolution, press down the far edge of the keyboard onto the base. You should feel the keyboard snap into the connection.

The same procedure applies to the numbers block. Again, please note that the ridge on the Modular Evolution must be positioned underneath the edge of the numbers block, which will extend sideways beyond the base.

## **2.4 Connecting the Cable**

The cable included in your package is used to connect the Modular Evolution both to the PC as well as to a power outlet. At one end of the cable are the two connectors that will be plugged into the back of the Modular Evolution. The power plug must be plugged into the round power outlet on the back of the housing, and the USB plug into the square USB outlet to the right of the power outlet.

The other end of the cable includes the power supply plug, which may now be connected to any convenient wall power outlet. When disconnecting your unit, please unplug the wall plug first and then the plugs on the back of the housing.

The remaining cable connector can be plugged into any free USB port on your PC. If the Modular Evolution is to be used as a medical device, the PC must conform to all Medical Device Standards, or else it must have a ground connection or be connected to an isolating transformer.

When the power is turned on for both the Modular Evolution and the PC, the Modular Evolution will be recognized automatically by USB-enabled operating systems. If you

are connecting the Modular Evolution to this PC's USB interface for the first time, you need to install the corresponding USB driver first, as described above.

## 2.5 Technical Specifications

In the following you find the technical specification for the components of the Modular Evolution 64 and 88.

### 2.5.1 Modular Evolution 88

- 88 Braille elements
- 704 (88x8) ATC sensors
- 2 navigation keys
- 2 Triple Action Keys
- 88 cursor routing keys
- 8 function keys B1 to B8
- 3 USB Type A connections
- 4 GB internal memory
- Power supply: 5V DC  $\pm$  5%; 2.5A
- Power consumption: 12 W
- Measurements: 64.3 cm W x 6.2 cm H x 26.5 cm D (25.3" W x 2.4" H x 10.4" D)
- Weight: 3.5 kg (7.7 lbs)

### 2.5.2 Modular Evolution 64

- 64 Braille elements
- 512 (64 x 8) ATC sensors
- 2 navigation keys
- 2 Triple Action Keys
- 64 cursor routing keys
- 8 function keys B1 to B8
- 3 USB Type A connections
- 4 GB internal memory
- Power supply: 5V DC  $\pm$  5%; 2.5A
- Power consumption: 12 W
- Measurements: 51.5 cm W x 6.2 cm H x 26.5 cm D (20.3" W x 2.4" H x 10.4" D)
- Weight: 2.9 kg (6.4 lbs)

### 2.5.3 Modular Keyboard

- 104/105 keys
- Tactile markings
- USB connection
- Power supply: 5 V DC  $\pm$  5%; 200 mA
- Power consumption: 1 W
- Measurements: 51.5 cm W x 4.2 cm H x 17.3 cm D (20.3" W x 1.7" H x 6.8" D)
- Weight: 1.0 kg (2.2 lbs)

#### **2.5.4 Modular Braille Keyboard**

- 8 Braille keys (P1 to P8)
- 2 space keys
- Function keys F1 to F12, Escape key, Numlog, ScrLog, Print
- Ctrl, Shift, Alt, Windows keys
- 6-key block, cursor keys
- Numbers block (17 keys)
- Power supply: 5V DC  $\pm$  5%; 200 mA
- Power consumption: 1 W
- Measurements: 25.0 cm W x 4.5 cm H x 16.5 cm D (9.8" W x 1.8" H x 6.5" D)
- Weight: 1.0 kg (2.2 lbs)

#### **2.5.5 Modular Numbers Block**

- 16 keys (B9 to B14, 0 to 9)
- Power supply: 5V DC  $\pm$  5%; 50 mA
- Power consumption: 250 mW
- Measurements: 12.7 cm W x 4.2 cm H x 17.3 cm D (5.0" W x 1.7" H x 6.8" D)
- Weight: 0.9 kg (2.0 lbs)

### 3 Start-Up

#### 3.1 Turning the Power On

Please make sure that the Modular Evolution is connected to your PC with the USB cable, and that the PC is running. Flip the main power switch towards you. You will hear a short, high-pitched beep, and the following start-up message will be displayed on the Braille display:

**'Handy Tech Modular Evolution yy Ver. Fx.xx'**

In this string, yy indicates the number of Braille modules, that is, either 64 or 88. In "Ver. Fx.xx", x.xx is the version number of your Modular Evolution's firmware (e.g., 1.00).

After you hear the beep, the Modular Evolution is ready to work. As soon as the screen reader transmits any information to the Modular Evolution, the start-up message will disappear, and the new data will be displayed.

#### 3.2 Energy Saving Mode

If no key is pressed or there is no change in the Braille display on the Modular Evolution for several minutes (the default setting is 90 minutes), it will enter sleep mode. In sleep mode, the Braille elements are off and some of the electronic modules are deactivated. As soon as any key is pressed, the Modular Evolution will be fully operational again immediately. You will recognize this because the tactile pins will be pushed back up. If you have selected a blinking cursor representation, the Modular Evolution will not go into energy saving mode.

#### 3.3 Braille Display Operation

In order to operate the Modular Evolution as a Braille display under Windows, you need a screen reader to output the contents of the PC screen, which is not part of the Modular Evolution package.

Please make sure that your Modular Evolution is properly connected and switched on, and that the appropriate Braille display driver by Handy Tech is installed, before starting up the screen reader program (see Section 2.2). As a rule, the screen reader will display the selected position within the active window on the Braille display. For example, if you are moving through a menu, the selected menu item is displayed. The navigation keys, [L] and [R] or [TRD] and [TLU], allow you to move through text. In word processing programs such as Microsoft Word, you can also position the cursor with the cursor routing keys. In addition, the [CR] keys also allow you to activate menu items or functions directly (e.g., when you are prompted for a yes or no answer with **'y/n'**, pressing the [CR] key above the **'y'** has the same effect as entering "y").

The screen reader program converts the text and graphic contents on the Windows screen into speech and Braille. Generally, the computer's built-in sound card is employed for the speech output function. The display of Braille is achieved with the help of your Braille display after the screen display information has been forwarded from the screen reader to the Modular Evolution. All standard screen readers are compatible with Handy Tech's Braille systems.

When you start up the program for the first time, a small start-up window appears, which displays the name of the Braille display detected by the program, Modular Evolution, as well as the interface used for communication, and the driver's version number. The various screen reader program functions may be assigned to specific keys on your Modular Evolution.

The operation of the Modular Evolution as Braille display under Windows is described below in Section 6.1 using JAWS as an example. A summary of the main operating features for users of Hal/SuperNova is contained in Section 6.2, and for users of Window-Eyes in Section 6.3.

Due to the Modular Evolution's recognition of your reading position by means of ATC technology, various assistant functions, e.g., automatically continuing at the end of a line, can significantly simplify your interaction with the PC. You will find a detailed description of these assistant functions in Section 5.

### **3.4 Braille Input with the Modular Evolution's Function Keys [L + 1 2 7] or [L + B1 + B3 + B4] (Chord B)**

Together with a screen reader, the Modular Evolution makes it possible for you to enter characters on the PC in Braille by using the function keys on the Modular Evolution.

If you want to utilize this function, you will need your screen reader's most recent driver for Handy Tech Braille systems. We recommend installing the driver that was included with your software package (please refer to Section 2.2, Software Installation).

