MID™

MODULAR INPUT DEVICE™

USER'S MANUAL

MID – UMANGB06
Rev. 6, November 2000

Covers MIDWIN ver. 3.0.7 and higher!

TIPRO
keyboards focusing on your future needs.

Contents:

1. Describing MID

The **MID** is a new concept of programmable keyboard, offering a solution for the ever changing needs of retailers, VARs, OEMs and POS software developers. MID is a modular input device, which brings ‘plug and play’ to the level of programmable keyboards.

MID is build around a **master module** *(Figure 1)* that controls programming, communication between MID modules and communication with the computer. It can control up to 14 modules with a maximum of 256 keys. Non-volatile memory (EEPROM) stores all the programmed data for the keyboard, making it independent of the computer and its operating system.

For more demanding systems, there is a master module which can simultaneously communicate via the keyboard port (AT/PS2) and the RS232 interface, enabling users to choose the mode of communication for each connected device. It is also possible for one key to send data to the keyboard port, while the next one communicates via RS232.

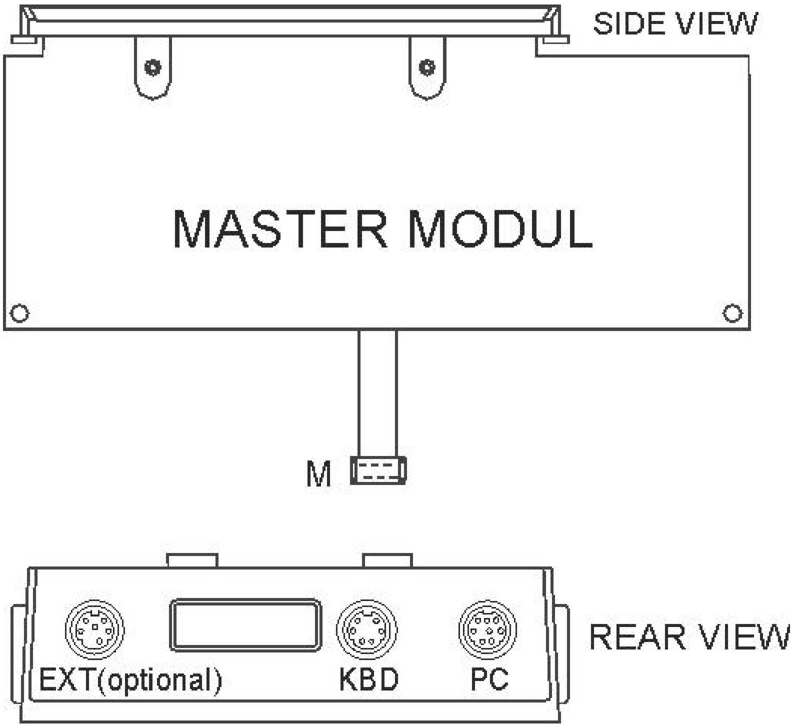


Figure 1: The Master module

Modules are available with various numbers of keys (32 to 128) with a choice of input and output devices that can be combined to create a keyboard to meet customer’s immediate and future needs.
Simple connection of additional modules, user friendly software that automatically recognises the attached configuration and enables programming of each module, a utility for printing labels and many other features distinguish MID from other programmable keyboards designed for POS and similar applications.

Keyboard modules with 32, 64, 96 and 128 keys are available in full travel and sealed short travel (membrane protected) variants, plus modules with a combination of alphanumeric (qwerty) and programmable keys. Both keyboard types use mechanical switches mounted on the rigid metal carrying plate for strength and durability.
In addition, the full travel modules are available also with integrated **keylock**, **iButton** and/or **LCD**. The first two, which can be integrated in the upper right-hand corner of a module are used for identification purposes, while the built-in LCD with 2x20 characters makes the keyboard ideal for applications requiring space saving.

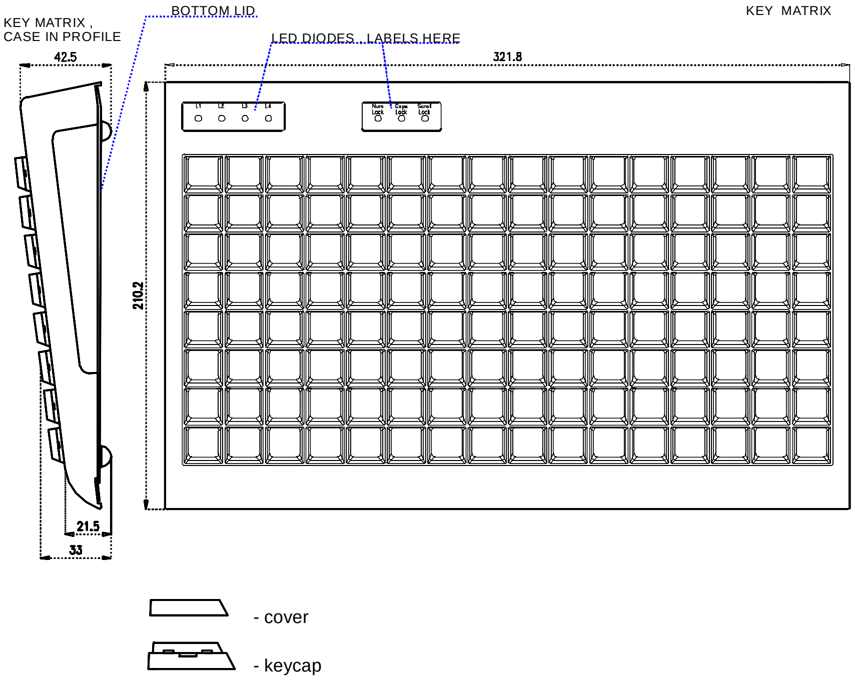


Figure 2: Keyboard modules

For electric funds transfer, identification and secure data entry, there are:

- **Magnetic card reader** (MCR; two and three track readers),
- **Bar code slot reader** (BCR) and
- **Smart card reader/writer modules** (ICCR).

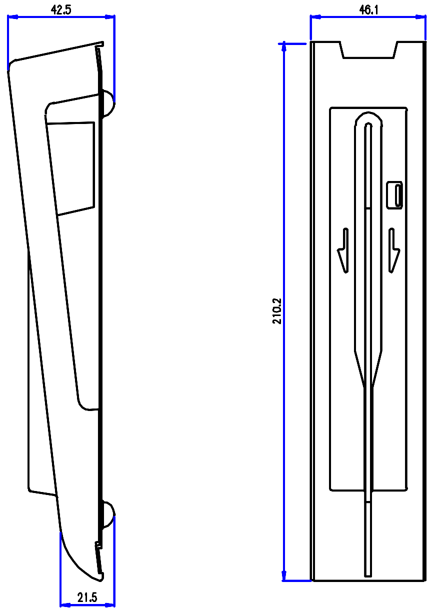


Figure 3: Magnetic card readers and bar code slot reader share the same housing

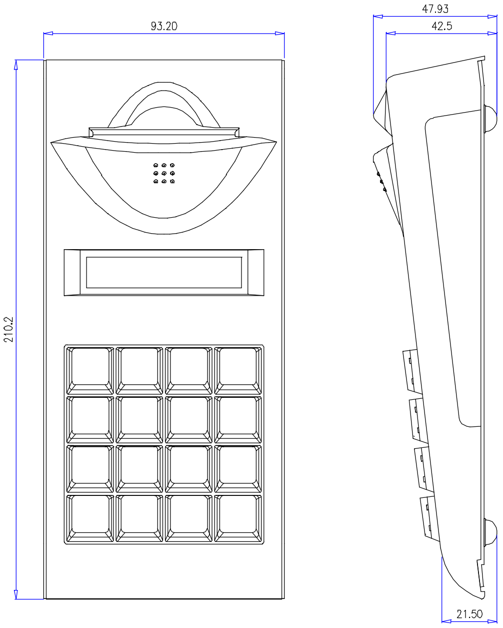


Figure 4: Smart card reader (ICCR)

Software allows programming of each key in four layers (four functions per key) as well as programming of other modules (MCR, BCR, keylock, iButton…).

Definition of each key in each layer can include:

- Any key function of a standard keyboard,
- Combination of simultaneously pressed keys,
- Inter character delay and beep,
- Auto repeat function and click tone, when the key is pressed.

Label printing utility, connected to the software for programming the keyboard, enables preparing, formatting and printing of labels for programmed keys, giving a professional look to the keyboard.

1.1. Where to use MID

MID is a programmable keyboard where keys can represent

- A sequence of codes *(e.g. SOLUTION)*
- A combination of standard keys *(e.g. CTRL-F11)*
- Or combination of both.

This makes the MID ideal to be used in

- POS, where every key means an item
- Special office applications, where every programmable key replaces a combination of keys or mouse action *(e.g. CAD, managers or bookkeeping programs…)*
- Dedicated applications, where very few commands are needed or where low introduction time is essential *(e.g. telephone exchange, label printers, industrial machines…).*

1.2. How to install MID

In the following chapters you will be introduced how to assemble, connect and program the MID.

The proper sequence of actions is as follows:

- **Assemble the MID configuration**
- **Connect MID to the computer**
  (where the MID will be programmed)
- **Define MID layout and program the keyboard**
  (once the keyboard is programmed the content remains in the non-volatile memory)
- **Install MID on the final working place**
  (the working place and the working type of MID connection may differ from the programming one's).

2. Assembling and connecting

2.1. Assembling MID configuration

An MID is a composition of one master module and one or more slave modules. On the figures below you can see how to assemble modules together.

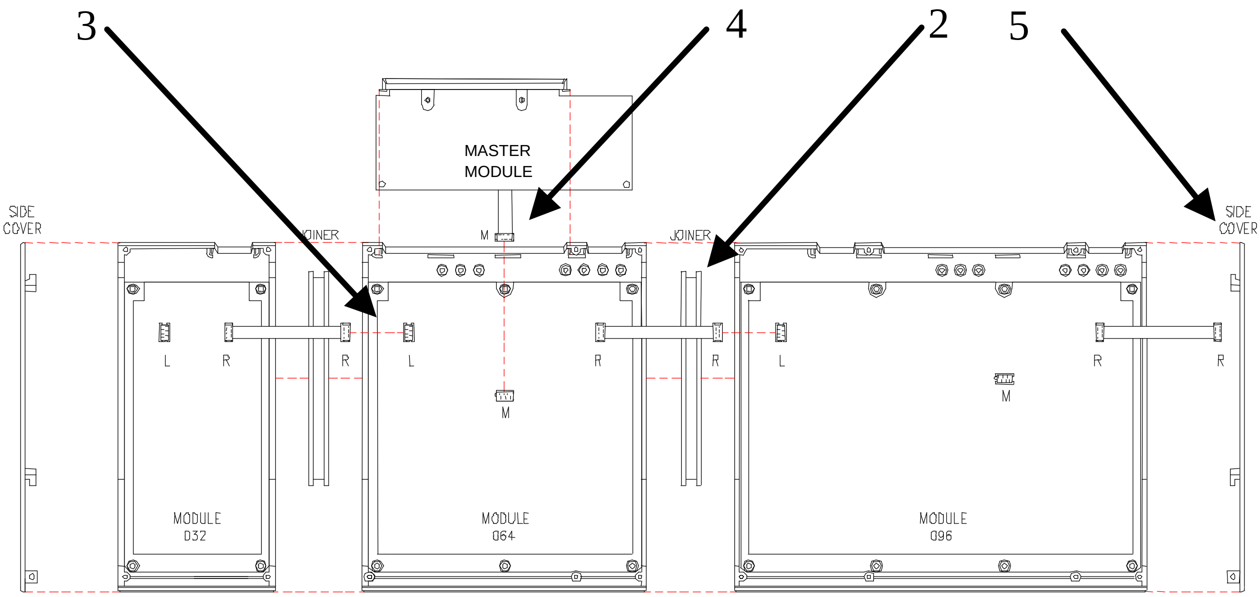


Figure 5: Assembling the keyboard I (bottom view)

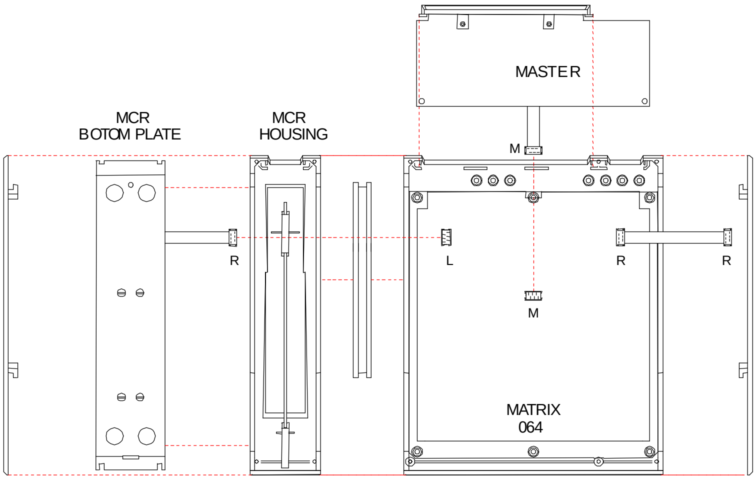


Figure 6: Assembling the keyboard II: combining a 64-key matrix module with an MCR module (bottom view)

The assembling procedure is as follows *(steps are indicated on the Figure 5)***:**

1. **Turn the modules upside down and dismount the bottom plates**
2. **Insert joiners between modules**
3. **Connect all modules together with short ribbon cables** *(connectors L-R)*
4. **Slip the master modules in the place of the back cover and connect it to the module's middle connector** *(connectors M-M)*

   If the configuration consists of more than one keyboard module *(in our example KM064A and KM096A)* you may connect master module in any of them.
5. **Add left and right side covers**
6. **Fasten the bottom plates**
7. **Stick the appropriate labels on the keyboard modules**:
   - where master module is inserted:
     PLACE LABELS [L1 L2 L3 L4] AND [Num Lock Caps Lock Scroll Lock] !
   - where master module is **NOT** inserted:
     PLACE BLANK LABELS!
   - with integrated keylock:
     PLACE THE LABEL AROUND THE KEYLOCK!
8. **If your configuration includes external modules connect them as explained in** ***2.3 Connecting external MID modules***.
9. **If your configuration includes an external barcode scanner connect it as explained in** ***2.4 Connecting the barcode scanner***.
10. **Keyboard is ready to be connected to the system.**

! **WARNING:** ***connect the keyboard when the computer is turned off!***

2.2. Connecting MID

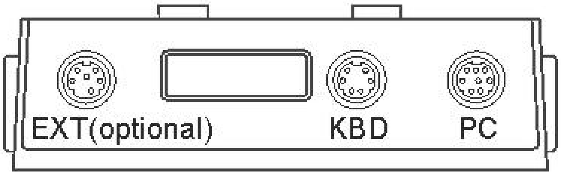
There are three ways how to connect MID to the system or with different words, three different working modes:

1. **MID uses AT/PS2 primary interface only –** this is typical when MID consists mostly of input modules *(e.g. key modules, MCR, iButton…)*. Communication with output modules is also possible, just somehow slower.
2. **MID communicates simultaneously via both AT/PS2 and RS232 primary interfaces -** this operating mode is typical when MID is composed of both **input** *(e.g. key modules, MCR, iButton…)* and **output** modules *(e.g. LCD, ICCR…)*.
3. **MID communicates via RS232 primary interface only –** this solution is suitable wherever only RS232 communication port is available.

MID modules sending data towards the host system are referred as INPUT modules (as seen from the host side), while modules receiving data form the host are referred as OUTPUT modules.

But, before explaining in details all three operating modes, get us first familiar with the connectors that are available on the rear side of the master module.

Figure 7 *(right)*: Rear side of the master module



Short description of the connectors:

- **PC** (mini DIN 8) is used for connection of the MID to the system.
- **KBD** is a pass through port, where a standard IBM PC compatible keyboard any other device with PS/2 could be connected (barcode scanner, OCR, additional MID…).
  Optionally you may also connect a barcode scanner with decoded RS232 output or other RS232 device *(RS232 option available only on master models MID-MR0Bx)*.

- Optional **EXT** connector is used for connection of an external MID module *(available only on master models MID-MxxxC).*

2.2.1. Connecting the MID to the AT/PS2 port only

These types of applications are based on the communication in the direction from the keyboard to the system. The keyboard is composed of input modules *(e.g. key modules, keylock, iButton, MCR, BCR)* and is connected to the system's keyboard port *(called also AT or PS/2 port – port where normally a standard keyboard is connected).*
This port on the PC has been designed basically as input interface that is very suitable for collecting data coming from the human driven peripherals, and less suitable *(rather slow)* for sending data from the system toward 'throughput hungry' peripherals.

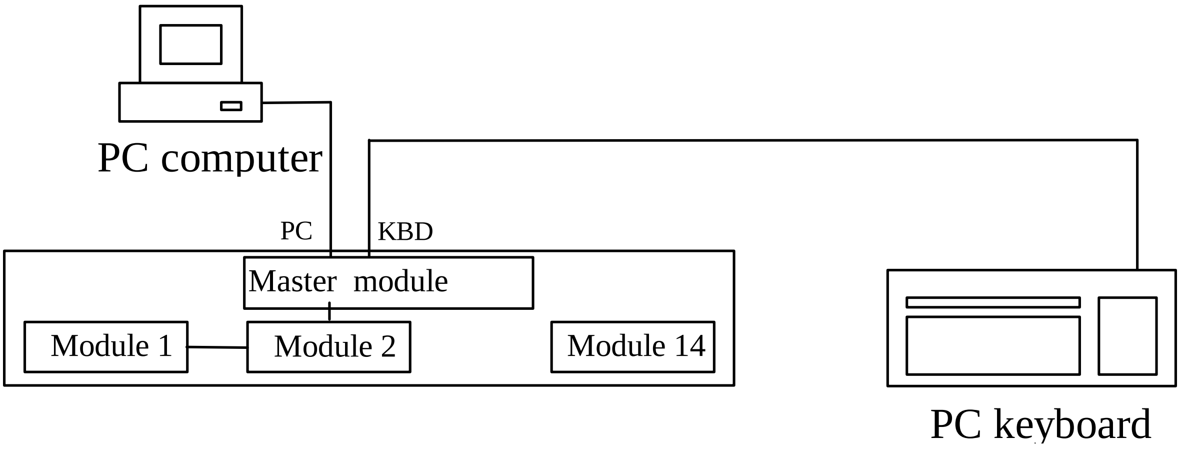


Figure 8: Connecting keyboard to the PC

On the figure above you can see a typical connection of the MID to the system. A standard PC keyboard is not needed – it may remain connected if besides programmable keys also fast alphanumeric entry is needed.