You can specifically activate and deactivate PC-control. This is necessary, because the Modular Evolution's function keys are used both to control the PC and to initiate screen reader functions. The following functionalities are available to you:

- Turning PC control on and off.
- Input of characters.
- Use of the control key (Ctrl), including for keyboard shortcuts: One example is the Copy function, which is implemented on a standard keyboard as a keyboard shortcut consisting of Ctrl+C.
- Use of the ALT key, including for keyboard shortcuts: Examples are activating the menu bar under Windows programs or initiating hotkeys.
- Initiating the "Windows" and "Context" keys.

- Initiating the Enter key.
- Initiating the Escape key.
- Initiating the Backspace key.
- Initiating the Delete key.
- Moving the cursor.
- Initiating the Pos1 and End keys.
- Initiating the Page Up and Page Down keys.
- Initiating the Shift key: One example is entering CTRL+Shift+f.
- Caps lock, for example in order to select blocks.
- Initiating the function keys, including in combination with CTRL, Shift, and ALT. This means it is possible, for example, to close certain windows or entire applications via function keys.

### 3.4.1 Table of Key Commands for Controlling the PC

The key combinations for controlling the PC are listed below in the form of a table. We have included as many combinations as possible; however, if a combination is not shown, it does not mean that it is not possible. For example, all key combinations shown here with the [L] key can also be performed with the [R] key.

Key combinations are represented by the plus sign (+), e.g., Ctrl+Alt+a. Consecutive key strokes are separated by a comma. The cursor routing keys are abbreviated as CR (e.g., CR12 = cursor routing key above Braille module 12).

PC Key(s)	Chord Commands	Emulated on the Modular Evolution by
Activate/deactivate PC control	Chord B	L + 1 2 7 or L + B1 + B3 + B4
Backspace	Chord b	L + 1 2 or L + B3 + B4 or 7 or B1
Delete		L + 4 5 or L + B5 + B6
Paste	Chord i	L + 2 4 or L + B3 + B5
Alt		TRC + L
Alt + character		TRC + character
Alt for next character		L + 7 8 or L + B1 + B8
Activate/deactivate Alt		L + R + 7 8 or L + R + B1 + B8
Enter		8 or B8 or TRC
Ctrl + character		TLC + character
Ctrl for next character		L + 3 6 or L + B2 + B7
Activate/deactivate Ctrl		L + R + 3 6 or L + R + B2 + B7
Tab	Chord t	L + 2 3 4 5 or L + B2 + B3 + B5 + B6
Shift + Tab	Chord T	L + 2 3 4 5 7 or L + B1 + B2 + B3 + B5 + B6
Ctrl + Tab		TLC + L + 2 3 4 5 or TLC + L + B2 + B3 + B5 + B6
Ctrl + Shift + Tab		TLC + L + 2 3 4 5 7 or TLC + L + B1 + B2 + B3 + B5 + B6
Escape	Chord e	L + 1 5 or L + B4 + B6 or TLC
Shift + Escape	Chord E	L + 1 5 7 or L + B1 + B4 + B6

PC Key(s)	Chord Commands	Emulated on the Modular Evolution by
Ctrl + Shift + Escape		TLC + L + 1 5 7 or TLC + L + B1 + B4 + B6
Shift + character	Chord s	L + 2 3 4 or L + B2 + B3 + B5, character
Lock/unlock Shift	Chord S	L + 2 3 4 7 or L + B1 + B2 + B3 + B5
Cursor keys		Up: L + 1 or L + B4, Left: L + 7 or L + B1, Down: L + 4 or L + B5, Right: L + 8 or L + B8
Mark	Chord S	L + 2 3 4 7 or L + B1 + B2 + B3 + B5 "holds down" the shift key until L + 2 3 4 7 or L + B1 + B2 + B3 + B5 is pressed again. It is therefore possible to work with all cursor movements, such as Pos1, End, etc. If you wanted to mark two characters to the right of the cursor, you would enter L + 2 3 4 7 or L + B1 + B2 + B3 + B5, then L + 8 or L + B8 (cursor right) twice, and L + 2 3 4 7 or L + B1 + B2 + B3 + B5 again.
Previous word (Ctrl + left cursor key)		L + 3 or L + B2
Next word (Ctrl + right cursor key)		L + 6 or L + B7
Page Up		L + 2 or L + B3
Page Down		L + 5 or L + B6
Ctrl + Page Up		TLC + L + 2 or TLC + L + B3
Ctrl + Page Down		TLC + L + 5 or TLC + L + B6
Pos1	Chord k	L + 1 3 or L + B2 + B4
End		L + 4 6 or L + B5 + B7
Ctrl + Pos1	Chord l	L + 1 2 3 or L + B2 + B3 + B4
Ctrl + End		L + 4 5 6 or L + B5 + B6 + B7
Function Keys F1 – F12		L + CR1 – CR12
Left Windows Key	Chord w	L + 2 4 5 6 or L + B3 + B5 + B6 + B7
Context Key	Chord W	L + 2 4 5 6 7 or L + B1 + B3 + B5 + B6 + B7
Windows Key + character		L + 2 4 5 6 8 or L + B3 + B5 + B6 + B7 + B8 followed by character
Lock/unlock Windows Key		L + R + 2 4 5 6 8 or L + R + B3 + B5 + B6 + B7 + B8
PAUSE Key	Chord p	L + 1 2 3 4 or L + B2 + B3 + B4 + B5
Windows + PAUSE Key		L + 2 4 5 6 8 or L + B3 + B5 + B6 + B7 + B8 followed by L + 1 2 3 4 or L + B2 + B3 + B4 + B5
Space Key		L or R
Screen Reader Key +		L + 2 3 4 8 or L + B2 + B3 + B5 + B8

PC Key(s)	Chord Commands	Emulated on the Modular Evolution by
character		followed by character
Lock/unlock Screen Reader Key		L + R + 2 3 4 8 or L + R + B2 + B3 + B5 + B8

### 3.5 Configuration Mode

Configuration mode can be activated by holding down [3 7] or [B1 + B2] for longer than 3 seconds. Once configuration mode has been entered, a long signal tone sounds, followed by the message **'CONFIG MODE'** on the Braille display.

Note:

Please note that any settings changes you enter in configuration mode have a significant effect on the operation of the Modular Evolution. Make sure that you are completely certain what these effects will be before making any changes.

The keys on the Modular Evolution now have the following functions (non-functional keys are not listed):

[7]/[B1] Exit configuration mode:

A short signal tone will sound. The new settings will be in force.

[3]/[B2] Switch between 6-dot display and 8-dot display:

After pressing the [3]/[B2] key, the display changes from the default 8-dot display to a 6-dot display, i.e., dots 7 and 8 will be suppressed. This is an emulation of a 6-dot Braille representation, although there is no actual conversion from 8-dot Braille code to true 6-dot Braille code. However, this is not needed for most characters. Pressing [3]/[B2] again toggles the display mode back to 8-dot Braille.

The Braille line will output the following message:

**'6-BRAILLE/8-BRAILLE'**

in either 6 or 8 dot representation, depending on the current status. The default setting is the 8-dot display.

[2]/[B3] Energy saving mode on/off:

If energy saving mode is turned on, the Modular Evolution is automatically turned off after a certain period of inactivity.

The Braille line will output the following message:

**'energy-saving mode on'**

**'energy-saving mode off'**

[1]/[B4] Set energy saving period:

This key allows you to specify the time period after which your Modular Evolution should switch into energy saving mode. The message **'default time: xxx min'** will appear on the display, where xxx indicates the number of minutes before energy saving mode is turned on. By pressing the [1]/[B4] key again, you can increase this setting in increments of three

minutes. If a value of higher than 120 is entered a period of 3 minutes will automatically be set.

- [L] Text messages language in configuration mode:  
Text messages can be provided in either German or English. You can select the desired language by pressing the [TLU] key position.

The Braille line will output the following message:

**'Sprache: deutsch'**

**'language: english'**

The new setting is immediately active once this key has been pressed.

- [R] Representation of numbers in start-up message and in configuration mode:  
The following messages will appear:

**'number presentation: 01'**

where 01 is represented as an ISO-character, i.e., with dot 6.

**'number presentation: 02'**

where 02 is represented in US-English Braille, that is, the letters a through j transposed down by one position.

**'number presentation: 03'**

where 03 is displayed in the Norwegian numbers convention, i.e., the letters a through j with dot 8.

- [4]/[B5] Turn on test mode. These automatic test programs can be shut down again by pressing the [7]/[B1] key. Exit test mode by pressing the [R] key.

## 4 Operations Settings for Handy Tech Braille Displays

The universal Handy Tech Braille display driver features several optional settings for operating your Modular Evolution with your PC and screen reader. In order to open the Settings window, activate the [1 8] or [B4 + B8] keys simultaneously. As an alternative, you can also use the [B12] key on the Modular Evolution 88's numbers block. The Settings window can also be started up from the Start menu, under "Programs – Handy Tech – Configure Braille display driver." The Braille display driver does not need to be running.

There are the following six tabs in the Settings window:

- Connection
- ATC
- Status Cells
- Key Actions
- Miscellaneous
- Info

Your changes in the settings of the different tab sheets will be saved by pressing the OK or Apply Button. If you choose the OK Button, the dialog will be closed.

The following sections provide more details about the settings that are available under these six tabs.

### 4.1 Connection

The check box "Activate Driver" is checked to enable your Braille system to be driven by the screen reader. If you uncheck this box, the driver will be deactivated, and you will not be able to drive any Handy Tech Braille display.

The field "Device Detection" provides two options: "Automatic" means that your screen reader will detect the Braille display regardless of the interface through which it is connected to your PC. The second option is to specify a fixed interface at which the screen reader should look for the Braille display. In the corresponding combo box you can choose one of the existing COM interfaces. The type of the interface (e.g. USB or Bluetooth) will also be shown.

The field "Show Pop-Up Braille Display Information" allows you to specify whether you want to be informed which Braille display system is connected to which of your PC's interfaces at the start-up of the screen reader. If this setting is activated, there will be a small pop-up box during start-up containing the Braille display driver's version number, any detected Braille displays, and the interface designation.

You have the following three options:

- When changing device or interface: The pop-up box appears only if you have connected a different Handy Tech Braille display to the PC, or if you have connected the same Braille display to a different interface on your PC.
- Never: The pop-up box will not be displayed during start-up.
- Always at start: Every time your screen reader starts up, the pop-up box will be displayed.

If the check box "Connect Braille display even when switched on after start up" is checked, the Braille display may be connected to the computer while the screen reader is already running, and the Braille display will be recognized. The default setting is for this check box to be unchecked.

Checking the check box "Reconnect Braille display automatically when disconnect" instructs the screen reader to search for the Braille display in brief intervals if there has been a disconnection. For example, if you turned off the Braille display in order to remove the keyboard or to install the power cable, the screen reader will continuously search for a Braille display until you turn the power back on. By checking the check box "Notify when searching for connection" you can cause the screen reader to inform you of this process. If you do, you will receive the message "Searching Modular Evolution 64/88" in short intervals.

## 4.2 ATC

The Modular Evolution's integrated ATC technology detects your reading position on the Braille display, which opens up innovative features in the operation and control of the PC. This tab is shown only if your screen reader supports the ATC functions through the Handy Tech Braille display driver.

ATC functionality is so extensive that we have dedicated a separate section to the ATC features. Please review the settings available under this tab in the next Chapter 5, Active Tactile Control (ATC).

## 4.3 Status Cells

The so-called status modules on your Braille display are used to indicate where your current position is on the screen, for example, within a menu or within a text field. Exactly what information is shown on the status modules depends on the screen reader. Under the "Status Cells" tab, you can specify some of the options for these status modules yourself.

The field "Device" allows you to specify which Handy Tech Braille system or Braille display you are using. By default, the actual connected device is recognized and becomes the default setting here. However, this setting provides you with the option of configuring other Handy Tech Braille displays, even though they are not currently connected to the computer.

In the next field, you may specify the size of the status display section. As a default, four Braille elements are used as status modules. There is automatically one blank

position inserted between the status modules and the remaining positions on the Braille line. The blank element has no function.

The field "Position of status cells" allows you to determine whether the status modules should be displayed on the left or right side of the Braille line. As a default, they are displayed on the left.

The check box called "Display status cells" lets you enable and disable the status display. The status information is not displayed by default. There is a quicker method for enabling and disabling the status display: pressing both of the thumb keys, [L] and [R], on the front face of the housing simultaneously. When you use this method you don't need to open the Settings menu.

### 4.4 Key Actions

This tab sheet allows you to adjust the behavior of the single keys strokes of your Modular Evolution in the following three different ways:

- Key Lock: Keys, defined as locked, will be ignored when pressed.
- Fast Keys: Keys, defined as fast keys, performs their action already when pressed and not – as usual – when released.
- Repeat Keys: Keyes, defined as repeat keys, will repeat their action continually while be pressed.

#### 4.4.1 Key Lock

Single keys of the Modular Evolution can be locked to prevent unintentional functions by pressing a key by mistake. This is helpful when starting to learn how to use the Modular Evolution.

With the checkbox "Use Key Lock" you can activate this function. The button "Locked Keys..." will open the dialog "Define locked keys for device". In the list box "Device" the connected Braille display is already preselected. In the list box "Available keys" you choose the keys to be locked. With the "Add" button you move the selected key into the list box "Locked keys". The "Remove" button removes the key back to the available keys. By default, no keys are locked.

#### 4.4.2 Fast Keys

Fast keys, also known as hot keys, refer to keys that implement the function associated with that key as soon as the key is pressed, instead of when the key is released. If one of the keys to be used in a key combination is a fast key, the fast key must therefore be pressed last.

The check box "Use Fast Keys" is used for enabling this function. The button "Fast Keys..." will open the dialog "Define Fast Keys for device". In the list box "Device" the connected Braille display is already preselected. In this dialog you can then select the keys you want to define as fast keys from the list box "Available keys" and move them by pressing the "Add" button into the list box "Fast Keys". By default, no keys are defined as fast keys. There are no fast keys available for Braille input.

### 4.4.3 Repeat Keys

With the settings under "Repeat Keys" you can specify the repeat interval at which a function initiated by a key is repeated when that key is continually pressed. This feature makes it easier, for example, while you are trying to navigate through a list, because you do not need to keep pressing the forward or backward key for each item in the list, but keep holding down that key until the cursor is at the desired item.