2.2.2. Connecting the MID to the AT/PS2 and RS232 port

This connection type is very useful, where both input *(key modules, MCR…)* and output modules *(LCD, ICCR…)* are used. In contrast to keyboard port the **RS232 interface** is basically bi-directional channel and provides much higher data throughput. This interface is in also called '**serial port'** and is labelled **COM1** and **COM2** on the PC side. Both interfaces can be used simultaneously.

It is advisable to use **input** modules through the keyboard port *(it is well supported in operating system and is easy to capture incoming codes)* and communicate with **output** *(e.g. LCD)* and **input/output** modules *(e.g. ICCR)* via the RS232, especially if the communication requires fast and comprehensive data exchange.

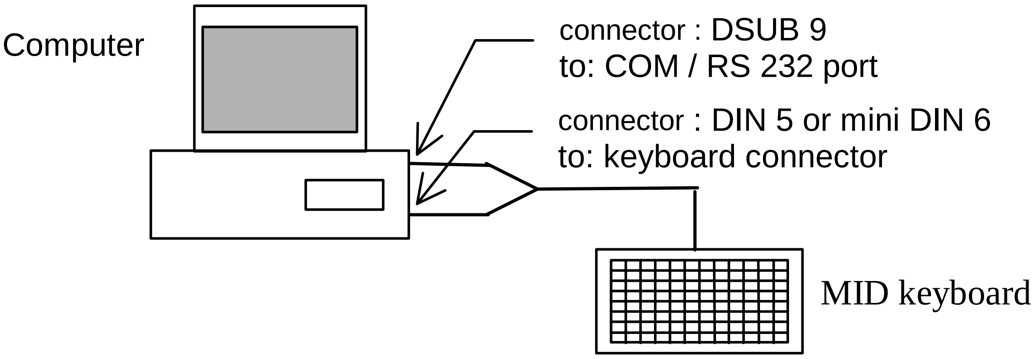


Figure 9: Using both AT/PS2 and RS232 primary interfaces

With this kind of connection you need a split cable that is connected as follows:

- **DIN5** or **mini DIN6** connector is connected to the keyboard connector of the PC computer.
- **DSUB9** connector has to be connected to the COM port (RS232 port) on the Terminal or PC computer. This connector is used for sending data from computer to the keyboard.

☞ **NOTE:** ***A standard IBM-compatible keyboard can be also connected to the MID (see Figure 8)!***

2.2.3. Connecting the MID to the RS232 port only

If a keyboard is connected to the system, which do not have a keyboard port *(e.g. cash registers, industrial printers, industrial machines, special PC applications…)* then the communication is performed through the RS232 port only. In this case the power supply has to be provided by an additional power supply and using special cable adapter.

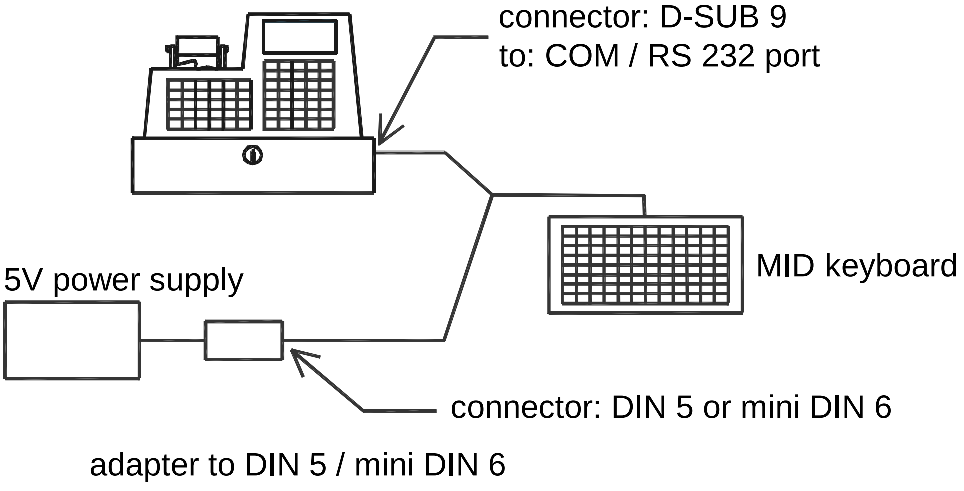


Figure 10: Using RS232 primary interface only

Same split cable as in previous chapter is needed. It has to be connected:

- **DIN5** or **mini DIN6** connector is connected through a special adapter directly to the 5V power supply.
- **DSUB9** connector has to be connected to the COM port (RS232 port) on the Terminal or PC computer. This connector is used for sending data in both directions.

2.2.3.1. Power supply connector

If the keyboard is used as shown in Figure 10, the additional power supply should be connected to the keyboard connector (mini DIN 6 or DIN 5). Power supply requirements depends on the keyboard configuration and can be found in the chapter *6.2 Technical data*.

Below you can see the pin-out of DIN 5 and mini DIN 6 connectors:

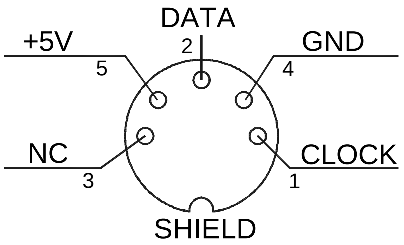


Figure 11: DIN 5 connector - MALE (front view)

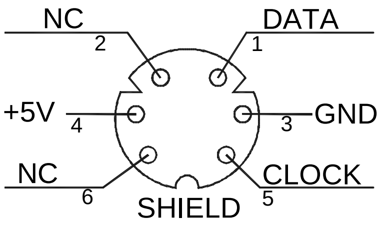
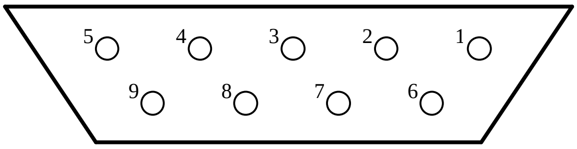


Figure 12: mini DIN 6 connector – MALE (front view)

2.2.3.2. D-SUB9 connector (RS232)

RS232 connection is provided through a standard female D-SUB9 connector, whose pin-out you can see on the following figure:



2 - TXD *(kbd to system)*
3 - RXD *(system to kbd)*
5 - GND

Figure 13: D-SUB 9 connector – FEMALE (front view)

2.3. Connecting external MID modules

An external MID module is derived from the corresponding regular MID module by means of simple electromechanical modification where additional 5-pin MINI DIN connector is added at the rear side of the module. Modules that are available in external variants are: MCR, BCR, ICCR and 32-key pin pad.

Using special cable *(ord. code: MID-CEE)* you can connect external module to the connector EXT on the master module *(see Figure* 7*)*. This connector is integrated only on some variants of master module – master modules with ord. code MID-Mx0xC.

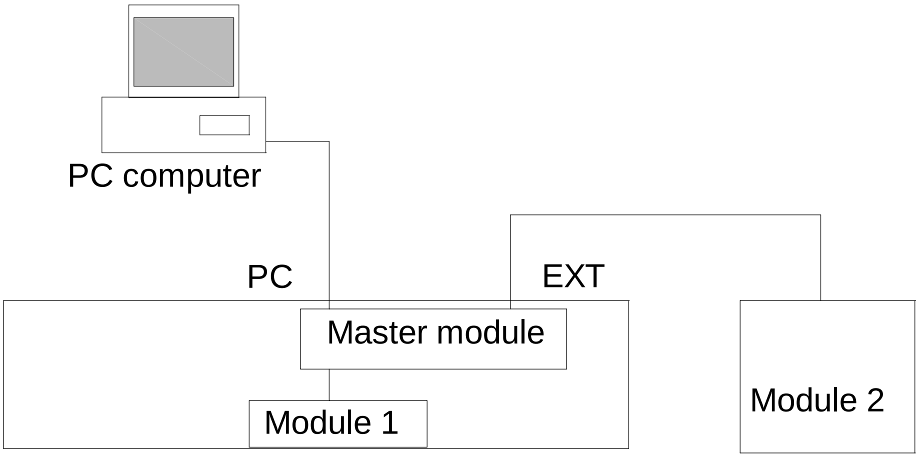


Figure 14:External MID module connection

2.4. Connecting the barcode scanner

There are two types of barcode scanners that can be connected directly to MID. These two types are:

- **Scanners with PS/2 output** can be connected directly to master module's KBD connector *(see Figure 7)*. Scanned codes are forwarded to AT/PS2 primary interface.
- Some master modules *(ord. code: MID-MR0Bx)* have in addition to PS/2 also the RS232 pass through port provided via the KBD connector. This enables connection of **a scanner with decoded RS232 output** to the **KBD** connector on the MID master module *(using a MID-CBB cable)*. Scanned codes can be forwarded either to primary AT/PS2 or RS232 interface.
  There is also available a split cable *(ord. code: MID-CKB)* that is used for simultaneous connection of RS232 scanner and standard PS/2 auxiliary keyboard.

Connection of barcode scanner to MID may reduce the number of cables and used computer's ports.

How to set parameters for different types of barcode scanners is explained in chapter 3.9.6 - Bar Code Reader (BCR).

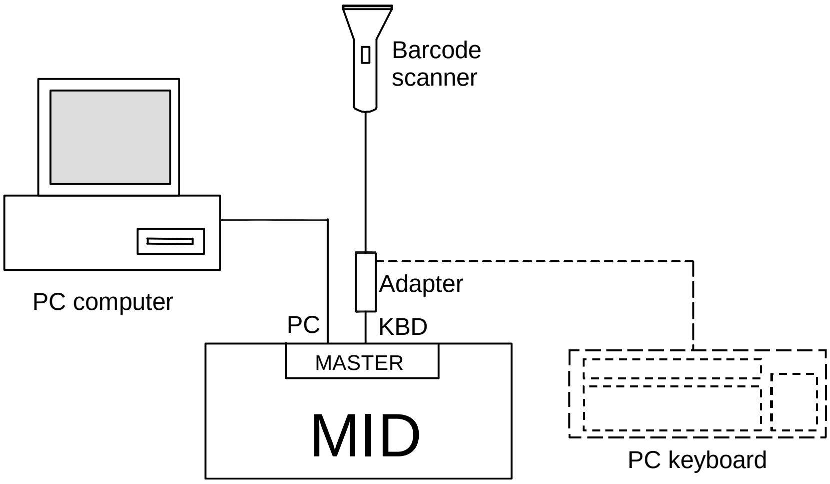


Figure 15: Connecting barcode scanner into MID

3. Programming the keyboard

3.1. Program installation

The software used to program the keyboard is on the supplied floppy disc. There are two programs, MIDDOS and MIDWIN. The MIDDOS program is used to program the keyboard under the MS-DOS operating system. The MIDWIN program should be used in Windows 95/NT, Windows NT and Windows 2000 environments.

Installing the program:

Insert the floppy disc into a 3.5-inch floppy disc drive.

- If you are using **MS-DOS**, run the file **SETUPDOS** *(A:\SETUPDOS)*;
- In **Windows**, use the file **SETUP** *(A:\SETUP)*.

SETUPDOS copies the contents of the floppy disc into the chosen directory on the computer's hard disk. SETUPWIN copies the contents into the chosen directory on the computer's hard disc and creates all necessary icons.

3.2. Running the program

Programming, which is identical for both DOS and Windows environments follows combining the keyboard.

The program is executed with the following commands:

- Under **MS-DOS**, change directory to the C:\TIPRO\MID then run the program MIDDOS;

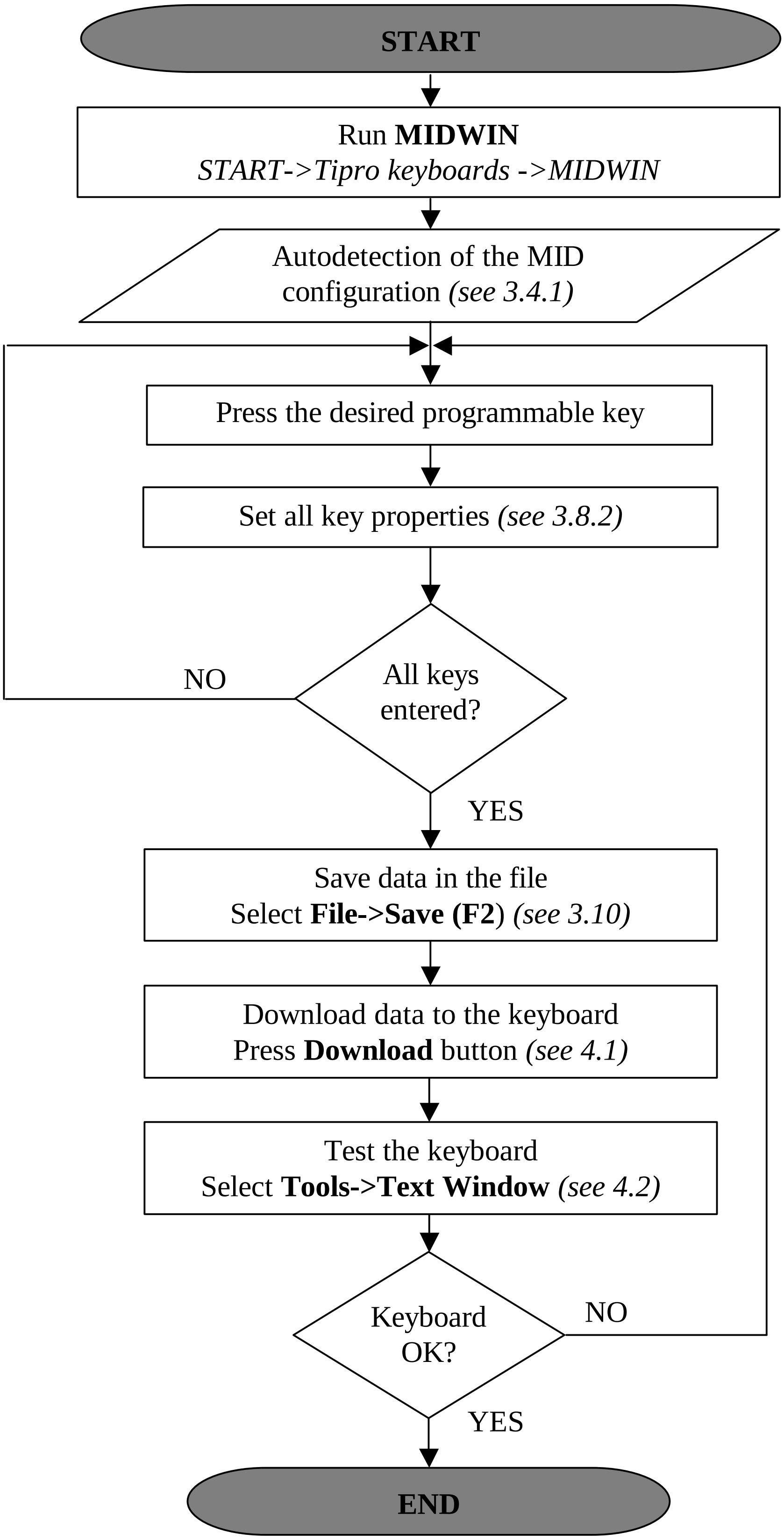
```
c:> CD c:\TIPRO\MID <ENTER>
c:> MIDDOS <ENTER>
```

- Under **Windows**, use the program MIDWIN *(in the program group Tipro keyboards)*;

☞ **NOTE:** ***you shouldn’t run the MIDDOS program from the DOS PROMPT in Windows environment! You should exit Windows in pure DOS mode!***

☞ **NOTE:** ***this manual covers MIDWIN versions 3.0.7 (issued on September 04, 2000) and higher! Some described functions may not be available in previous versions!***

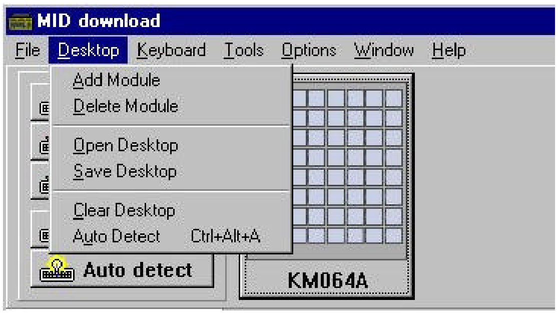
3.3. Programming keyboard – flow chart


START
Run **MIDWIN**
START->Tipro keyboards ->MIDWIN
Autodetection of the MID configuration *(see 3.4.1)*
Press the desired programmable key
Set all key properties *(see 3.8.2)*
All keys entered?
NO
YES
Save data in the file
Select **File->Save (F2**) *(see 3.10)*
Download data to the keyboard
Press **Download** button *(see 4.1)*
Test the keyboard
Select **Tools->Text Window** *(see 4.2)*
Keyboard OK?
NO
YES
END

3.4. Arranging the keyboard

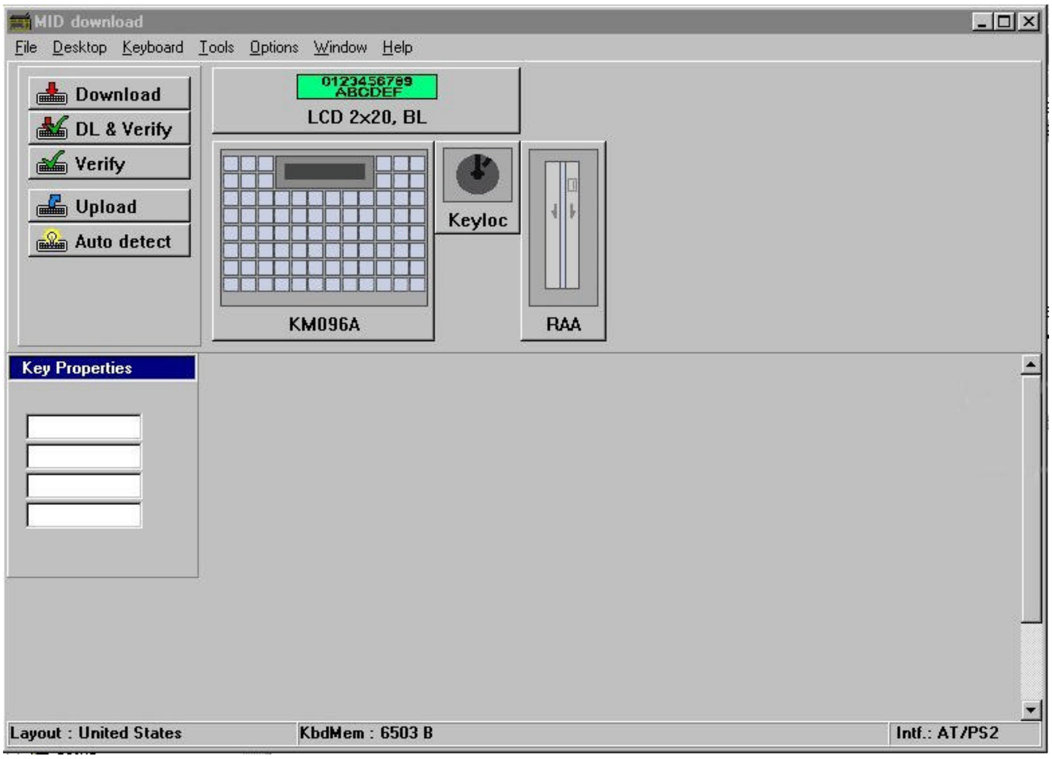
The configuration of the keyboard is detected automatically when the MIDWIN is started. However, you may generate the keyboard also off-line by adding and removing modules.