The check box "Use Repeat Keys" is used for enabling this function. The default setting is that key repeats are disabled. The button "Repeat Keys..." will open the dialog "Settings for repeat keys". In the list box "Device" the connected Braille display is already preselected. In this dialog you can then select the keys you want to define as repeat keys from the list box "Available keys" and move them by pressing the "Add" button into the list box "Repeat Keys". For the Modular Evolution, the keys [B4], [B5], [TLU], [TLD], [TRU], [TRD], [L], and [R] are implemented with a default repeat interval of 500 milliseconds if you activate key repeats. There is no key repeat available for Braille input.

### 4.5 Miscellaneous

Under the tab "Miscellaneous", you can specify whether your actions should be tracked in a protocol file. This function is available in case you enlist Technical Support. Please check this box only when asked to do so by your customer service representative. You will then also be able to specify where this protocol file should be saved, in the field called "Protocol file".

The check box "Quick Entry in PC mode by Dot 7 as Back Space and Dot 8 as Enter" results in the [B1] key functioning like a Backspace key during Braille input, and the [B8] key as Enter. If you want to disable this option, you can do so by unchecking this box, which is checked by default.

### 4.6 Info

In the "Info" tab sheet you find important information about your Modular Evolution and the driver software, you are using.

In the field "Active Braille display" you find the type of Braille display, you are using, as well as the interface it is connected to and the serial number of your Braille display. In addition you find a reference when the next recommended maintenance of your Braille display is due.

In the field "Driver properties" the type of screen reader, you are using is listed, as well as the version of your driver.

At "Your dealer" you get the contact details of your Handy Tech dealer with postal address, telephone number and E-mail.

## 5 Active Tactile Control (ATC)

The Modular Evolution's integrated ATC technology now makes it possible for the first time to detect the Braille dots that you touch. By evaluating the nature of individual tactile contacts, your reading position on the Braille line can be determined. Using various assistant functions that can be customized, your reading position can be employed to control the screen reader. Depending on your current reading status, certain actions can be initiated. ATC can recognize four different reading behaviors:

- Normal reading: The reading position is moving from left to right.
- Fast reading: Reading speed is faster than at a pre-determined rate of characters per second.
- Resting: Detected when one character is touched for longer than a specified time period.
- Reading backwards: The reading position is moving from right to left.

A certain action can be assigned to each of these four behaviors. There are two customizable modes for the so-called assistant functions. The two modes are "Reading" and "Learning". The tab "ATC" in the Settings menu of the Handy Tech Braille system is used to specify what your Modular Evolution and your screen reader should do when each reading behavior is detected, depending on whether you selected either Reading or Learning mode.

Under the ATC tab, the check box "Use ATC" allows you to enable or disable the ATC functionality. There is also a quicker way to do this, by pressing [L + 1 7] or [L + B1 + B4] (Chord A). By default, this function is unchecked.

The sliding "Sensitivity" control is used to set the sensitivity of the ATC sensors to match your personal reading style. You can increase or decrease, respectively, the sensitivity by activating the "right" or "left" cursor key.

The field "Assistant Mode" is used to specify whether you want to take advantage of the assistant functions for reading or learning Braille. If you have selected one of the two functions in the combo box, you can use the "Settings" button to determine how the screen reader should react to your reading behavior. More details on these settings are provided below in Section 5.1, ATC Assistant for Reading or Learning.

The ATC-monitor enables the text currently being displayed on the Braille line to be shown in a window corresponding to the size of the Braille line on the monitor, as well, so that a seeing person is able to follow what is going on on the Braille display. The Settings button in this field allows you to specify the color used for displaying the reading position. A different color can be specified for each reading behavior. More details on these settings are provided below in Section 5.4, ATC-Monitor Settings.

If the check box "Show monitor after start-up" is checked, the ATC-monitor will automatically start upon the screen reader's start-up. If you want to turn on the ATC-

monitor at a later time, you can go into this menu and activate the button "Start monitor now".

If you check the "Generate protocol" check box at "Reading protocol", everything you enter or read on the Braille display will be logged in a protocol file as of the moment when you click "OK" or "Apply". It's faster to use the short key combination [L + 1 2 3] or [L + B2 + B3 + B4] (chord I) to activate the logging function. If ATC was off, it will be activated. You are free to choose any name for this protocol file. The default file name is HtAtc.log. Generating the reading protocol stops only when you deactivate this "Generate protocol" option again, or when you quit the screen reader. The protocol file can be scanned and analyzed by an evaluation program later.

## 5.1 ATC Assistant for Reading or Learning

You can specify an action as your screen reader's reaction to your reading status. The following actions are available:

- no action
- speak letter: the letter at the reading position will be spoken.
- speak word: when touching the first letter of a word, the word will be spoken. Optionally it is also possible to change the setting so that the word is spoken when read completely. Here you can also set a delay time.
- speak Braille display: the text shown on the Braille display will be spoken by the speech output.
- low signal
- high signal
- speak Braille display and move to the next line: When using this setting with "reading fast", you can skip through text by the length of the Braille display till you reach the section, where you want to read without speech. After refreshing the Braille display, the reading of the previous line will be interrupted and the reading starts with the new position.
- say all and route Braille line: starting to read the whole text and the Braille display will be synchronized with the reading position of the speech output. When detecting any reading position, the speech will stop and the Braille display shows the current position.
- say current character's attributes: the attribute at the current reading position will be announced e.g. "bold Arial 12".
- say character attribute changes: if the attribute at the reading position changes, like from normal to bold, than "bold" will be announced. Also changes of font type and font size will be announced e.g. "bold Arial 12".
- route mouse cursor to reading position: the mouse pointer will – depending on the reading behavior – be moved with the reading position. This helps to synchronize the magnification area on the screen with the reading position on the Braille display.

The following four behaviors can be detected as your reading status:

- reading fast

- reading normal
- resting
- reading backwards

It is also possible to delay the speech output for a certain amount of time if you do not want the text to be spoken right away. This delay is entered in milliseconds. The possible range for this value is from 0 (no delay) to 5000 milliseconds.

You can also determine the reading speed after which the ATC-function should define your reading speed as "fast". For this specification, you can enter any value from 0 to 200 characters per second.

The time period after which the ATC-function should identify your reading status as "resting" can also be customized. This value is specified in milliseconds.

You can further control the speech output by checking or unchecking the check boxes "Speak word only at end of word" and "Also spell word". If "Also spell word" is checked, you can then also insert a delay before speech output starts by activating the check box "Use delay while spelling word". These settings are implemented only if you have assigned the action "Speak word" to any one of the four possible reading behaviors.

You can control what happens when you reach the end of the Braille line in the field "Action when line has been read". Three check boxes are available. If you check "Signal tone", a signal tone will be emitted when you have read the last character on the line. If the check box "Automatic scrolling after xxx milliseconds" is checked, you don't need to press [TRD] to advance when you reach the end of the line, instead, the next line will automatically be displayed after the specified time has elapsed. If you activate the check box "Indicate empty lines", blank lines will be shown on the Braille display by setting all the dots of the first three elements on the display. This is useful if you have automatic scrolling enabled, because now you do not have to manually advance through blank lines by pressing [TRD].

## 5.2 Tips for Utilizing ATC to Learn Braille

In this section, we provide some useful tips for how you can improve your Braille reading skills with the help of ATC. First, enable ATC by entering the key combination [L + 1 7] or [L + B1 + B4] (Chord A), that is, the B4 and B1 keys together with the left thumb key. This will activate the Braille system's reading position detection via ATC. You can turn ATC off again by entering this same key combination.

In the default setting, the Assistant Mode is "Reading". Under the tab ATC in the Settings window for Handy Tech Braille displays, change the Assistant Mode to "Learning". Now, after you have read an entire word, the word will be spoken as speech output. In this way, ATC can help you to become more secure in reading text. If you come across any Braille character that you do not recognize, you only need to

remain at that character and the speech output will spell the character. Individual letters and characters are also spoken if you are reading backwards.

ATC can also be extremely useful when you are learning a foreign language. For example, if you want to learn how to pronounce, let's say, German words, correctly, you can first switch your speech output to German. Then, set the Assistant Mode under the tab ATC in the Settings window for Handy Tech Braille displays to "Learning". We recommend setting a speech output delay of approximately 2000 milliseconds, i.e., 2 seconds. Now when you activate ATC, you will have two seconds after having read an entire word to pronounce it yourself, before the speech output speaks the word as well.

### 5.3 Tips for Utilizing ATC for the Experienced Braille Reader

In this section, you will find tips on how the ATC technology can help you, as an experienced Braille display user, to operate your PC and your screen reader program even more efficiently.

Probably the most important Assistant function made possible by ATC is automatic text scrolling when you reach the end of the Braille line. Enable ATC by entering the key combination [L + 1 7] or [L + B1 + B4] (Chord A). This will activate reading position detection via ATC. In the default setting, the Assistant Mode is "Reading". You can turn ATC off again by entering the same key combination.

Automatic scrolling is the default setting. The active cursor should be tracking the Braille display in order to make automatic scrolling of the text possible. If ATC is active, you will find that the Braille display automatically resets itself to the next segment of text once you have read to the last character represented on the Braille line, just as if you had entered [R] or [TRD].

If you leave the default setting in Reading mode, you can also cause the entire text on the line to be spoken when ATC recognizes fast reading. Simply move quickly across at least three Braille characters from left to right, which will be detected as fast reading, and the speech output will speak the entire text on the display. By default, fast reading is recognized upwards of a reading speed of 15 characters per second. You can customize this value in the Reading Speed profile.

At this point, we would like to draw your attention to a special feature: If there is a blank line, the first three elements on the display will be set with all eight dots. This enables the Braille system to provide automatic scrolling even when there are blank lines.

If you remain at one character for longer than one second or whichever delay you specify in the Reading Speed profile, that character will be spoken.

We recommend the following ATC-settings for you as an experienced Braille reader:

With "reading normal" we recommend to use "say character attribute changes". Now you can easily follow attribute changes at the reading position without a hassle switching to attribute information. This is especially useful when checking the layout for example within a word document.

With "reading fast" it makes sense to use the action "say all and route Braille line". This allows you to browse fast through a text till you reached the position you were looking for.

You can assign the reading behavior "resting" with "say current character's attributes". This allows you to check the current character's attributes anytime.

For "reading backward" we recommend to assign the action "route mouse cursor to reading position". This allows you with a small gesture to place the mouse pointer to your reading position. This can be helpful to route the attention of a sighted person to a specific text position.

## 5.4 ATC-Monitor Settings

For the graphic display of the reading modes on the monitor screen, you may assign a different color to each reading status. The following colors are the default assignments for each mode:

- Finger on line: yellow
- Reading status fast: light blue
- Reading status normal speed: green
- Reading status resting: orange
- Reading status reading backwards: red

You can customize the colors by opening the standard Windows color dialog.

## 6 Operating a PC with a Screen reader

The so-called screen reader programs' task is to output the information displayed on a PC monitor screen, converting it into speech and Braille for blind users. The Modular Evolution serves to display the Braille information. Since only a small portion of the actual screen contents can be displayed on a Braille line, the screen reader must also be capable of only relaying the most relevant information in any given situation to the Braille display system.

All of the screen readers currently on the market relay only focused Windows-information when they are operating. For example, if a menu item is highlighted in any Windows menu, that menu item is displayed on the Braille line by default. If you move the Windows-focus up or down with the arrow keys, these changes will automatically be forwarded to the Braille display as well.

In any editable text field, the cursor is usually represented on the Braille display in the corresponding position as the blinking dots 7 and 8. If the cursor moves past the portion of the screen that is displayed on the Braille display while writing text, the Braille display content advances automatically. The reading keys, [TRD] for forward and [TLU] for back, enable you to move through the text regardless of the position of the cursor. By activating one of the cursor routing keys, the PC cursor can be placed at that text position. If you want to return to the cursor's position after moving around with [TLU] and [TRD], you can in most cases do this by pressing [7]/[B1], or by moving the cursor with the arrow keys. Any marked text, which is displayed on the monitor by highlighting, is represented on the Braille line through underlining with dots 7 and 8.

In general, the information spoken by the speech output may not be identical to the data shown on the Braille display. For example: When quitting Microsoft Word with "Save As...", the speech output will say the text "Do you want to save the changes you made to 'file name'?" followed by the buttons "Don't Save", "Cancel", and "Save". The Braille display will only show the button names. By activating one of the cursor routing keys above any of the button names, that button can be clicked. However, you can also display the other text in the dialog box on the Braille display by using the [TRD] and [TLU] keys.

The Modular Evolution is supported by various screen readers, including:

- JAWS
- Hal/SuperNova (Dolphin Systems)
- Window-Eyes

The current driver for your screen reader is provided on the program CD included in your package.

### 6.1 Screen reader under Windows, Example JAWS

The functionality of JAWS for Windows is so extensive that only the basic functions for operating the Braille display can be described in brief in this section.

The status modules of a Braille display contain important data regarding screen positioning. Since the Modular Evolution does not include dedicated status modules, you can use [L + R] to toggle the status modules on and off. The first three status elements indicate the cursor's pixel position on the line. The fourth status element indicates which mode is currently active, as follows:

- p for PC cursor
- j for JAWS cursor
- s for structured mode

Dots 7 and 8 of the status elements show the Braille display's position within the window line. Dots 7 and 8 in the status elements have the following meanings:

- 1+2+3+4: The entire window line is shown on the Braille display
- 1+2: Left half of the window line
- 3+4: Right half of the window line
- 2+3: There is more text on the left and right in the window line

#### 6.1.1 Overview

This table lists all functions associated with the keys on the Modular Evolution. We have not included an exhaustive description of each of the functions, because you will find them in the JAWS for Windows manual.

Control Key / Braille Dot	Function
[B1] / [7]	Activate PC cursor tracking.
[B2] / [3]	Display the first line in the window (title).
[B3] / [2]	Move the Braille display to the left.
[B4] / [1]	Move the Braille display section one line up without changing the horizontal position.
[TLU] or [TRU] or [L]	If there is any text to the left of the Braille display section, it moves to the left, if not, it moves one line up.
[TLD] or [TRD] or [R]	If there is any text to the right of the Braille display section, it moves to the right, if not, it moves one line down.
[B5] / [4]	Move the Braille display section one line down without changing the horizontal position.
[B6] / [5]	Move the Braille display to the right.
[B7] / [6]	Display the last line in the window.
[B8] / [8]	Drag the JAWS cursor to the PC cursor and activate the JAWS cursor.
[L + R]	Toggle status modules on and off.