All functions that are explained in this chapter can be found in the menu group **Desktop**.



3.4.1. Self-recognising

The command **Desktop/Auto detect** (ALT, D, U) checks the configuration of the connected MID keyboard and displays it in the main window. This command is identical to pressing the **Auto detect** button on the desktop. This procedure is executed automatically when MIDWIN is started



Layout : United States KbdMem : 6503 B Intf.: AT/PS2

Figure 16: Autodetecting the MID configuration

3.4.2. Adding modules

The keyboard may be constructed manually using the **Desktop/Add Module** (ALT, D, A) command. This produces the **Add New Module** window.

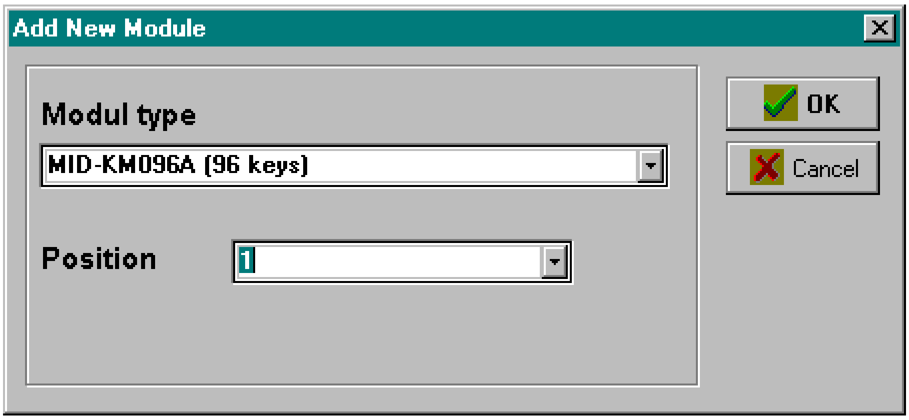


Figure 17: Add New Module window

The **Module Type** scroll down menu shows the list of all modules. Select the desired module and choose its position in the **Position option**. Repeat the procedure for all modules.

3.4.3. Deleting modules

Modules added by mistake or made redundant can be removed with the **Delete Module** option. Use main menu command **Desktop/Delete Module** (Alt, D, D) to produce the **Delete Module** window. Choose the module to be deleted under the option **Module**.

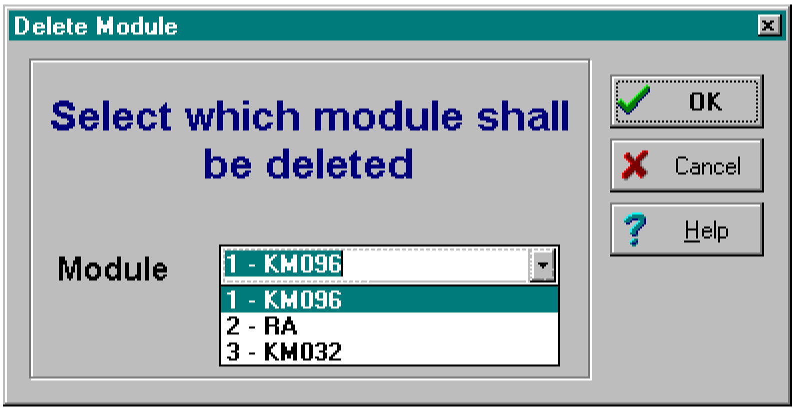


Figure 18: Remove Module Window

3.4.4. Deleting configuration

All the modules of the keyboard can be deleted by the **Clear Desktop** option. Choose the command **Desktop->Clear Desktop** (Alt, D, C) from the main menu and the entire on-screen configuration will be deleted.

3.4.5. Saving configuration

Save the combined modules with the **Save Desktop** command. The command **Desktop->Save Desktop** (Alt, D, S) opens the standard **Save** dialogue; input the configuration's name and the desired saving location here. The file extension for the MID configuration file is **.mcf**.
Note that only the names of the modules and their positions are stored in the configuration file.

3.4.6. Opening existing configuration

Any completed configuration may be recalled with the **Open Desktop** command. The menu option **Desktop->Open Desktop** (Alt, D, O) opens the **Open** window where the location of the keyboard to be reconfigured may be pinpointed.

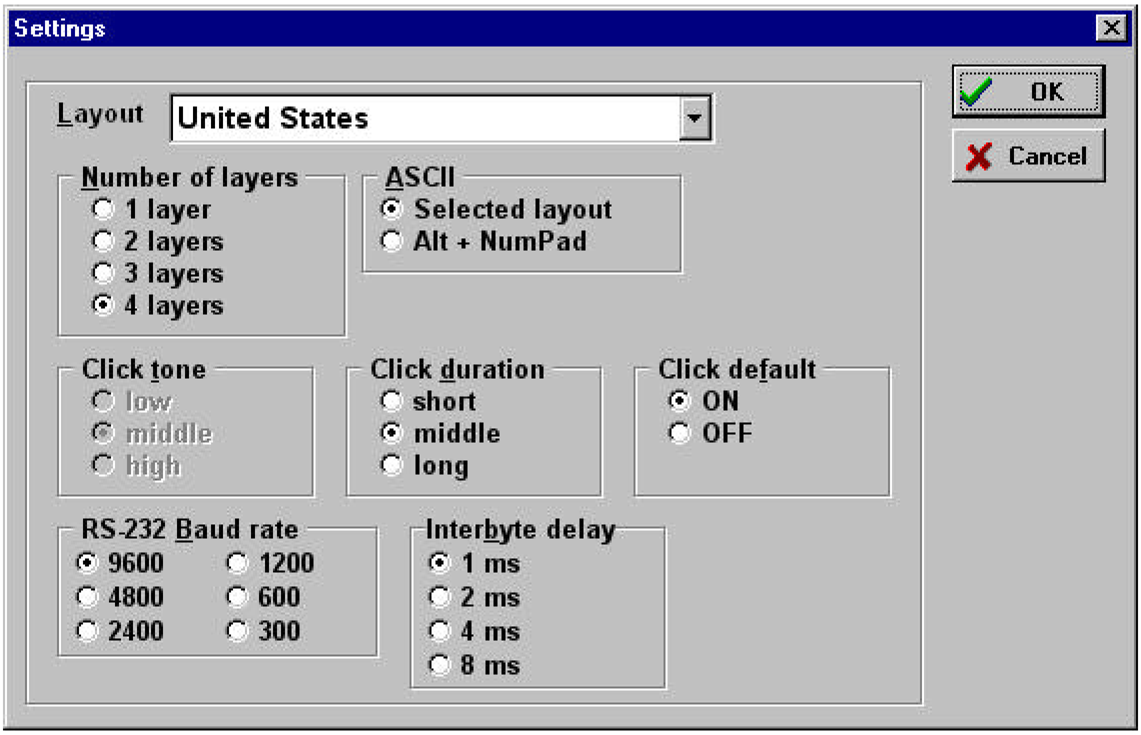
3.5. Keyboard settings

The basic keyboard options are set in the **Settings** window, and are opened with the **Keyboard->Settings** (Alt, K, S) command.
The following options can be set:

- In the field **Layout** you must set which international standard keyboard layout is used,
- By control element **Number of layers** is set how many separate contents (layers) that can be set for each keyboard key,
- The **ASCII** control element selects how the ASCII data (ASCII key content and magnetic card data) are sent to the PC computer. It can be sent as keyboard scan codes (check *Selected layout*) or as Alt-ASCII sequence (check *Alt+NumPad*);

- The keyboard can produce the sound every time a key is pressed (key click function). There are two controls in this window used to set the characteristics of the sound – **tone** and **duration**.
- By the global control element **Click default** it is set whether the key click function for the whole keyboard is enabled (check *ON*) or disabled (check *OFF*) on the keyboard reset. This option can be combined with **Click switch** key *(refer to 3.8.2 Key configuration input)*, which enables and disables this function on-line (while working). If the key click function is set to DEFAULT OFF, you can turn it on by Click Switch key and vice-versa,
- If you use an RS232 MID keyboard you can select the **RS232 Baud rate** of the keyboard. Default setting is 9600 Baud,
- MID keyboard may send codes too fast for some computers. In this case you need to change the **Interbyte delay** setting that defines the time difference between two consecutive sent codes (default is 1 ms).

The pre-set values are shown on the following figure:



Settings

Layout: United States

Number of layers
○ 1 layer
○ 2 layers
○ 3 layers
● 4 layers

ASCII
● Selected layout
○ Alt + NumPad

Click tone
○ low
● middle
○ high

Click duration
○ short
● middle
○ long

Click default
● ON
○ OFF

RS-232 Baud rate
● 9600 ○ 1200
○ 4800 ○ 600
○ 2400 ○ 300

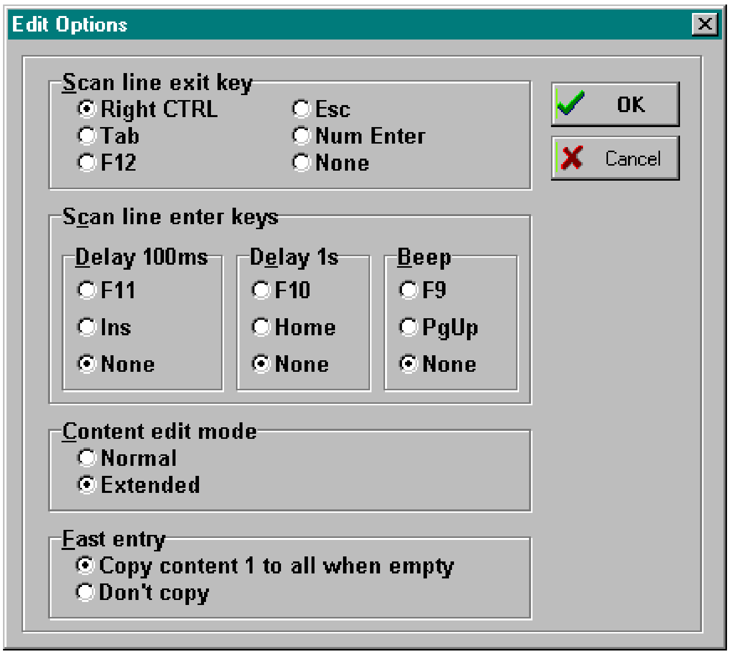
Interbyte delay
● 1 ms
○ 2 ms
○ 4 ms
○ 8 ms

Figure 19: Settings window

3.6. Edit options

The editor options (how the contents are entered) are set in the **Edit options** window, which can be opened with the **Options->Editor** (Alt, O, E) command or with the **Editor options** button on the desktop.

- With the **Scan line exit key** you may reserve one key that is used for exiting the scan line *(the field where the AT/PS2 Scan Codes are captured).*
- For RS232 or a special (not standard) AT/PS2 key content mode set the **Content edit mode** option to **Extended**. When this option is checked, keys contents can be inserted as standard AT/PS2, special AT/PS2 or RS232 keys, while the **Normal** mode enables only standard AT/PS2 keys *(refer to 3.8.2.2 Content keys).*
- MID keyboard allows you to program a special beep or delay in-between other codes. So called **intercharacter beep** and **delay** can be entered with **Delay 100 ms**, **Delay 1s** and **Beep** keys that are defined in this window. When a standard key is assigned a special function *(e.g.* ***F10*** *=* ***Delay 1s****)* every press of that key inserts a delay of 1 s. If you would like to enter a F10 (original value) then the **Delay 1s** key need to be reassigned to **None** or other possible key.
- In the control **Fast entry** you can select whether the **Content 1** is copied to all the other contents if they are empty.



Edit Options

Scan line exit key
● Right CTRL ○ Esc
○ Tab ○ Num Enter
○ F12 ○ None

Scan line enter keys

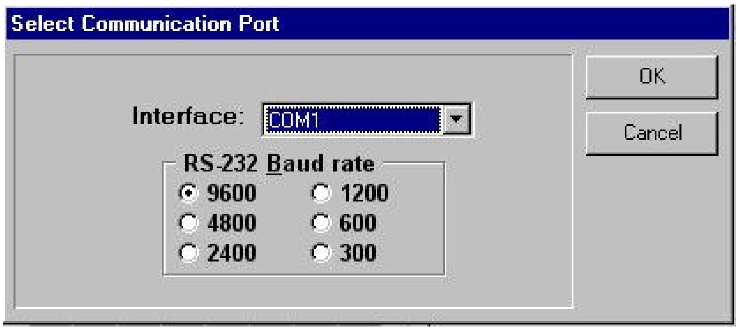
Delay 100ms	Delay 1s	Beep
○ F11	○ F10	○ F9
○ Ins	○ Home	○ PgUp
● None	● None	● None

Content edit mode
○ Normal
● Extended

Fast entry
● Copy content 1 to all when empty
○ Don't copy

Figure 20: Edit options window with default values

3.7. Selecting Communication Port



Select Communication Port

Interface: COM1

RS-232 Baud rate

● 9600 ○ 1200
○ 4800 ○ 600
○ 2400 ○ 300

In the chapter **4.4 Keyboard information** we will discuss how to get the information about the keyboard and integrated firmware through the primary interface *(it is set to AT/PS2 at start-up and current primary interface is displayed in bottom right-hand corner of the main window – see Figure 16)*. In case, if you have connected MID keyboard only to RS232 port then you may obtain the data through this port as well just by selecting the port with **Options->Communication Port**. Be aware, that also the other communication with the keyboard (e.g. autodetect, download and upload) will be performed through this port. Only the master modules version 03.00.xx support these additional functions so it may happen, that some functions will not work.

3.8. Setting the matrix modules

The matrix modules are set in the following way: each key is assigned a content that is sent when the key is pressed. These may be any of the sort of standard keyboard keys' contents, character strings, key combinations and special function keys of the programmable keyboard.

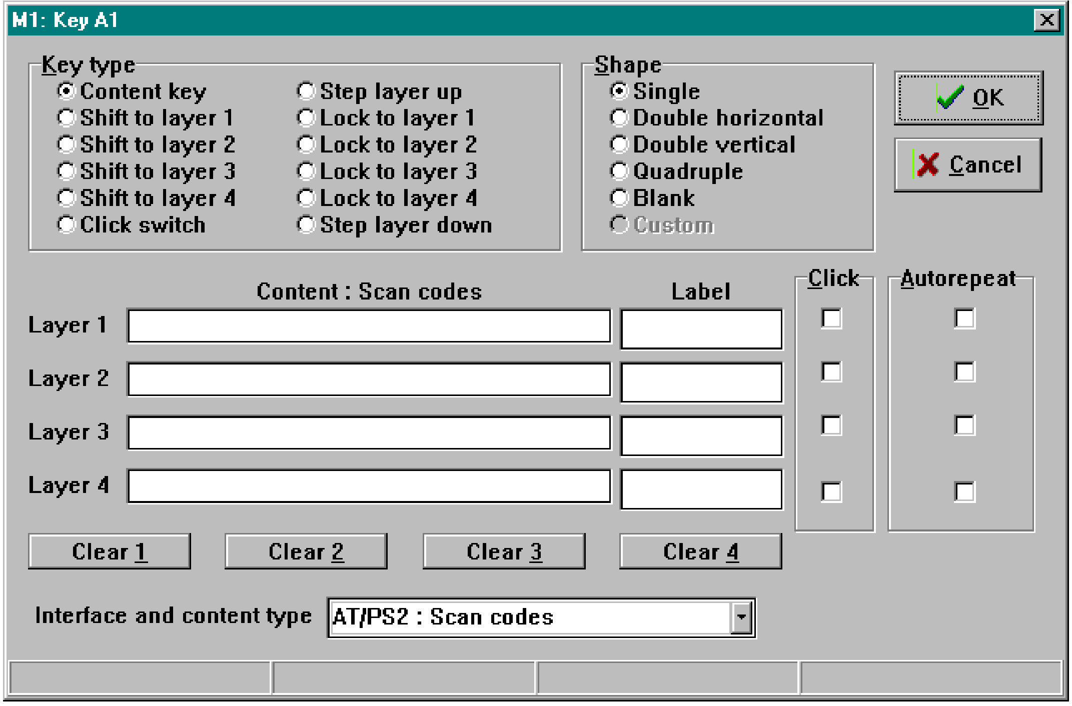
3.8.1. Writing default key configurations

Setting up the keyboard can be simplified with using the default key attributes. With the menu option Options->Key defaults (Alt, O, D) you can define common key attributes, which will be offered when a new, blank key will be opened.
Common key attributes can be:

- Key click and Autorepeat function,
- RS232 output,
- Key size, etc.

3.8.2. Key configuration input

To change the key settings you need to click on the selected key. The following dialogue is opened:



M1: Key A1

Key type

● Content key	○ Step layer up
○ Shift to layer 1	○ Lock to layer 1
○ Shift to layer 2	○ Lock to layer 2
○ Shift to layer 3	○ Lock to layer 3
○ Shift to layer 4	○ Lock to layer 4
○ Click switch	○ Step layer down

Shape

● Single
○ Double horizontal
○ Double vertical
○ Quadruple
○ Blank
○ Custom

	Content : Scan codes	Label	Click	Autorepeat
Layer 1			□	□
Layer 2			□	□
Layer 3			□	□
Layer 4			□	□

Interface and content type: AT/PS2 : Scan codes

Figure 21: Setting of the A1 key content

3.8.2.1. Special function keys

Special function keys are intended for controlling the keyboard.
These are the following:

- **Shift to layer 1** *(or 2, 3, 4)*: temporarily switch to layer 1 *(or 2, 3, 4)*, Shift layer keys can be due to the rollover problem only single sized keys *(refer to 4.5 Rollover)*.
- **Step layer up/down**: switch between layers up or down respectively,
- **Lock to layer 1** *(or 2, 3, 4)*: go to layer 1 *(or 2, 3, 4)*,
- **Click switch**: enable/disable beeping.

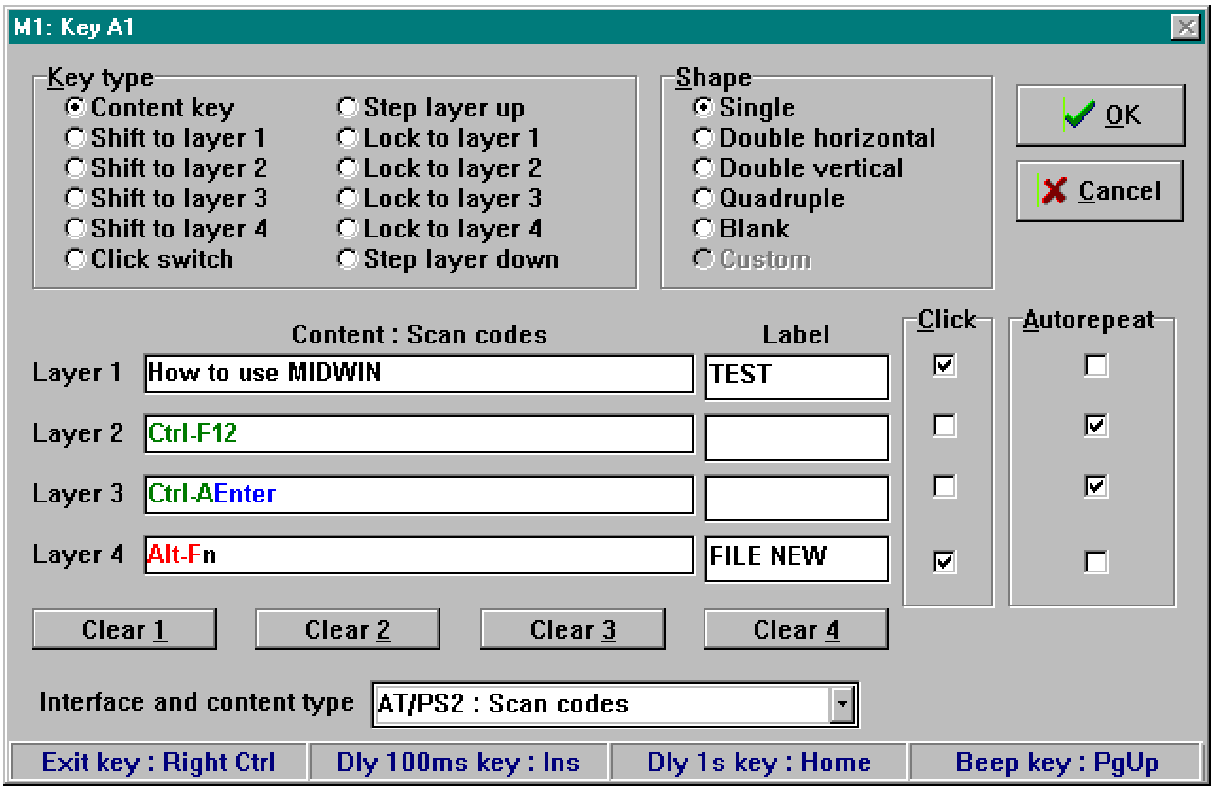
The keys type can be selected in **Key type** control element.

3.8.2.2. Content keys

- Key can have up to 4 different layer contents and every layer content can be a sequence of characters, any combination of standard keys, etc.

  The function keys of standard keyboards (e.g. Backspace, Enter etc.) are literally recorded and displayed in the content line in a different colour than normal keys with alphanumeric characters, just so a mix-up with character strings cannot occur. For example, a string of entered "Enter" characters is completely different from simply pressing the Enter key.

- The **Label** fields are intended for entering names of specific key layers. These labels can be later printed with the Print labels function.



M1: Key A1

Key type

● Content key
○ Shift to layer 1
○ Shift to layer 2
○ Shift to layer 3
○ Shift to layer 4
○ Click switch
○ Step layer up
○ Lock to layer 1
○ Lock to layer 2
○ Lock to layer 3
○ Lock to layer 4
○ Step layer down

Shape

● Single
○ Double horizontal
○ Double vertical
○ Quadruple
○ Blank
○ Custom

	Content : Scan codes	Label	Click	Autorepeat
Layer 1	How to use MIDWIN	TEST	☑	□
Layer 2	Ctrl-F12		□	☑
Layer 3	Ctrl-AEnter		□	☑
Layer 4	Alt-Fn	FILE NEW	☑	□

Interface and content type: AT/PS2 : Scan codes

Exit key : Right Ctrl | Dly 100ms key : Ins | Dly 1s key : Home | Beep key : PgUp

Figure 22: Key properties

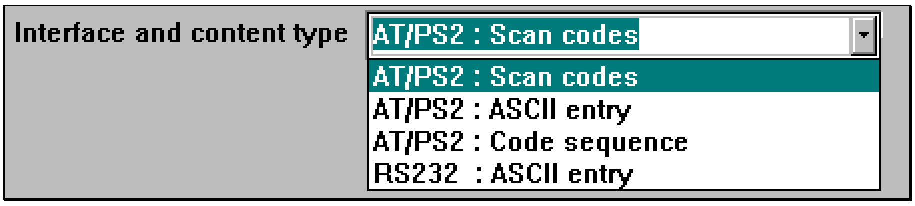
- On any layer, a key can be assigned a property of producing a sound signal whenever pressed (soft click); a tick next to the Click control element designates this.

- Content's auto-repeating is set through the **Autorepeat** control element.

- Shape of the keys can also be set. Simply go to the control element

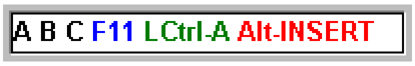
Shape and mark the chosen shape. Setting the keycap as a **Blank keycap** disables the key.

- **Interface and content type** determines which interface should the contents of the key be sent to (AT/PS2 or RS232) and how the contents are entered (as scan codes or as ASCII). In the picture below you can see the available options:



Interface and content type: AT/PS2 : Scan codes

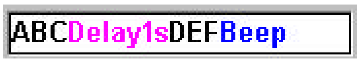
– **AT/PS2: Scan codes** – contents are entered as normal scan codes and are captured automatically by pressing the desired key. You can enter any key combination, e.g. A, F11, CTRL-A, … Since all scan codes are captured (also TAB) there is one reserved key, used for exiting the scan line and is displayed in the status bar. This key is by default Right-CTRL key and can be altered in the Edit options.
(This mode is the default entry mode and is used normally).

Example: 

A B C F11 LCtrl-A Alt-INSERT

In the scan line you can also enter a delay between two characters or force a keyboard to beep. The special codes for so called **intercharacter beep** and **delay** can be entered by the special keys, which need to be assigned in the **Edit Options** menu *(refer to 3.6 Edit options).*
There are two different delay periods that can be entered: 100 ms and 1s. You can enter of course a sequence of several delay codes to get the appropriate delay *(5 times 1s makes delay of 5s).*
Whenever you start entering the codes you can see in the status line which keys are assigned as special delay and beep keys *(Figure 22: Insert = Delay 100ms, Home = Delay 1s, PgUp = Beep).* If you want to use the original key value (e.g. key Insert = Ins not Delay 100 ms) you need to reassign that key in the **Edit Options** menu. By default there is no key assigned as special Intercharacter beep and delay keys.

Example:

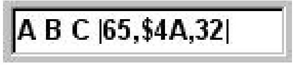


ABCDelay1sDEFBeep

(the keyboard will send ABC, wait 1s and yet after that send DEF and beep at the very end).

– **AT/PS2: ASCII entry** – contents are entered as chars and ASCII codes. You can enter any character simply by pressing the key (e.g. A,B,C,…) or by entering the ASCII code. These codes should be entered as decimal or hexadecimal numbers in-between pipe characters ('|') [1].

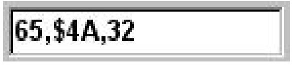
Example:



A B C |65,$4A,32|

– **AT/PS2: Code sequence** – contents are entered as codes, which should be sent from the keyboard to the system[1]. *(Use this option only if you are very familiar with the system architecture and communication protocols!)*

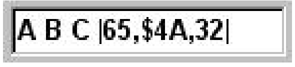
Example:



65,$4A,32

– **RS232: ASCII entry** – contents are entered as ASCII signs and codes. You can enter any character simply by pressing the key (e.g. A,B,C, …) or by entering the ASCII code. The codes should be entered in-between pipes ('|') and can be entered as decimal or hexadecimal numbers. The key contents are sent to the system through the RS232 port[1].

Example:



A B C |65,$4A,32|

*(If this field is disabled, change the **Content edit mode** to **Extended;** refer to 3.6 Edit options).*

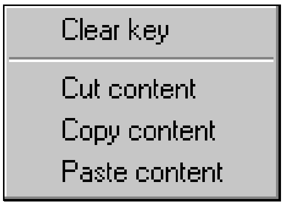
[1] **NOTE: Code 0 is not allowed to be a part of the key content and will be removed automatically.**

Repeat the described procedure for each key of the keyboard. Thus, a configuration catering for our every need can be created.

3.8.2.3. Copying/deleting keys

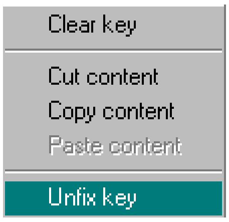
When several keys should hold the same content, the functions **Clear/Cut/Copy/Paste-content** are used. Go to the key that needs copying. Press the right mouse button and a window will pop up; choose the **Copy content** command. The content of the key is now stored in memory. Go to a new key and choose the **Paste content** command. The content in memory is pasted onto the new key. The content is deleted through the **Clear key** command.

The **Cut** content command displaces the current content of a key, in that it stores the content into memory and, at the same time, deletes it from the key. The **Paste** content command then copies the content in memory onto the selected key.



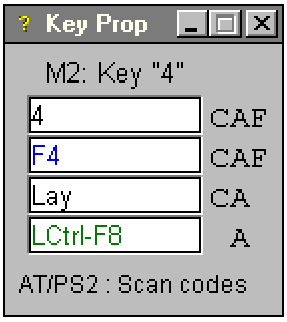
3.8.2.4. Changing the contents on the predefined modules

The alphanumeric modules, such as MID-QM128A, PM128A and TM128A, have several keys which contents cannot be changed initially. These keys are protected in a way that lower 2 layers are fixed.
To change the key contents you need first to unfix the key by pressing the right mouse button and to select the **Unfix key** option. From now on all the available layers can be changed.



3.8.2.5. On-line key content preview

The contents of the key marked with the mouse cursor are constantly displayed in the **Key Prop** window (Windows), or in the status line (DOS).



M2: Key "4"

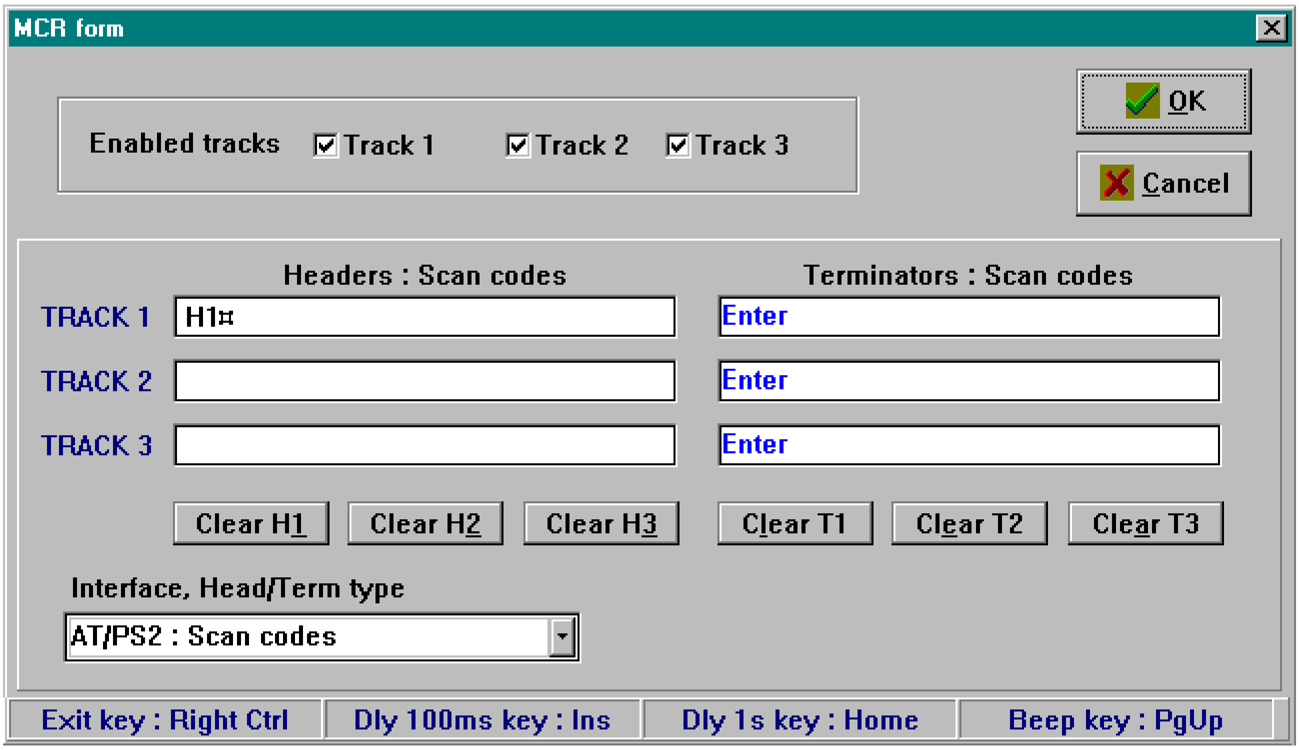
4 CAF
F4 CAF
Lay CA
LCtrl-F8 A

AT/PS2 : Scan codes

3.9. Setting up additional modules

3.9.1. Magnetic card reader

Up to three tracks on magnetic cards can be read with the MCR module. The magnetic reader's track is active when the corresponding field in the **Enabled tracks** control field is ticked. Entering data in the **Header** and **Terminator** fields is only possible when the track is active. Field contents are identical to the contents of the keys *(refer to 3.8.2.2 Content keys)*.



Enabled tracks ☑ Track 1 ☑ Track 2 ☑ Track 3

	Headers : Scan codes	Terminators : Scan codes
TRACK 1	H1¤	Enter
TRACK 2		Enter
TRACK 3		Enter

Interface, Head/Term type: AT/PS2 : Scan codes

Exit key : Right Ctrl | Dly 100ms key : Ins | Dly 1s key : Home | Beep key : PgUp

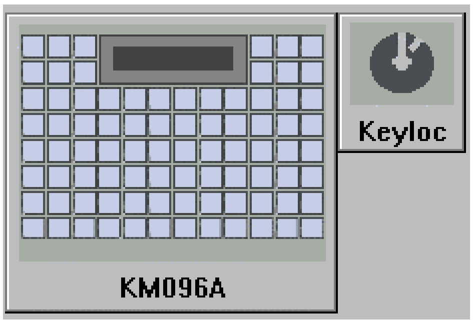
Figure 23: MCR properties

The **Interface, Head/Term type** field determines the MCR interface (AT/PS2 or RS232) and how the contents of the Headers and Terminators are entered (as scan codes, code sequence or ASCII).