Control Key / Braille Dot	Function
[B9] or [B1 + B8] / [7 8]	Switch between structured mode, section output and speech output.
[B10] or [B2 + B8] / [3 8]	Change cursor representation (dots 7 and 8, all 8 dots, blinking and non-blinking).
[B11] or [B3 + B8] / [2 8]	Toggle between 6/8 dot Braille.
[B12] or [B4 + B8] / [1 8]	Handy Tech configuration dialog (as of Handy Tech JAWS Driver version 3.x)
[B13] or [B5 + B8] / [4 8]	Toggle between focused text on Braille display/same text as on screen.
[B14] or [B6 + B8] / [5 8]	Activate the JAWS cursor.
[B2 + B3] / [2 3]	Beginning of line
[B6 + B7] / [5 6]	End of line
[B2 + B3 + B4] / [1 2 3]	Top of file
[B5 + B6 + B7] / [4 5 6]	End of file
[B1 + B2 + B7 ] / [3 6 7]	Speech interruption on/off
[0] through [9]	Digits 0 through 9
[B1 + B2 + B7 + B8] / [3 6 7 8]	Output task bar
[TLC]	Tab
[TRC]	Shift + Tab
[TLC + TRC]	Enter
[L + B1 + B4] / [L + 1 7]	Toggle ATC on/off
[L + B2 + B3 + B4] / [L + 1 2 3]	Toggle ATC reading protocol on/off
[L + B1 + B3 + B4] / [L + 1 2 7]	Toggle Braille input on/off
[L + B1 + B2 + B3 + B4 ] / [L + 1 2 3 7]	If there is any text to the left of the Braille display section, it moves to the left, if not, it moves one line up.
[R + B5 + B6 + B7 + B8] / [R + 4 5 6 8]	If there is any text to the right of the Braille display section, it moves to the right, if not, it moves one line down.
[L + R + B1 + B2 + B3 + B4] / [L + R + 1 2 3 7]	Move the Braille display section one line up.
[L + R + B5 + B6 + B7 + B8] / [L + R + 4 5 6 8]	Move the Braille display section one line down.

By entering letters in Braille, you can in addition input the so-called mnemonic commands that are listed below:

j	[B3 + B5 + B6] / [2 4 5]	Activate the JAWS settings menu
%	[B2 + B3 + B4 + B5 + B6 + B7] / [1 2 3 4 5 6]	Activate the screen reader settings menu (JAWS)
d	[B4 + B5 + B6] / [1 4 5]	Desktop minimizes all applications
h	[B3 + B4 + B6] / [1 2 5]	Activate JAWS Help (paste + F1)
\$	[B5 + B7] / [4 6]	Tab
k	[B2 + B4] / [1 3]	Shift Tab
g	[B3 + B4 + B5 + B6] / [1 2 4 5]	Grade 2 on/off

m	[B2 + B4 + B5] / [1 3 4]	Alternative for activating the menu bar
s	[B2 + B3 + B5] / [2 3 4]	Start menu
+	[B2 + B3 + B6] / [2 3 5]	Toggle 6/8 dot Braille
=	[B2 + B3 + B6 + B7] / [2 3 5 6]	System Tray
z	[B2 + B4 + B6 + B7] / [1 3 5 6]	Announce time
	[B2 + B5] / [3 4]	Status cells on/off
c	[B4 + B5] / [1 4]	Ctrl+Tab
C	[B1 + B4 + B5] / [1 4 7]	Shift Ctrl+Tab
e	[B4 + B6] / [1 5]	ESC
?	[B3 + B7] / [2 6]	Enter
b	[B3 + B4] / [1 2]	Braille cursor tracking on/off
f	[B3 + B4 + B5] / [1 2 4]	Active cursor tracking on/off
v	[B2 + B3 + B4 + B7] / [1 2 3 6]	Set level of Braille contractions

The cursor routing keys (CR) are used to directly place the cursor at that text position. In addition, the following functions can be initiated by activating cursor routing keys in combination with certain control keys.

[CR + B4] or [CR + B5]	Mark a text block (beginning and end of block)
[CR + 1] or [CR + 4]	
[CR + B7] / [CR + 6]	Describe object at the CR position
[CR + B8] / [CR + 8]	Right mouse click at the CR position
[CR + L] or [CR + R]	Describe the font

If the four status modules are in use on the Braille display, the CR keys above the status elements (S1 through S4) have the following functions:

[S1]	Toggle attribute / text mode
[S2]	Change attribute representation, underline with dots 7+8
[S3]	Toggle unconditional / conditional cursor tracking
[S4]	Toggle active cursor tracking on/off

## 6.2 Screen reader under Windows, Example Hal/SuperNova

Hal converts the information on the PC screen into speech and into Braille output, while SuperNova offers the additional option of displaying the screen information enlarged for seeing-impaired users. The functionality of Hal and SuperNova for Windows is so extensive that only the basic functions for operating the Braille display can be described in brief in this section.

In addition to navigating, the most important keys for operating Hal/SuperNova with the Modular Evolution are [B1]/[7] and [B2]/[3]. [B1]/[7] switches into Live-Focus, and [B2]/[3] activates the virtual focus. The virtual focus can be used to explore the contents of the screen, while also providing an opportunity to activate the Windows-elements displayed on the Modular Evolution. In contrast, Live-Focus tracks whichever Windows-element is the most relevant at the moment. For example, when entering text, if a cursor routing key is pressed at one of the Braille modules, this

result in a mouse click at that text position, which means the cursor is now at this location.

### 6.2.1 Overview

This table lists all functions associated with the keys on the Modular Evolution. We have not included an exhaustive description of each of the functions, because they are already contained in the manuals for Hal and SuperNova.

Control Key / Braille Dot	Function
[B1] / [7]	Use Live-Focus
[B2] / [3]	Top
[B3] / [2]	Left by one width
[B4] / [1]	One line up
[TLU] or [TRU] or [L]	Back
[TLD] or [TRD] or [R]	Forward
[B5] / [4]	One line down
[B6] / [5]	Right by one width
[B7] / [6]	Braille down
[B8] / [8]	Go to Live-Focus
[L + R]	Toggle status modules on/off
[B9] or [B1 + B8] / [7 8]	Physical / logical mode
[B10] or [B2 + B8] / [3 8]	Braille cursor style
[B11] or [B3 + B8] / [2 8]	Eight dot / six dot Braille
[B12] or [B4 + B8] / [1 8]	Handy Tech configuration dialog
[B13] or [B5 + B8] / [4 8]	Expand gap on/off
[B14] or [B6 + B8] / [5 8]	Use virtual focus
[B2 + B3] / [2 3]	Beginning of line
[B6 + B7] / [5 6]	End of line
[B2 + B3 + B4] / [1 2 3]	Top of file
[B5 + B6 + B7] / [4 5 6]	End of file
[B6 + B7 + B8] / [5 6 8]	Run through attributes
[0] through [9]	Digits 0 through 9
[TLC]	Tab
[TRC]	Shift + Tab
[TLC + TRC]	Enter
[L + B1 + B3 + B4] / [L + 1 2 7]	Toggle Braille input on/off
[L + B1 + B2 + B3 + B4] / [L + 1 2 3 7]	Back
[R + B5 + B6 + B7 + B8] / [R + 4 5 6 8]	Forward
[L + R + B1 + B2 + B3 + B4] / [L + R + 1 2 3 7]	One line up
[L + R + B5 + B6 + B7 + B8] / [L + R + 4 5 6 8]	One line down
[L + B1 + B4] / [L + 1 7]	Toggle ATC on/off
[L + B2 + B3 + B4] / [L + 1 2 3]	Toggle ATC reading protocol on/off