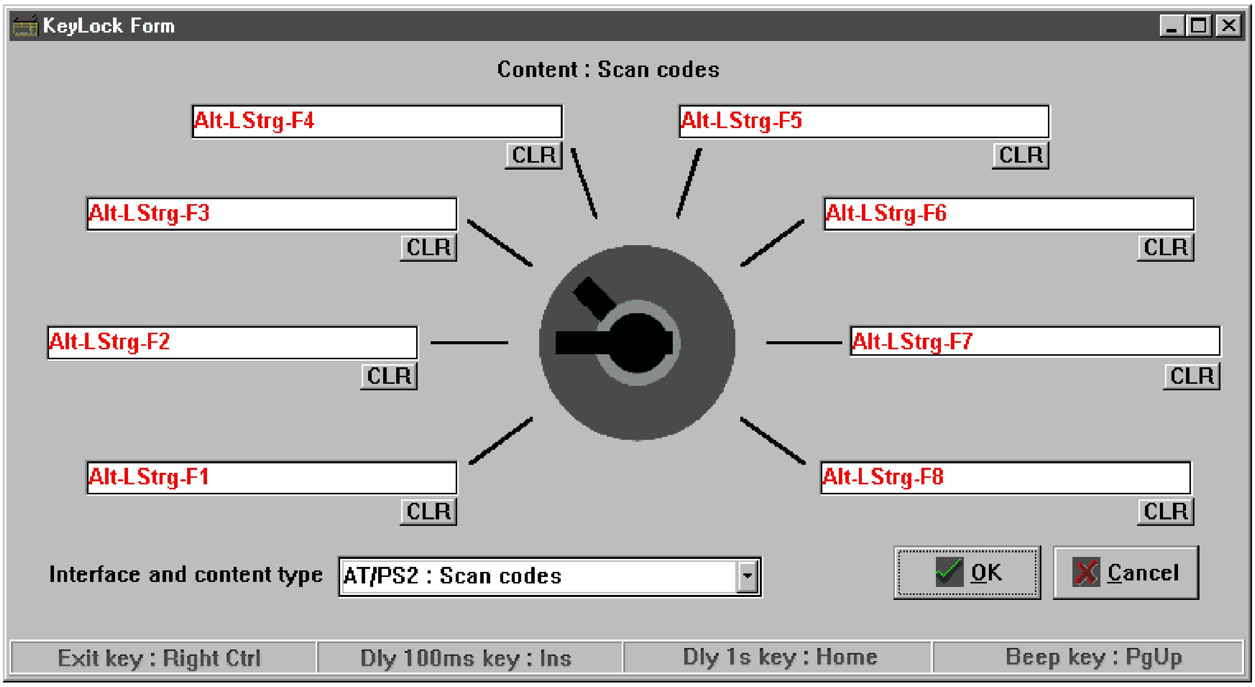
The content of the magnetic card can be sent to the system either as ALT-ASCII codes or as scan codes in selected standard keyboard layout (AT/PS2 mode only). This option can be selected in the **Keyboard settings** window *(refer to 3.5 Keyboard settings)*.

3.9.2. Matrix modules with integrated keylock

Matrix modules with integrated keylock are displayed as two separated modules, a matrix and a keylock module *(in this case key module 96 + keylock).*



To change the keylock properties select the keylock module and the following window appears:


KeyLock Form

Content : Scan codes

Alt-LStrg-F4 CLR
Alt-LStrg-F5 CLR
Alt-LStrg-F3 CLR
Alt-LStrg-F6 CLR
Alt-LStrg-F2 CLR
Alt-LStrg-F7 CLR
Alt-LStrg-F1 CLR
Alt-LStrg-F8 CLR

Interface and content type: AT/PS2 : Scan codes

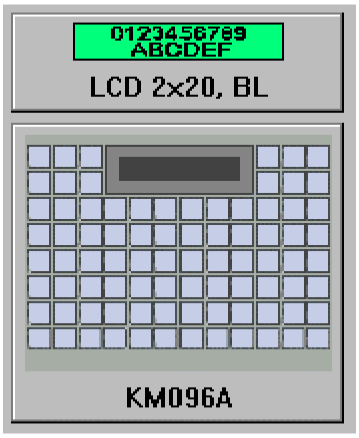
Exit key : Right Ctrl | Dly 100ms key : Ins | Dly 1s key : Home | Beep key : PgUp

Figure 24: Keylock properties with default values

When the position of the keylock is changed, the programmed content is sent to the system. As you can see on the Figure 24 you can set a different content in each keylock position.

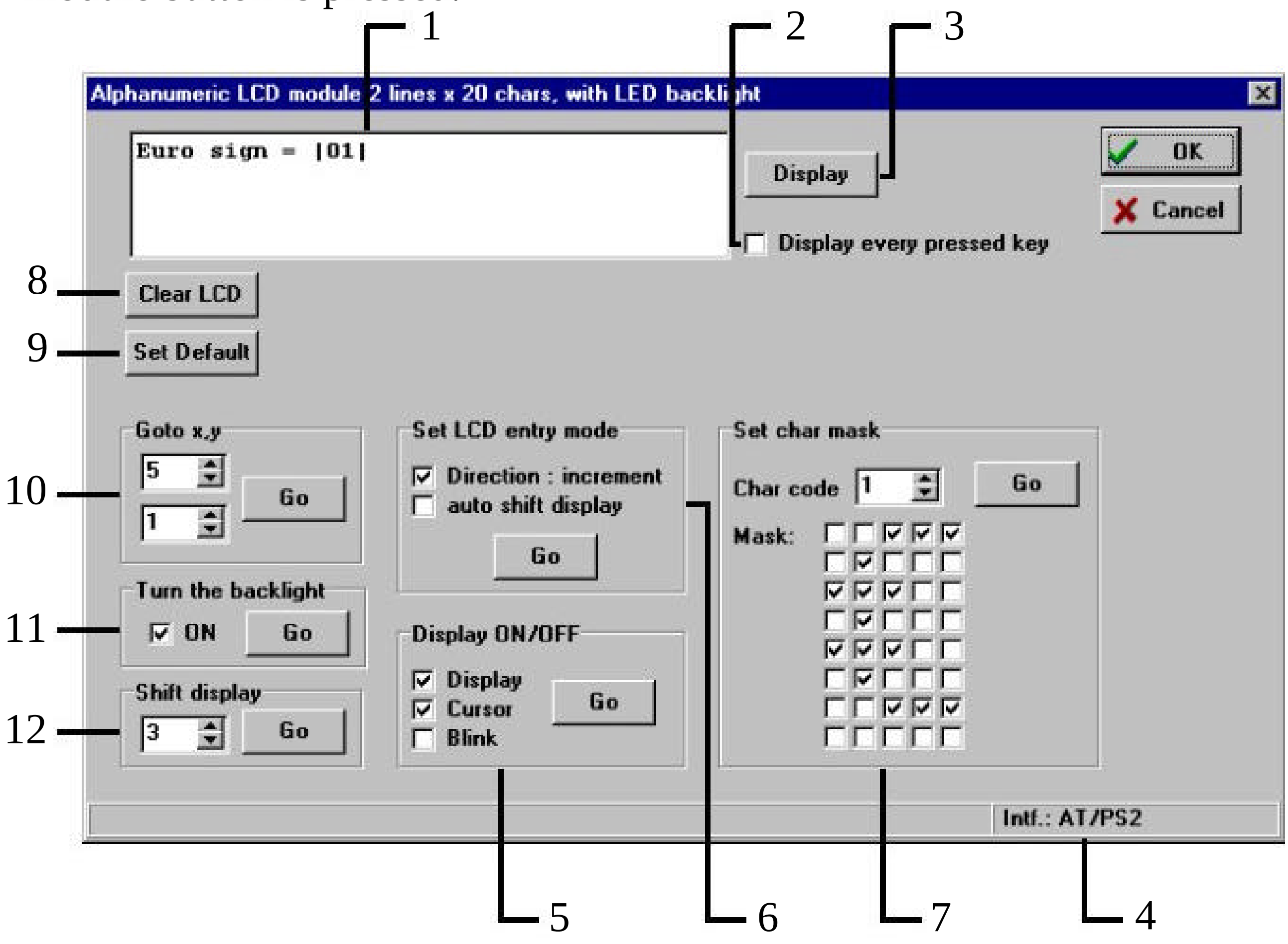
The keylock contents can be entered in the same way as key contents – they can be sent through AT/PS2 or through RS232 interface *(for more information about setting different interfaces and content types, refer to 3.8.2.2 Content keys).*

3.9.3. Matrix modules with integrated LCD



Matrix modules with integrated LCD are displayed as two separated modules, a matrix and LCD module *(in this case key module 96 + LCD 2x20 with backlight).*

LCD functions (display string, clear display, go to xy) can be tested in the LCD presentation window, which is displayed when the LCD module button is pressed.



Alphanumeric LCD module 2 lines x 20 chars, with LED backlight

Euro sign = |01|

□ Display every pressed key

Goto x,y: 5, 1

Turn the backlight: ☑ ON

Shift display: 3

Set LCD entry mode: ☑ Direction : increment; □ auto shift display

Display ON/OFF: ☑ Display; ☑ Cursor; □ Blink

Set char mask: Char code 1

Mask:
□□☑☑☑
□☑□□□
☑☑☑□□
□☑□□□
☑☑☑□□
□☑□□□
□□☑☑☑
□□□□□

Intf.: AT/PS2

Figure 25: LCD presentation window

The following functions can be tested:

- **Display string:** set the string that shall be displayed [(1)] and press Display button [(3)]. Nonprintable characters can be entered as ASCII codes between brackets "|" - in this example ASCII 0 *(= defined as euro sign – see above).*
  Every entered char (in the box 1) can be displayed on-line on the

display if you check the **Display every pressed key** box (2);

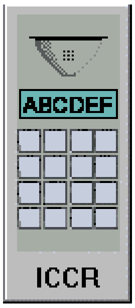
- **Goto x,y**: set the column number (0..39, top) and the row number (0..3, below), then press **Go** button (8);
- Displayed text can be s**hifted** by entering the number of chars and pressing the **Go** button (12) *(negative numbers shift display to the left)*;
- **LCD's backlight** can be turned ON and OFF in the section 11,
- The LCD display mode can be set in sections 5 and 6, and reset to the default values with the **Default** button (9);
- Up to 8 different **user defined characters** can be set on the ASCII positions 0 to 7. Define the character mask (5x8), the char number and press the **Go** button (7). In this example the Euro sign is designed as the ASCII character 0.
- The Interface field(9) shows the primary interface for the communication. You may change it as displayed in chapter 3.7.

A combination of integrated LCD and keylock module is also possible. The MID keyboard is displayed in this case as a composition of three modules.

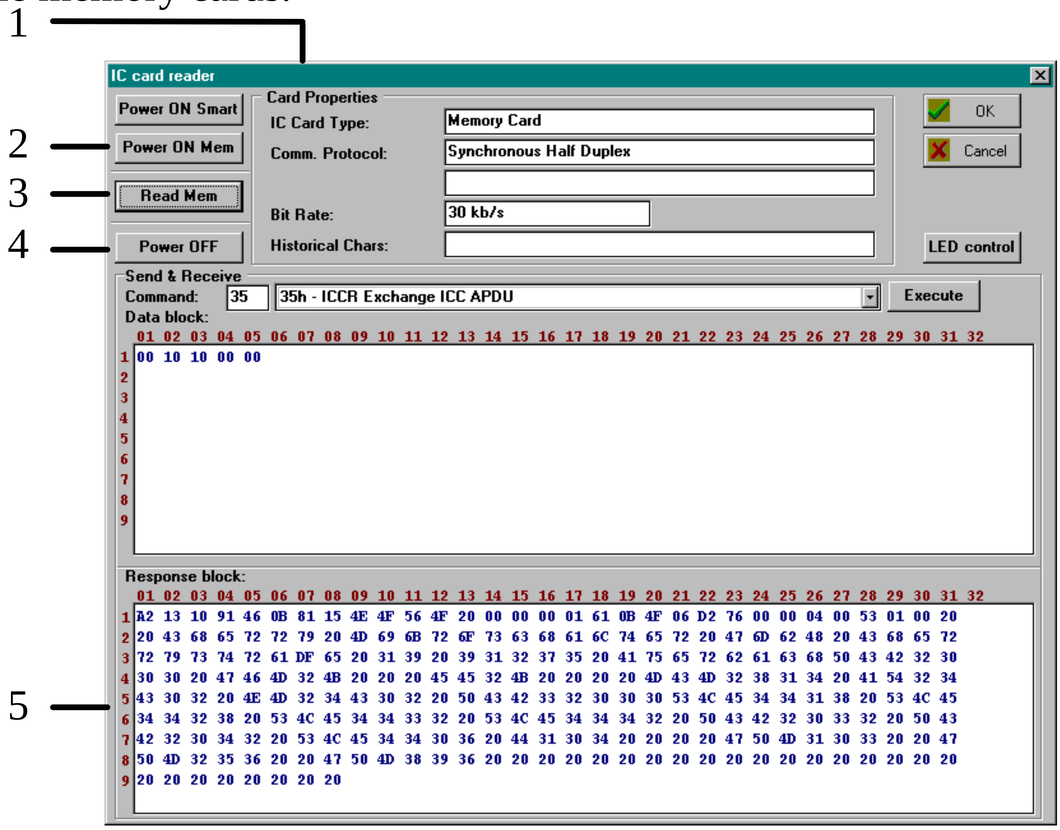
** DOS version of the download program may not support some LCD test functions.*

3.9.4. Matrix module with integrated smart card reader

The existing module MID-KM032S integrates besides 16 programmable keys a smart card reader and a 2x16 character LCD.



Some basic test functions are integrated in the download program - power ON/OFF, sending a command to the LCD and reading the content of the memory cards.



Card Properties
IC Card Type: Memory Card
Comm. Protocol: Synchronous Half Duplex
Bit Rate: 30 kb/s
Historical Chars:

Send & Receive
Command: 35 35h - ICCR Exchange ICC APDU

Data block:

```
  01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
1 00 10 10 00 00
2
3
4
5
6
7
8
9
```

Response block:

```
  01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
1 A2 13 10 91 46 0B 81 15 4E 4F 56 4F 20 00 00 00 01 61 0B 4F 06 D2 76 00 00 04 00 53 01 00 20
2 20 43 68 65 72 72 79 20 4D 69 6B 72 6F 73 63 68 61 6C 74 65 72 20 47 6D 62 48 20 43 68 65 72
3 72 79 73 74 72 61 DF 65 20 31 39 20 39 31 32 37 35 20 41 75 65 72 62 61 63 68 50 43 42 32 30
4 30 30 20 47 46 4D 32 4B 20 20 20 45 45 32 4B 20 20 20 20 4D 43 4D 32 38 31 34 20 41 54 32 34
5 43 30 32 20 4E 4D 32 34 43 30 32 20 50 43 42 33 32 30 30 30 53 4C 45 34 34 31 38 20 53 4C 45
6 34 34 32 38 20 53 4C 45 34 34 33 32 20 53 4C 45 34 34 34 32 20 50 43 42 32 30 33 32 20 50 43
7 42 32 30 34 32 20 53 4C 45 34 34 30 36 20 44 31 30 34 20 20 20 20 47 50 4D 31 30 33 20 20 47
8 50 4D 32 35 36 20 20 47 50 4D 38 39 36 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
9 20 20 20 20 20 20 20 20
```

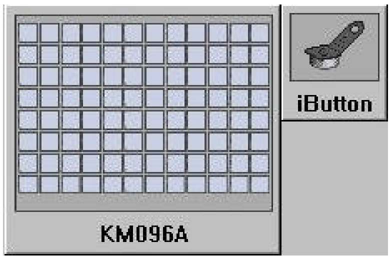
Figure 26: Smart card reader window

How to read the content of the memory card *(based on the Siemens SLE 4432/4442 IC):*

1. Insert the card
2. Press the **Power ON Mem** button (2) *(in the **Card Properties** section* (1) *you can see the type of the inserted card)*
3. Press the **Read Mem** button (3) *(the whole content of the card is displayed in the **Response block*** (5)*)*
4. Press the **Power OFF** button (4) *(now you may take out the card)*

* *DOS version of the download program may not support some ICCR test functions.*

3.9.5. Matrix module with integrated identification button reader (iButton)



The MID iButton Reader is a built-in option for MID KM (Key Matrix) modules. It consists of the iButton socket/holder, which is mounted on the top right-hand corner of the housing and associated electronic circuitry. Since the socket is magnetized it holds firmly the inserted iButton.

Every iButton holds its unique identification number, which is sent toward the system when the button is inserted in the socket. Three programmable sequences, which are sent along with this ID number, define the output interface and help the system application to differentiate between keyboard and iButton data.

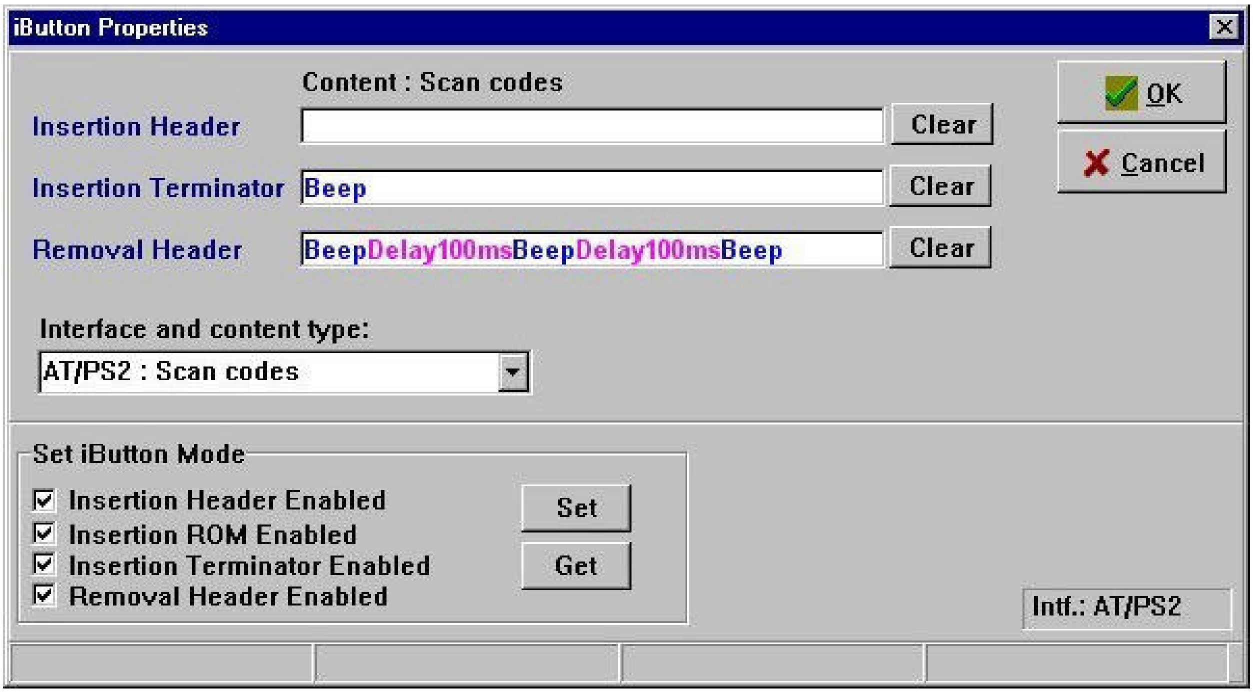
Below you can see the sequence order of the iButton actions:

Action	**IButton is inserted**				**IButton is removed**
What is sent toward the system	Insertion Header	ID number	Insertion Terminator		Removal Header

All programmable sequences can be programmed same as any programmable key (see 3.8.2.2). The field **Interface** defines the communication interface for the sent data (could be AT/PS2 or RS232).
The settings flags, which can be defined in the bottom-left hand corner of the window, shall be used only in some special occasions, when some part of the data (e.g. Removal Header) should not be sent.

!

WARNING: ***Socket of the reader is a permanent magnet. Do not place MAGNETIC CARDS (as well as anything else sensitive to the magnetic field) in close proximity of the reader in order to prevent damage!***



iButton Properties

Content : Scan codes

Insertion Header:

Insertion Terminator: Beep

Removal Header: BeepDelay100msBeepDelay100msBeep

Interface and content type: AT/PS2 : Scan codes

Set iButton Mode

- ☑ Insertion Header Enabled
- ☑ Insertion ROM Enabled
- ☑ Insertion Terminator Enabled
- ☑ Removal Header Enabled

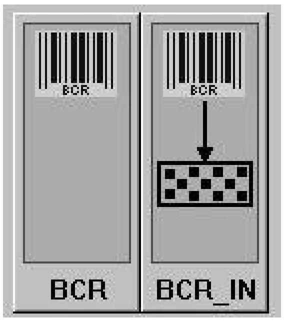
Intf.: AT/PS2

Figure 27: iButton Properties dialogue

☞ **NOTE:** ***Set and Get iButton Mode functions shall be used for special use only!***

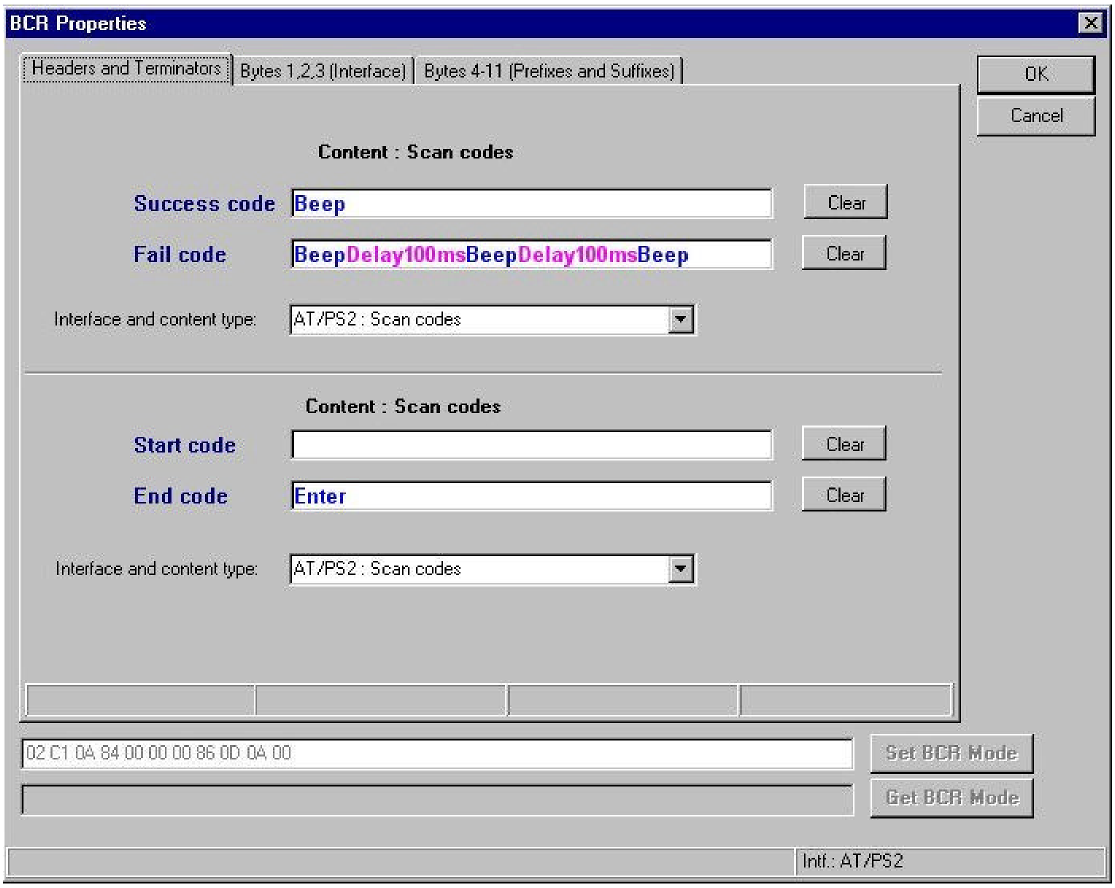
3.9.6. Bar Code Reader (BCR)

Both two different types of MID Bar Code Readers (MID BCR Slot reader – *left* and MID BCR Input - *right*) are supported in MIDWIN.



MID BCR is a Bar Code Slot Reader designed as a slave module for the MID keyboard. The module, which is integrated in the same housing as MID MCR, provides fully programmable header and terminator (that are appended to the bar code data), as well as two other programmable event descriptions for identifying successful/failed readings.

MID BCR INPUT is a RS232 pass-through port, optionally integrated on the master module. Since all the port settings are programmable a variety of readers with decoded RS232 serial output could be connected. Incoming data are modified and rerouted to the selected AT/PS2 or RS232 interface. Those data stream modifications include several programmable features, such as appending of header (prefix) and a terminator (suffix) sequence.



Content : Scan codes

Success code: Beep

Fail code: BeepDelay100msBeepDelay100msBeep

Interface and content type: AT/PS2 : Scan codes

Content : Scan codes

Start code:

End code: Enter

Interface and content type: AT/PS2 : Scan codes

02 C1 0A 84 00 00 00 86 0D 0A 00

Intf.: AT/PS2

Figure 28: Defining headers and terminators

Four different programmable sequences enables the BCR unit to fulfil many system software requirements, these are:

- **Success code** is generated when the bar code has been successfully read. The action is executed before any data is sent.
- **Fail code**: this sequence indicates that the code has not been read successfully.
- **Start code** and **End code** are sent right before and after usefully bar code data. The interface type of these codes defines the port (AT/PS2 or RS232), where the data shall be sent.

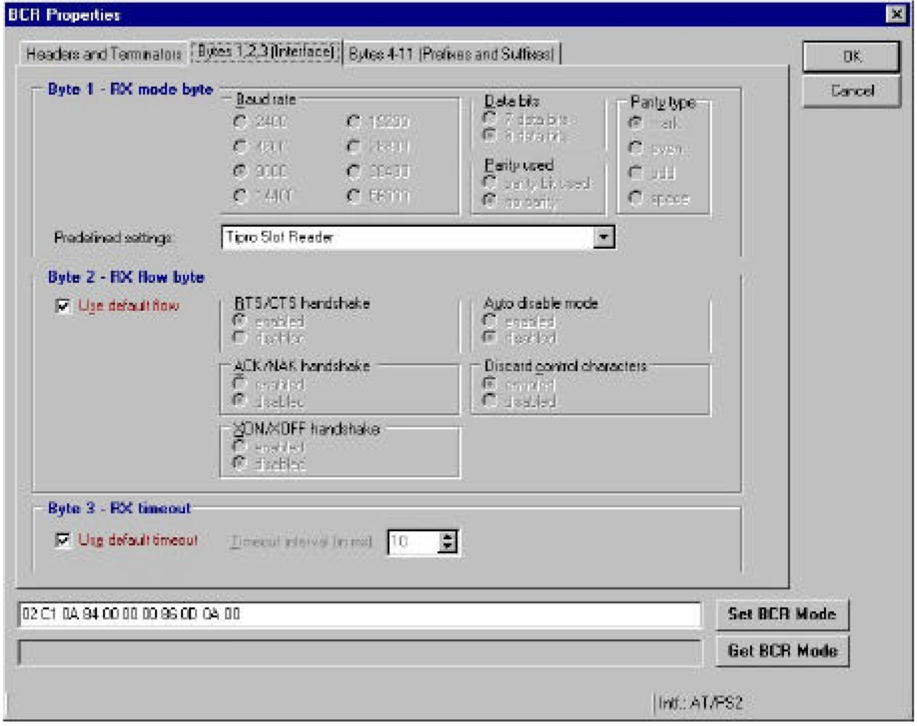
The sequence order of the sent data:

Bar code successfully read	Success code	Start code	Bar code data	End Code
Bar code unsuccessfully read	Fail code			

☞ **NOTE:** ***Beeping as a part of the sequence could be entered only if the interface type is selected to AT/PS2 Scan codes. Since the interface could be different for Success/Fail code and for Start/End code you can set beeping as a success and fail code even if the primary interface type (Start/End code) is set to RS232.***

The **BCR Properties** page consists of two additional sub-pages, where you can define the parameters of the connected Bar Code reader. As a help tool there are few types of the BCRs already predefined in the Predefined **Settings** scroll down menu.

All set settings are saved in the keyboard layout file along with all properties of all keys.



Byte 1 - RX mode byte

Baud rate: ○ 2400 ○ 4800 ● 9600 ○ 14400 ○ 19200 ○ 28800 ○ 38400 ○ 56000

Data bits: ○ 7 data bits ● 8 data bits

Parity used: ○ parity bit used ● no parity

Parity type: ● mark ○ even ○ odd ○ space

Predefined settings: Tipro Slot Reader

Byte 2 - RX flow byte

☑ Use default flow

RTS/CTS handshake: ● enabled ○ disabled

Auto disable mode: ○ enabled ● disabled

ACK/NAK handshake: ○ enabled ● disabled

Discard control characters: ● enabled ○ disabled

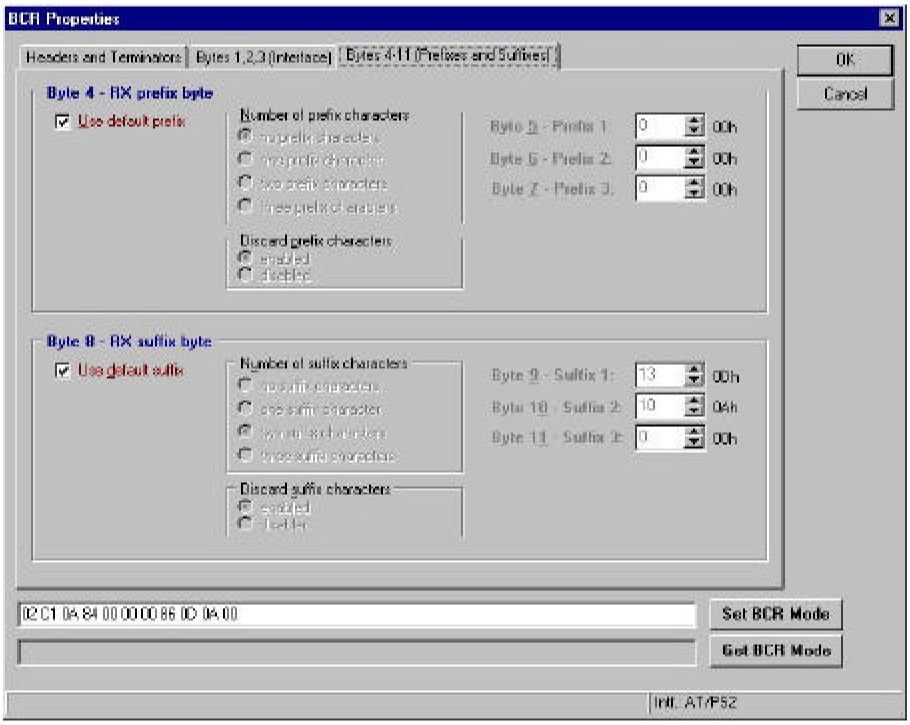
XON/XOFF handshake: ○ enabled ● disabled

Byte 3 - RX timeout

☑ Use default timeout Timeout interval (in ms) 10

02 C1 0A 94 00 00 00 96 0D 0A 00

Int.: AT/PS2



BCR Properties

Byte 4 - RX prefix byte

☑ Use default prefix

Number of prefix characters
● no prefix characters
○ one prefix character
○ two prefix characters
○ three prefix characters

Discard prefix characters
● enabled
○ disabled

Byte 5 - Prefix 1: 0 00h
Byte 6 - Prefix 2: 0 00h
Byte 7 - Prefix 3: 0 00h

Byte 8 - RX suffix byte

☑ Use default suffix

Number of suffix characters
○ no suffix characters
○ one suffix character
● two suffix characters
○ three suffix characters

Discard suffix characters
● enabled
○ disabled

Byte 9 - Suffix 1: 13 0Dh
Byte 10 - Suffix 2: 10 0Ah
Byte 11 - Suffix 3: 0 00h

02 C1 0A 84 00 00 00 86 0D 0A 00

Intf.: AT/PS2

3.10. Saving the keyboard contents

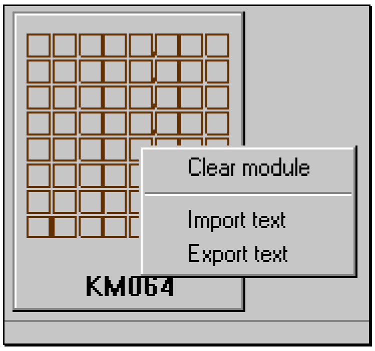
The contents are saved with the **Save** command in the **File menu** (File->Save, or F2), that opens the **Save As** window. Enter the name of the keyboard with the extension **.lay** into the File name field (example - File name: *example.lay*).

The keyboard configuration is automatically saved into the separate file as well. Information on how to save and open the keyboard configuration file can be found in the chapters *2.3.5 Saving configurations* and *2.3.6 Opening existing configurations*.

3.11. Import / Export key contents

Sometimes you would like to copy key contents from one module to another. To avoid wasting time, we have included **Import** and **Export text file** features.

These two features highly increase your flexibility. You can save contents of keys into the text files, each module separately. You just need to press the right mouse button on the selected module and the following popup menu is opened.



You may have several different MID keyboard configurations and all of them have one or more identical modules. With these options you can create as many different configurations while the basic module remains the same.

> *An example: your program needs one 128 key module (KM128), but for one customer it is not enough, he wants an additional numpad module (KM032), the other one wants additional MCR module etc. Instead of building the KM128 module for each configuration you can copy it from one keyboard to the others.*

3.11.1. MID export text file format

Exported key contents are saved in the MID export text file format (filename.mtx). This format is used not only by exporting and importing key contents but also by reading the definition of fixed keys (e.g. QWERTY module).

Here is listed an example of exported text file:

```
A1/S/CT/A++++/C++++/F++--/~1~{F1}~~~!~1~~~
A2/S/CT/A++++/C++++/F++--/~2~{F2}~~~@~2~~~
A3/S/CT/A++++/C++++/F++--/~3~{F3}~~~#~3~~~
A4/S/CT/A++++/C++++/F++--/~4~{F4}~~~$~4~~~
A5/S/CT/A++++/C++++/F++--/~5~{F5}~~~%~5~~~
```

Every following line consists of key definition (describing first line):
A1 : co-ordinate of the key (left-hand upper key)
S : single key *(**C** = Custom key etc.)*
CT : content key *(**S2** = Shift to layer 2 etc.)*
A++++ : autorepeat: key has in all layers autorepeat function

`C++++` : key click function: key has in all layers click function

`F++--` : fixed layers: layer 1 and 2 are fixed, 3 and 4 are programmable

`~1~{F1}~~~ :` 4 contents, separated by ~

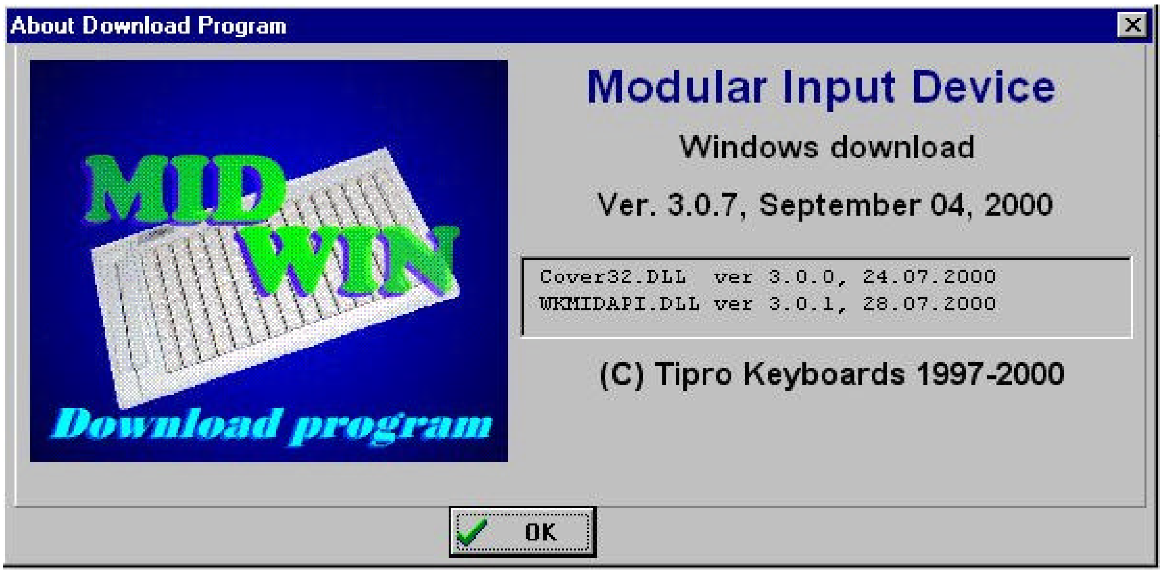
content 1 is letter **1**,
content 2 is key **F1**,
contents 3 and 4 are blank,

*** all contents are described in the US English layout and are translated when importing;

`~!~1~~~ :` 4 labels, separated by ~

label 1 is letter **!**,
label 2 is letter **1**,
labels 3 and 4 are blank.