By entering letters in Braille, you can in addition input the so-called mnemonic commands that are listed below:

%	[B2 + B3 + B4 + B5 + B6 + B7] / [1 2 3 4 5 6]	Activate system control
h	[B3 + B4 + B6] / [1 2 5]	Help
\$	[B5 + B7] / [4 6]	Tab
k	[B2 + B4] / [1 3]	Shift Tab
g	[B3 + B4 + B5 + B6] / [1 2 4 5]	Literary Braille on/off
m	[B2 + B4 + B5] / [1 3 4]	Alternative for activating the menu bar
s	[B2 + B3 + B5] / [2 3 4]	Start menu
+	[B2 + B3 + B6] / [2 3 5]	Eight dot / six dot Braille
=	[B2 + B3 + B6 + B7] / [2 3 5 6]	System Tray
z	[B2 + B4 + B6 + B7] / [1 3 5 6]	Announce date and time
c	[B4 + B5] / [1 4]	Ctrl + Tab
C	[B1 + B4 + B5] / [1 4 7]	Shift Ctrl + Tab
e	[B4 + B6] / [1 5]	ESC
?	[B3 + B7] / [2 6]	Enter
f	[B3 + B4 + B5] / [1 2 4]	Tracking on/off
v	[B2 + B3 + B4 + B7] / [1 2 3 6]	Set level of Braille contractions

The cursor routing keys (CR) are used to directly place the cursor at that text position. In addition, the following functions can be initiated by activating cursor routing keys in combination with certain control keys. If the four status modules are in use on the Braille display, the CR keys above the status elements (S1 through S4) have the following functions:

[S1]	Run through attributes
[S2]	Set level of Braille contractions
[S3]	Tracking on/off
[S4]	Physical / logical mode

### 6.3 Screen reader under Windows, Example Window-Eyes

Window-Eyes by GW Micro is one of the most commonly used screen readers worldwide. It enables access to all kinds of different applications, without complicated scripts. Window-Eyes is highly customizable, so you can control how to display the monitor information.

When you use Window-Eyes with a Braille display, you can track both the focus as well as the mouse cursor. In addition, there is also an invisible cursor, the so-called WE-cursor. If you bind the Braille display to the WE-cursor, you can move the position of the Braille display relative to the screen without changing the position of either the focus or the mouse cursor.

### 6.3.1 Overview

Your Modular Evolution, just like all the other Handy Tech Braille displays, is supported by Window-Eyes. The following table provides an overview of Window-Eyes commands that can be entered with the control keys on the Braille display. We have not included an exhaustive description of each of the functions, because they are already contained in the Window-Eyes manual.

Control Key / Braille Dot	Function
[B1] / [7]	Go to focus
[B2] / [3]	Go to the active window's title bar
[B3] / [2]	Toggle Braille tracking on/off
[B4] / [1]	Move Braille display section one line up
[L] or [TLU]	Braille display section to the left
[R] or [TRD]	Braille display section to the right
[B5] / [4]	Move Braille display section one line down
[B6] / [5]	Toggle between Window-Eyes-cursor and mouse cursor
[B7] / [6]	Go to the active window's status line
[B8] / [8]	Drag mouse to focus
[B9] or [B1 + B8] / [7 8]	Specifies whether type of control element will be indicated or not
[B10] or [B2 + B8] / [3 8]	Toggle Browser Mode on/off
[B11] or [B3 + B8] / [2 8]	Toggle between 6/8 dot Braille
[B12] or [B4 + B8] / [1 8]	Handy Tech configuration dialog
[B13] or [B5 + B8] / [4 8]	Toggle blank spaces
[B14] or [B6 + B8] / [5 8]	Drag cursor to mouse
[B2 + B3] / [2 3]	Beginning of line
[B6 + B7] / [5 6]	End of line
[B2 + B3 + B4] / [1 2 3]	Top of file
[B5 + B6 + B7] / [4 5 6]	End of file
[0] through [9]	Digits 0 through 9
[TLC]	Tab
[TRC]	Shift +Tab
[B7 + B8] / [6 8]	Show Attributes on/off
[B6 + B7 + B8] / [5 6 8]	Show Single Attributes on/off
[L + B1 + B3 + B4] / [L + 1 2 7]	Braille input on/off
[L + B1 + B4] / [L + 1 7]	ATC on/off
[L + B2 + B3 + B4] / [L + 1 2 3]	ATC reading protocol on/off

By entering letters in Braille, you can in addition input the so-called mnemonic commands that are listed below:

w	[B3 + B5 + B6 + B7] / [2 4 5 6]	Activate the Window-Eyes settings menu
%	[B2 + B3 + B4 + B5 + B6 + B7] / [1 2 3 4 5 6]	Activate the screen reader settings menu (Window-Eyes)
d	[B4 + B5 + B6] / [1 4 5]	Desktop minimizes all applications
h	[B3 + B4 + B6] / [1 2 5]	Activate Window-Eyes Help



\$	[B5 + B7] / [4 6]	Tab
k	[B2 + B4] / [1 3]	Shift Tab
g	[B3 + B4 + B5 + B6] / [1 2 4 5]	Grade 2 on/off
m	[B2 + B4 + B5] / [1 3 4]	Alternative for activating the menu bar
s	[B2 + B3 + B5] / [2 3 4]	Windows Start menu
+	[B2 + B3 + B6] / [2 3 5]	Toggle 6/8 dot Braille
=	[B2 + B3 + B6 + B7] / [2 3 5 6]	System Tray
z	[B2 + B4 + B6 + B7] / [1 3 5 6]	Announce date and time
c	[B4 + B5] / [1 4]	Ctrl + Tab
C	[B1 + B4 + B5] / [1 4 7]	Shift + Ctrl + Tab
e	[B4 + B6] / [1 5]	ESC
?	[B3 + B7] / [2 6]	Enter
v	[B2 + B3 + B4 + B7] / [1 2 3 6]	Set level of Braille contractions

The cursor routing keys (CR) are used to directly place the cursor at that text position.

## 7 Important Information

This section contains important safety and warranty information. Please make sure you have read this information before starting up your Modular Evolution.

### 7.1 Symbols

The symbols located on the underside of the unit have the following meanings:



Please read the information in the manual!



Applied Part, Type B

### 7.2 Safety Information under the Standards for Medical Devices

Medical electric devices are subject to special precautions in regard to electromagnetic compatibility and must be installed and taken into operation according to the directions contained in this user manual. Please review also the general safety information in Section 7.3 below.

Portable mobile HF communications facilities may affect electrical devices.

### 7.3 General Safety Information

Avoid any contact between your Modular Evolution and any fluids (rain, coffee...). If fluids enter into the housing, the Braille elements could be severely damaged, which can only be remedied by costly repairs.

Do not expose your Modular Evolution to extreme temperatures or high humidity during operation. The ambient temperature should be between +10° C (= 50° F) and +40° C (= 100° F), and relative humidity may not exceed 80%.

The Modular Evolution must not be operated in moist rooms, for example, bathrooms, because the device generates voltages up to 200 V.

The device contains no user-serviceable parts. In the event of a defect, please contact your dealer, or Handy Tech directly. Only an authorized Handy Tech dealer has permission to service the device.

Only representatives of Handy Tech Elektronik GmbH or its authorized dealers have permission to open the Modular Evolution's housing.