3.12. Program version



Modular Input Device

Windows download

Ver. 3.0.7, September 04, 2000

```
Cover32.DLL  ver 3.0.0, 24.07.2000
WKMIDAPI.DLL ver 3.0.1, 28.07.2000
```

(C) Tipro Keyboards 1997-2000

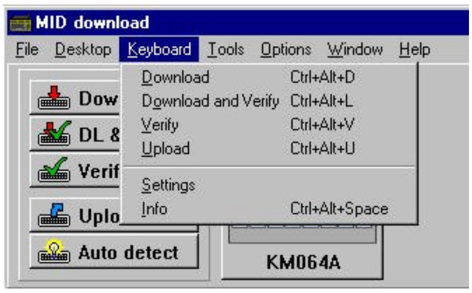
The **Help->About** from the Main Menu provides full information on the software release:

- MIDWIN version code *(e.g. Ver. 3.0.7)*
- Release date *(e.g. September 04, 2000)*
- Name, version code and release date of the DLL with Printing key labels utility *(e.g. Cover32.DLL ver 3.0.0, 24.07.2000)*
- Name, version code and release date of the DLL with low-level keyboard communication *(e.g. WKMIDAPI.DLL ver 3.0.1, 28.07.2000)*

4. Keyboard features

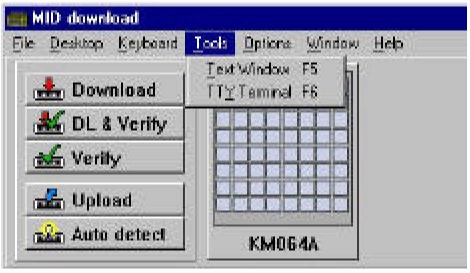
4.1. Programming the keyboard

The **Download** function saves settings of all modules and all keys into the MID’s internal non-volatile memory.
With the additional **Verify** function you can check if the data have been successfully stored.



4.2. Testing the keyboard

The accuracy of the programming can be tested in the test windows. The keyboard can be tested either in the AT/PS2 or in RS232 mode.

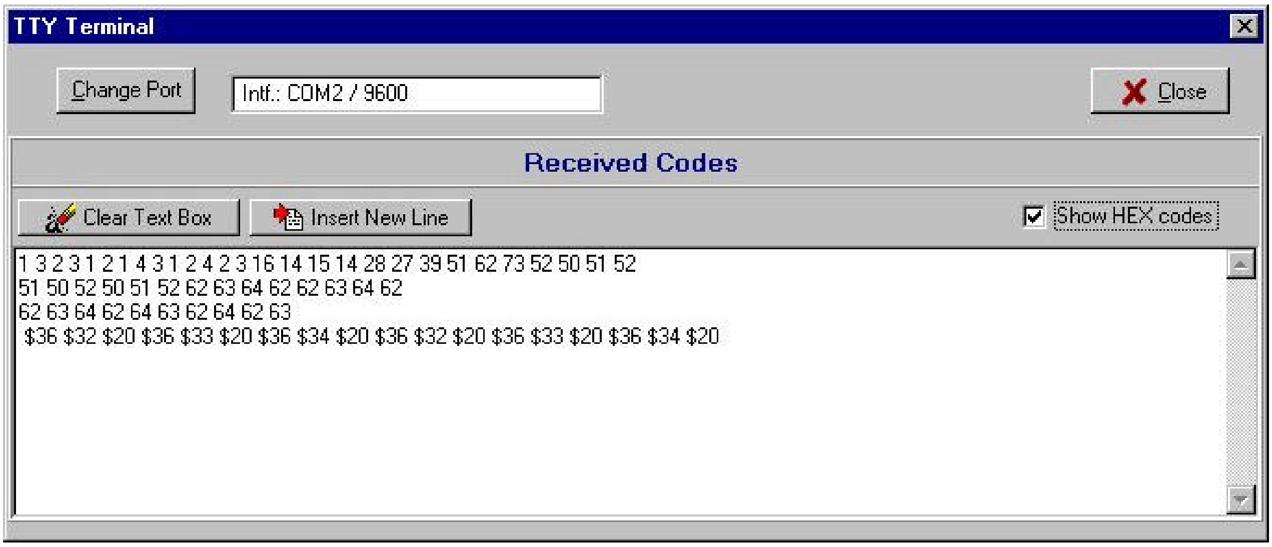


To test the AT/PS2 keyboard output choose the menu command **Tools->Text window** (Alt, T, T) and the normal text input window is displayed.

First verify the layer switching keys. When such key is pressed (its content being a switch to a certain layer), an appropriate LED diode should light up on the keyboard. The active LED diode represents an active layer for the whole keyboard (all the matrix modules). The display in the test window must fit the content of the currently active layer.

4.2.1. Testing the RS232 keyboard

With the menu command **Tools->TTY terminal** (Alt, T, Y) you can test the codes coming from the keyboard through the RS232 interface.
First the program asks for the connected serial port and the baud rate, which can be changed later also.



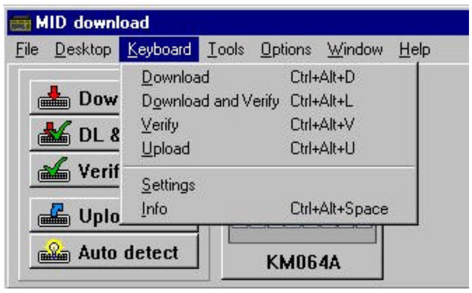
```
1 3 2 3 1 2 1 4 3 1 2 4 2 3 16 14 15 14 28 27 39 51 62 73 52 50 51 52
51 50 52 50 51 52 62 63 64 62 62 63 64 62
62 63 64 62 64 63 62 64 62 63
 $36 $32 $20 $36 $33 $20 $36 $34 $20 $36 $32 $20 $36 $33 $20 $36 $34 $20
```

Figure 29: TTY terminal

The data coming from the keyboard to the system can be displayed as ASCII or hexadecimal codes (check **Show Hex Codes**) in the field.

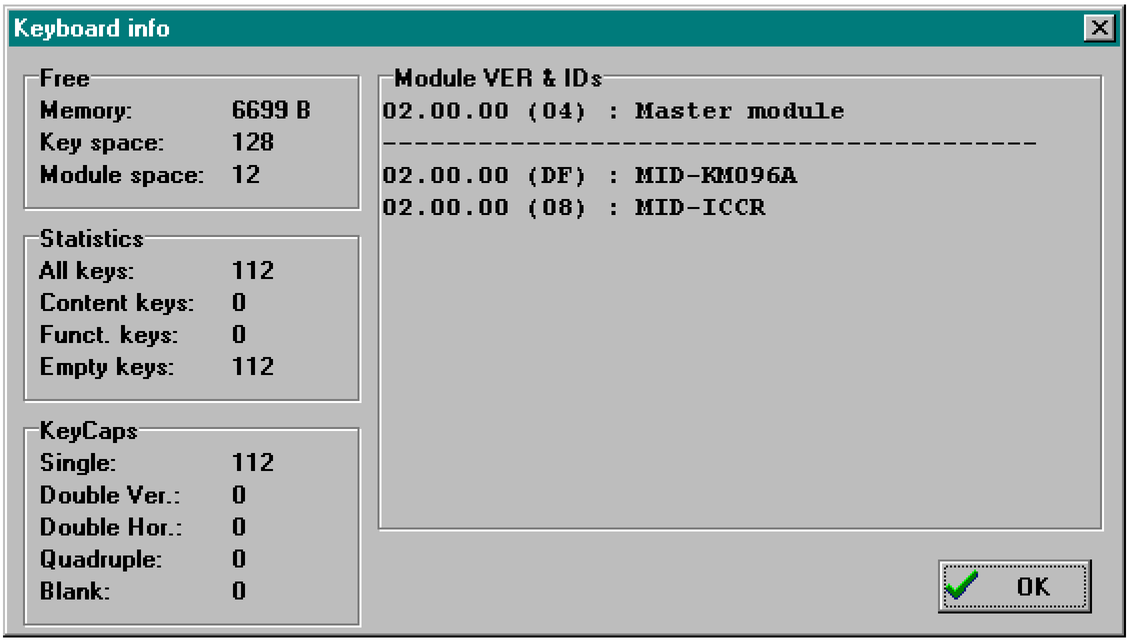
4.3. Uploading the keyboard

It may happen that you would like to check what is programmed in the MID. The **Upload** function reads the content of the connected MID and displays it on the desktop.



4.4. Keyboard information

Sometimes you need the compressed information about the arranged keyboard. You would like to know, how much of the free keyboard memory is still available, how many matrix modules can be added, how many extra sized keycaps do you need, etc. This all can be displayed in the **Keyboard info** dialogue window if you select **Keyboard->Info** (Alt, K, I) option.



Keyboard info

Free
Memory: 6699 B
Key space: 128
Module space: 12

Statistics
All keys: 112
Content keys: 0
Funct. keys: 0
Empty keys: 112

KeyCaps
Single: 112
Double Ver.: 0
Double Hor.: 0
Quadruple: 0
Blank: 0

Module VER & IDs

```
02.00.00 (04) : Master module
-------------------------------------------
02.00.00 (DF) : MID-KM096A
02.00.00 (08) : MID-ICCR
```

Figure 30:Keyboard info window

The displayed keyboard parameters are:

Free: shows how many memory bytes, keys and matrix modules are free to be used,

Statistics: shows key content usage,

Keycaps: shows the number of single keycaps, double vertical, etc.,

Module VER & IDs: the list of IDs and firmware versions of the master module and all connected modules.

4.5. Rollover

4.5.1. What is rollover

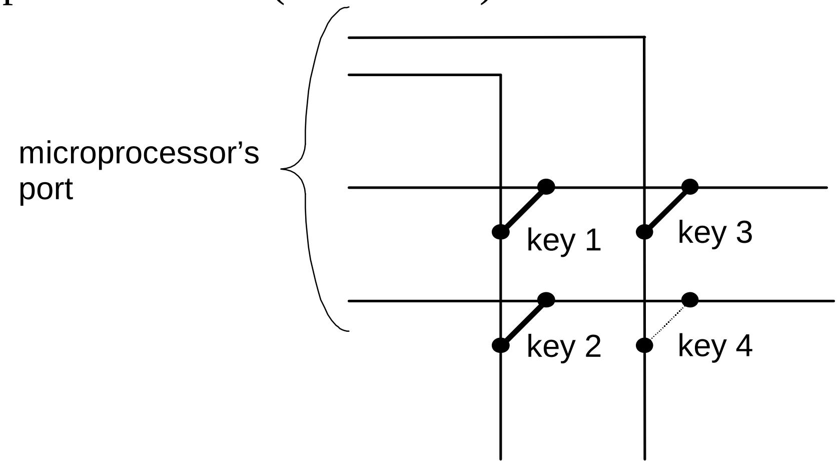
Sometimes, when three or more keys are pressed at the same time, the microprocessor in the keyboard detects that also an extra fourth key was pressed. This fourth key is called the ***Ghost key***, and the situation when this happened is called the ***rollover***. Since a keyboard cannot know which specific key combination was used (might be any 3 of these 4 keys, or all 4) it reacts as if an illegal condition has occurred. The **Modular keyboard** warns the user with a beep that something illegal was pressed, and sends no code to the system.

How does it occur?

The terminals of each key are connected to the microprocessor, one to the output and the other to the input port. When the key is pressed the processor detects that two signals (one OUTPUT and one INPUT) are linked together.

On the following figure you can see the situation when three keys, which are connected to the same processor‘s port, are pressed at the same time (solid lines). From the processor‘s point of view it is the same situation as if the fourth key was pressed as well (dashed line).

Figure 31: Rollover - connections

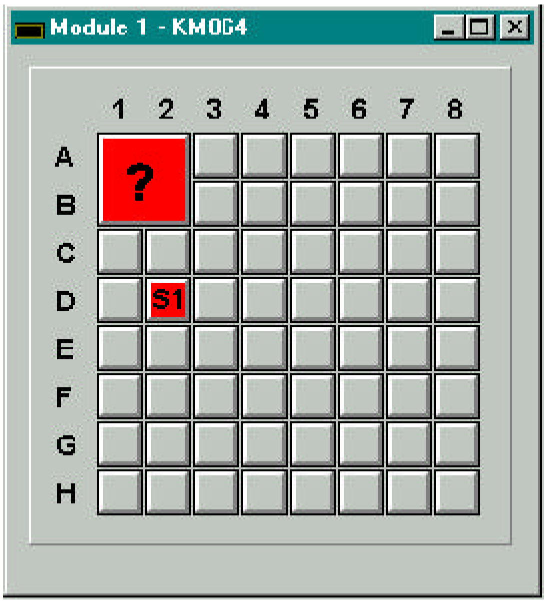


All matrix modules are designed in a way, that quadruple keycap can be put at any position on the module. The only restrictions are when an extra-sized key (quadruple or double) is combined with another key, normally with **Shift layer** key. To obtain this we have integrated an additional function in the download program. Before sending data to the keyboard memory the download program checks if there are any prohibited combinations of Shift layer keys and extra-sized keys. The data are downloaded only if the keyboard layout was designed properly.

4.5.2. What to do if a rollover occurs

Here is the example of the situation where the rollover occurs.

The key **D2** is set as **Shift layer** key and key **A1** is set as **quadruple** key. This combination is not allowed, because the rollover will occur when both keys are pressed at the same time. As you can see on the figure the not allowed combination is coloured, and the problematic quadruple key is signed with the question mark.

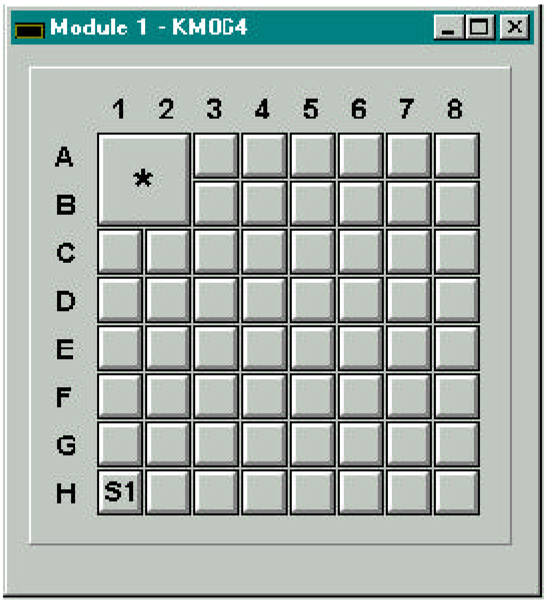


Module 1 - KM064

	1	2	3	4	5	6	7	8
A	?							
B								
C								
D		S1						
E								
F								
G								
H								

Rollover

To continue you need to remove either the **quadruple** key from the position **A1** or the **Shift layer** key from the position **D2,** or to redefine the **A1** key to a smaller keycap size (Choose what matches your application best). On this example the **Shift layer** key is moved to the position **H1** – the prohibited situation is removed.