Avoid switching your Braille system on immediately after moving it from a cold room into a warm environment. Under unfavorable conditions, condensation can damage the device. Wait until the device has warmed to room temperature before turning it on.

All cables (interface cable, power cable) must be installed such that they do not pose any hazards (tripping hazard).

When you connect or disconnect the interface cable to or from the Braille display, always avoid directly touching the wire contacts inside the plug. Touching the contacts could damage your computer interface through static electricity overload.

Before disconnecting the interface cable from the Braille display, we recommend first disconnecting the cable from the PC.

Please use only the power supply unit shipped with your Modular Evolution for connecting it to utility power.

When cleaning the device, always disconnect both the power cable and the interface cable first.

If the Braille display was dropped, the housing is damaged, or the Braille system is malfunctioning, turn the unit off immediately. It needs to be serviced by authorized service personnel.

The power supply should be disconnected if the unit will not be used for an extended period of time.

This device must be disposed of at the end of its useful life in compliance with applicable guidelines for electronic devices.

## 7.4 Handling the Braille Display

The Braille system's Braille modules utilize the highly reliable and maintenance-free piezo technology. If handled properly, you will enjoy many years of trouble-free operation.

Always operate your Modular Evolution at normal room temperature and protect it from humidity. Avoid exposing the Braille display to extreme changes in temperature.

Do not drop your Braille system, and avoid exposing the device to strong vibrations. When you have to move the device, support the entire assembly from below. There are two ridges for this purpose on the left and right side.

Your Braille display will be the better for it if you take care to operate it with clean hands, because otherwise the tactile pins can become sticky and may release only if prodded.

Please ensure that no fluids enter into the Braille display. The Braille elements are especially sensitive to humidity, because humidity could destroy the high-voltage piezo elements.

We recommend covering the Braille display whenever it is turned off, to prevent unnecessary contamination with dust.

Clean your Braille display with a slightly damp cloth. Do not use any cleaners. The Braille elements must be cleaned with a dry, lintfree cloth only. The Braille elements should be cleaned and serviced thoroughly every two years in average operating conditions. In general, during servicing of the Braille elements, all tactile pins and key heads will be replaced and all input elements checked. An endurance test will then be performed. We can provide you with a replacement device during the maintenance period.

## 7.5 Warranty

If you open the Modular Evolution housing, which is sealed, within the warranty period, the warranty becomes void. The same applies to improper handling or use.

In the unlikely event that your Braille system does become defective, our repair service is available for repairs.

## 7.6 Technical Support

Your Braille system is a highly complex product. Although the Braille system has been optimized to be as easy to use and as self-explanatory as possible, errors in understanding or operation, which may impede your use of the device, may occur.

Please always consult this handbook first if you encounter difficulties. All procedures are described here. If this does not solve your problem, you have the option of reviewing possible solutions in the download area on Handy Tech's web page, [www.handytech.de](http://www.handytech.de).

As an alternative, you can also contact your dealer or local customer service representative. These agents receive ongoing training and information about the product, beyond what can be included in any manual.

If this does not result in the desired solution of your problem, do not hesitate to contact Handy Tech Elektronik GmbH in Horb directly. You have the following options:

- Mail: Handy Tech Elektronik GmbH, Brunnenstraße 10, D-72160 Horb, Germany
- Phone: +49 7451 5546 0
- Fax: +49 7451 5546 67
- E-Mail: [help@handytech.de](mailto:help@handytech.de)

# Modular Evolution

Important Information

*Hindy Tech*



Elektronik GmbH

## **8 Copyright Notice**

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## Appendix

### Guidance and manufacturer's declaration - electromagnetic emissions

<b>Guidance and manufacturer's declaration - electromagnetic emissions</b>		
The Braille display is intended for use in the electromagnetic environment specified below. The customer or the user of the Braille display should assure that it is used in such an environment.		
<b>Emissions test</b>	<b>Compliance</b>	<b>Electromagnetic environment - guidance</b>
RF emissions CISPR 11	Group 1	The Braille display uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The Braille display is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

### Guidance and manufacturer's declaration – electromagnetic immunity

<b>Guidance and manufacturer's declaration – electromagnetic immunity</b>			
The Braille display is intended for use in the electromagnetic environment specified below. The customer or the user of the Braille display should assure that it is used in such an environment.			
<b>Immunity test</b>	<b>IEC 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment guidance</b>
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact  ±8 kV air	±6 kV contact  ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines  ± 1 kV for input/output lines	± 2 kV for power supply lines  ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode  ± 2 kV common mode	± 1 kV differential mode  ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % $U_T$ (>95 % dip in $U_T$ ) For 0,5 cycle  40 % $U_T$ (60 % dip in $U_T$ ) For 5 cycles	< 5 % $U_T$ (>95 % dip in $U_T$ ) For 0,5 cycle  40 % $U_T$ (60 % dip in $U_T$ ) For 5 cycles	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Braille display requires continued operation during power mains interruptions,

	70 % $U_T$ (30 % dip in $U_T$ ) For 25 cycles	70 % $U_T$ (30 % dip in $U_T$ ) For 25 cycles	it is recommended that the Braille display be powered from an uninterruptible power supply or a battery.
	< 5 % $U_T$ (>95 % dip in $U_T$ ) for 5 s	< 5 % $U_T$ (>95 % dip in $U_T$ ) for 5 s	
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	0,3 A/m	If image distortion occurs, it may be necessary to position the Braille display further from sources of power frequency magnetic fields or to install magnetic shielding. The power frequency magnetic field should be measured in the intended installation location to assure that it is sufficiently low.

NOTE:  $U_T$  is the a.c. mains voltage prior to application of the test level.

## Guidance and manufacturer's declaration – electromagnetic immunity

<b>Guidance and manufacturer's declaration – electromagnetic immunity</b>			
The Braille display is intended for use in the electromagnetic environment specified below. The customer or the user of the Braille display should assure that it is used in such an environment.			
<b>Immunity test</b>	<b>IEC 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment - guidance</b>
			Portable and mobile RF communications equipment should be used no closer to any part of the Braille display, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. <b>Recommended separation distance</b>
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1,2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 V/m	$d = 1,2 \sqrt{P}$ 80 MHz to 800 MHz
			$d = 2,3 \sqrt{P}$ 800 MHz to 2,5 GHz
			Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, <sup>a</sup> should be less than the compliance level in each frequency range. <sup>b</sup> Interference may occur in the vicinity of equipment marked with the following symbol:

			
<p>NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.</p> <p>NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p> <p><sup>a</sup> Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Braille display is used exceeds the applicable RF compliance level above, the Braille display should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Braille display.</p> <p><sup>b</sup> Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

### Recommended separation distances between portable and mobile RF communications equipment and the Braille display

<b>Recommended separation distances between portable and mobile RF communications equipment and the Braille display</b>			
The Braille display is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Braille display can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Braille display as recommended below, according to the maximum output power of the communications equipment.			
<b>Rated maximum output power of transmitter</b>	<b>Separation distance according to frequency of transmitter</b>		
	<b>150 kHz to 80 MHz</b>	<b>80 MHz to 800 MHz</b>	<b>800 MHz to 2,5 GHz</b>
<b>W</b>	<b>d = 1,2 √P</b>	<b>d = 1,2 √P</b>	<b>d = 2,3 √P</b>
0,01	0,12	0,12	0,23
0,1	0,38	0,38	0,73
1	1,2	1,2	2,3
10	3,8	3,8	7,3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			