Module 1 - KM064

	1	2	3	4	5	6	7	8
A	*							
B								
C								
D								
E								
F								
G								
H	S1							

Rollover solved

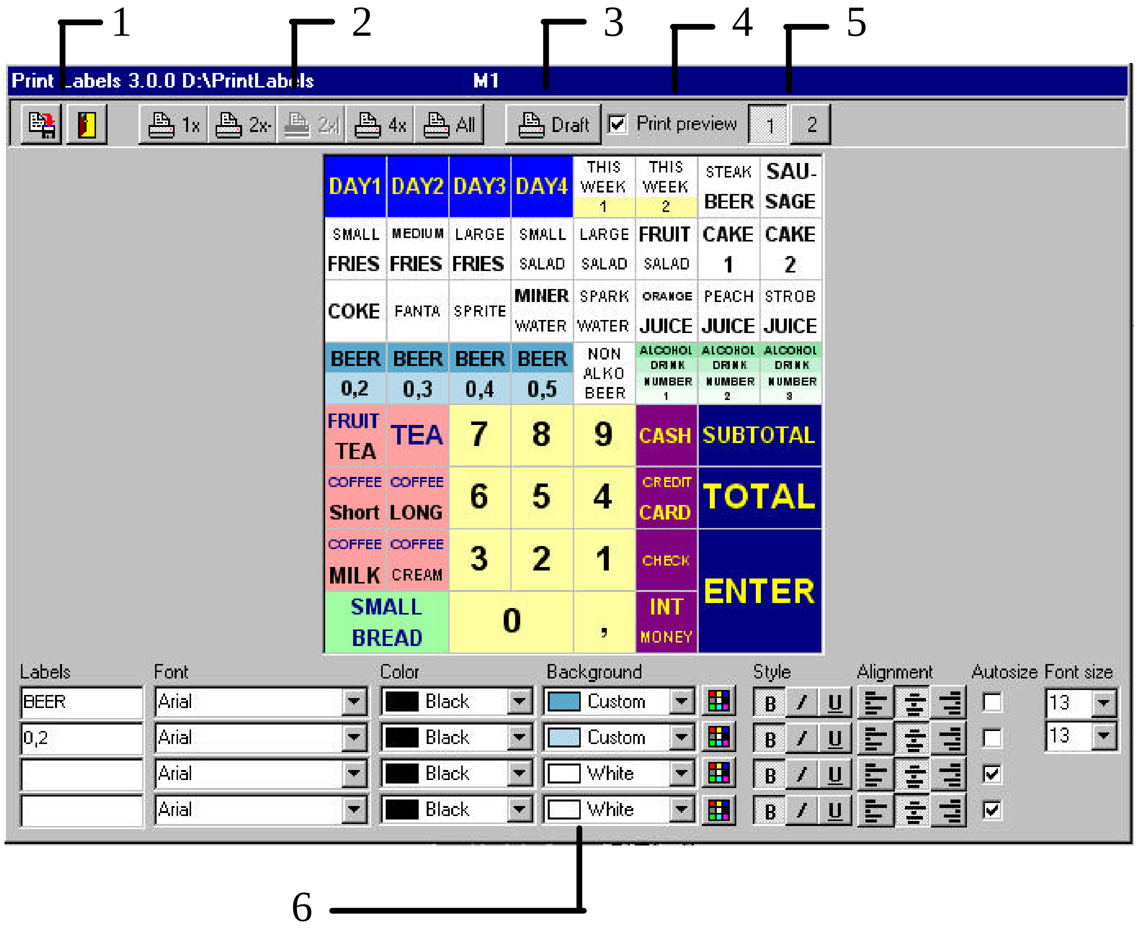
5. Other utilities

5.1. Printing key labels

Integrated in MIDWIN, is the ability to print keycap labels. The program allows you to print labels in different colours, font types and sizes.
There are 4 label fields in the key definition window *(refer to 3.8.2 Key configuration input)* where you can put the text that should be written on the keycaps. Only the non-blank fields are printed on the default-selected printer.

The command **File->Print labels** (ALT, F, P) opens the window, where the keycap labels can be edited and printed.

On the figure below you can see an example of configured keyboard, the description of the significant parts follows:



DAY1	DAY2	DAY3	DAY4	THIS WEEK 1	THIS WEEK 2	STEAK BEER	SAU- SAGE
SMALL FRIES	MEDIUM FRIES	LARGE FRIES	SMALL SALAD	LARGE SALAD	FRUIT SALAD	CAKE 1	CAKE 2
COKE	FANTA	SPRITE	MINER WATER	SPARK WATER	ORANGE JUICE	PEACH JUICE	STROB JUICE
BEER 0,2	BEER 0,3	BEER 0,4	BEER 0,5	NON ALKO BEER	ALCOHOL DRINK NUMBER 1	ALCOHOL DRINK NUMBER 2	ALCOHOL DRINK NUMBER 3
FRUIT TEA	TEA	7	8	9	CASH	SUBTOTAL	
COFFEE Short	COFFEE LONG	6	5	4	CREDIT CARD	TOTAL	
COFFEE MILK	COFFEE CREAM	3	2	1	CHECK	ENTER	
SMALL BREAD		0		,	INT MONEY		

Labels	Font	Color	Background	Style	Alignment	Autosize	Font size
BEER	Arial	Black	Custom	B / U		☐	13
0,2	Arial	Black	Custom	B / U		☐	13
	Arial	Black	White	B / U		☑	
	Arial	Black	White	B / U		☑	

Figure 32: Printing labels

1. With these two buttons you can save the entered changes to the key labels or exit this window and return back to the main window. The label properties are saved in a file with the extension **.cov** while the changes of the label texts are saved in the keyboard layout file and are therefore visible in the key definition window.
2. Key labels are printed separately, each size on a different page. With these 5 buttons you can print labels on **Single/Double horizontal/Double vertical** or **Quadruple** keycaps. If you want to print all pages at once you need to press the button **All**.
3. The **Draft** button starts printing of the complete keyboard layout on single page. Since all single, double and quadruple keycaps are visible on the same sheet, this feature is very useful for layout design and verification. The drawback of such printout is disproportional size of double and quadruple keycaps. Therefore it shall not be used for final labels assembling.
4. The option **Print preview** enables you to see the printed layout before printing.
5. Only labels on one module can be seen at once. You can change the visible module with keys in the upper row.
6. Each key can have up to 4 different labels printed on the inserted paper. You can set different font type, text and background colour, font style *(bold, italic and underline)*, alignment and font size for each label separately. Font size can be set automatically to maximum (check the **Autosize** field) or manually. Font size cannot be bigger than the one that fits onto the key label. For the background colour also a custom colour could be selected.

To change the key label properties first click on the selected field *(if the keycap size is bigger than single keycap you should click the upper left-handed corner)* and then change the text, colour and other text properties.

ⓘ **IMPORTANT:** ***use the right mouse button to select multiple keys!***

5.2. MID API

MID Application Programming Interface (MID API) is a set of functions that your application can call to perform specific commands on TIPRO MID modules. MID API communicates to MID via AT/PS2 keyboard or serial interface. It supports the following platforms: Windows 95/98, Windows NT and Windows 2000.

The MID family consists of many different modules, which you can combine into sophisticated input device. Modules differ in size and functionality. Some of them don't need any special API functions in order to operate (matrixes), but the others can't live without them (LCD's, smart card readers, etc.). We created MID API in order to allow programmers to develop applications for TIPRO modular keyboards.

The libraries, H files, examples for various Windows programming tools and a comprehensive documentation of the MID API are already included in the standard MIDWIN installation. No additional installation is required.

6. Technical data

6.1. Keyboard features

- Up to 8 key modules
- Total maximum number of keys 256
- Up to 14 all modules

6.2. Technical data

- power supply: 5V DC ± 5%
- power consumption
  - master module: 25 mA *(without external keyboard)*
  - master module RS232: 30 mA *(without external keyboard)*
  - all key modules: 15 mA
    - with LCD module 2x20 with backlight: 90 mA
  - MCR: 15 mA
  - BCR: 45 mA
  - ICCR: 25 mA + LCD backlight
- communication: AT/PS2 or RS232
- non-volatile memory
  - 64 Kbit EEPROM memory
  - data retention: 100 years
  - endurance: 1 000 000 write/erase cycles
- operating temperature range : 0 – 40°C *(32 –104F)*
- storing temperature range: -20 – 60°C *(-4 – 140F)*
- relative humidity range: 20%-85% (non-condensing)

6.3. ASCII Character Set

Char	Dec	Hex
NUL	0	0
SOH	1	01
STX	2	02
ETX	3	03
EOT	4	04
ENQ	5	05
ACK	6	06
BEL	7	07
BS	8	08
HT	9	09
LF	10	0A
VT	11	0B
FF	12	0C
CR	13	0D
SOH	14	0E
SI	15	0F
DLE	16	10
DC1	17	11
DC2	18	12
DC3	19	13
DC4	20	14
NAK	21	15
SYN	22	16
ETB	23	17
CAN	24	18
EM	25	19
SUB	26	1A
ESC	27	1B
FS	28	1C
GS	29	1D
RS	30	1E
US	31	1F

Char	Dec	Hex
Space	32	20
!	33	21
"	34	22
#	35	23
$	36	24
%	37	25
&	38	26
'	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F

Char	Dec	Hex
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
\	92	5C
]	93	5D
^	94	5E
_	95	5F

Char	Dec	Hex
`	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
|	124	7C
}	125	7D
~	126	7E
DEL	127	7F

6.4. Specification of the serial communication

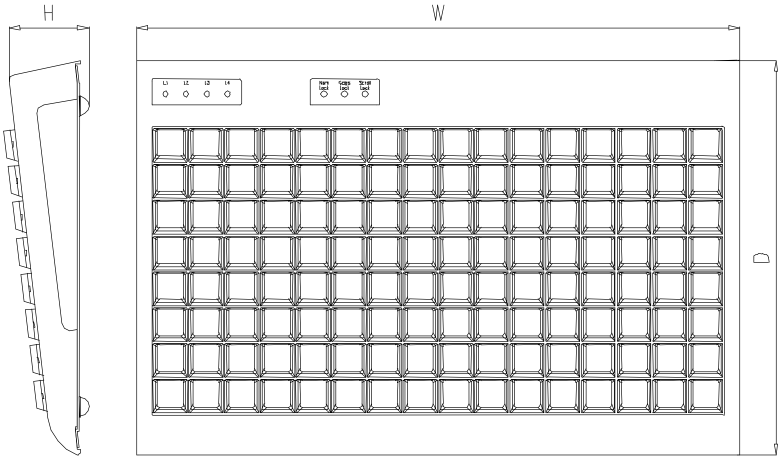
Baud rate: Selectable to 9600, 4800, 2400, 1200, 600 or 300 Baud
Data bits: 8
Parity: None
Stop bits: ONE
Protocol: Tipro defined protocol

The protocol guidelines can be obtained from the Tipro web site:
http://www.tipro.net/Support/Docs/MidMisc/RS232PRO.doc

6.5. Keyboard modules

6.5.1. Full travel keyboard modules

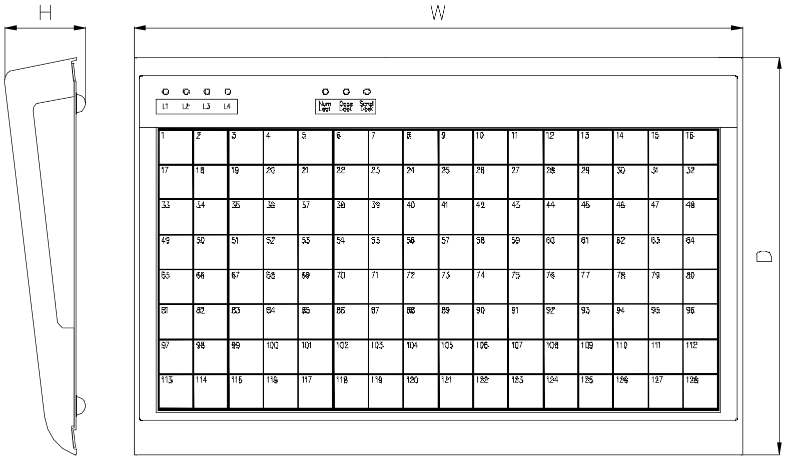
Full travel modules are equipped with Cherry MX mechanical keyswitches. Thanks to "gold crosspoint" contact technology and 4 mm travel these modules are satisfying the most demanding user's requirements.



6.5.2. Short travel keyboard modules

Short travel modules are equipped with Omron B3F 4005 mechanical keyswitches and covered with fixed protection cover. It guarantees front side protection (IP65) from dust and liquids.

Protection cover is made of a high quality textured polyester film resistant to alcohol, dilute acids, dilute alkalis, esters, hydrocarbons, ketones and household cleaning agents.



Dimensions for the long and short travel modules:

Matrix size	**housing dimension W/D/H [mm]**		
4 x 8 (32)	93	210	42,5
ICCR	93	210	48
8 x 8 (64)	196	210	42,5
12 x 8 (96)	246	210	42,5
16 x 8 (128)	322	210	42,5

Main features of the keyswitches:

	long travel - Cherry MX	**short travel - OMRON B3F**
lifetime	> 50 million operations	> 300 000 operations
actuating force	(60 ± 20) cN	(255 ± 65) cN
key travel	$4^{-0,4}\,mm$	$0,3^{+0,2}_{-0,1}\,mm$

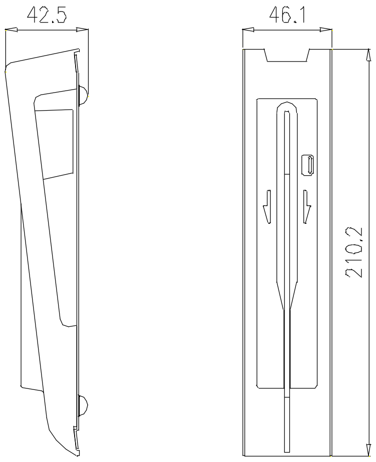
6.5.3. Integrated iButton module

IButton properties:

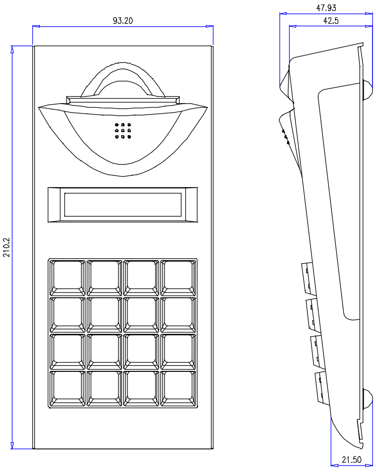
- ROM (Read Only Memory) pre-programmed with unique 64-bit registration number
- Operating/Storage Temperature Range: -40°C to +85°C
- Mechanical Shock: 500g's (6 axis)
- Immersion in Saline: 24 hours
- Drop Test: 1.5m to concrete
- Crush Test 12kg for 30seconds
- Contact Durability: 1million insertion

6.6. MCR modules

- Connectors: 2 internal connectors for side connection with other MID modules
- Weight: 250 g
- Power consumption: 15mA$_{TYP}$
- Package: module with magnetic card reader
- Reads tracks 1+2 or 2+3 or 1+2+3
- In conformance with: ISO7811 standard
- Head operating life: up to 1 million card passes with ISO7810/7811 conformed cards
- Card thickness range: 0.18mm to 0.84mm
- Stripe media coercitivity range: both Lo-Co and Hi-Co (more than 4200Oe)
- Card feeding speed: (5 – 150) cm/s



6.7. IC Card Reader modules (ICCR)



Consists of

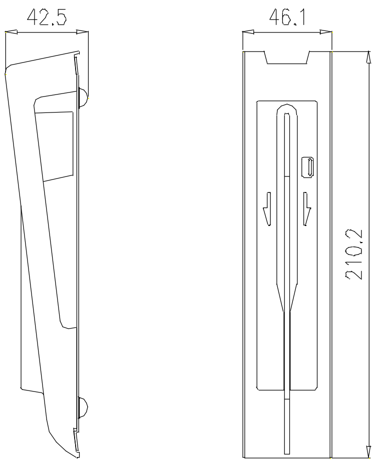
- ICC Reader
- 2x16 character alphanumeric LCD
- 4x4 free programmable keys

- Weight: 520 g
- Power consumption: 20 mA$_{\text{TYP}}$ + IC card consumption

IC Card Reader

- In conformance with: ISO 7816 standard, PC/SC specification
- Supported asynchronous protocols: T = 0, T = 1
- Supported synchronous protocols: S = 10
- Asynchronous baud rate: 10752baud (4MHz/372)
- Synchronous bit rate: approximately 30kb/s
- Detecting and reporting ICC insertion and withdrawal
- IC contacts position: ISO 7816 compliant
- IC contacts type: landing
- IC contacts material: copper alloy with gold over nickel plating
- IC contacts pressure: 1.5 N$_{\text{MAX}}$ per contact
- Card insertion force: 10 N$_{\text{MAX}}$
- Card withdrawal force: 3 N$_{\text{MIN}}$
- Durability: more than 200000 cycles (insertion/withdrawal)

6.8. Bar Code slot Reader (BCR)



- Connectors: 2 internal connectors for side connection with other MID modules
- Weight: 250 g
- Power consumption: 45 mA
- Package: module with bar code slot reader
- Light Source: 660 nm red LED
- Light Sensor: photo diode
- Resolution: 0.15 mm (6 mils)
- Height of Scan Line: 10.5 mm
- Card Swiping Speed: 100 – 1000 mm/sec (3.9 – 39.0 inch/sec)
- Card Thickness: up to 1.8 mm
- Ambient Light: up to 3000 lux
- Supported Bar Codes: all types of UPC/EAN/JAN, Code 3 of 9, Code 3 of 9 full ASCII, Code 128, Code 93, Interleaved 2 of 5, Industrial 2 of 5, Matrix 2 of 5, Codabar, MSI/Plessey, Code 11

6.9. Accessories

Accessory is a set of equipment necessary to assemble the keyboard. It consists of:

- two side covers (left and right)
- one joiner
- one cable for communication with the computer

Accessory for master with both RS232 and AT, PS/2 interface encloses a cable with split end on the computer side - for keyboard and RS232 connection.

6.10. Ordering Codes

Tables with ordering codes for all key modules, MCRs, BCRs, accessories and cables can be obtained on the Tipro home page:

http://www.tipro.net/Support/Docs/MidMisc/ordcodes.htm

7. Copyrights and technical support

Copyrights

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Software distribution

MIDDOS and MIDWIN are distributed with MID Master module. It is free software and may be used by any number of systems.

Modification of the programs or their resources is strictly forbidden. Any modification of any component of the MIDDOS or the MIDWIN are a breach of intellectual property laws in most countries and will be pursued vigorously to the full extent of the law.

No liability for consequential damages

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Technical support

Your first port of call for technical support for MIDWIN is this manual and the list of frequently asked question on the Internet. The address of the Tipro Technical support web site is:

http://www.tipro.net/tehnical.htm

If these sources do not give satisfactory answers you may contact our technical support by **Email** or **Fax**. We endeavour to answer questions within 48 hours (except on holidays, weekends and working free days).

Contact Tipro keyboards

Via	At
Internet	support@tipro.si
Fax	+386 1/78 88 299
Mail	Tipro keyboards Ljubljanska cesta 64 SI-1290 Grosuplje Slovenia

Updating software

Both the download programs, MIDDOS and MIDWIN, will be regularly updated on our www home page. If you need to install new version of the download program you have to get either the MIDDOS or the MIDWIN setup program from the following Internet sites and run it as written in chapter **3.1 Program installation**.

HTTP: **www.tipro.net** *(follow **Support**)*
Or directly: **www.tipro.net/technic.htm#MIDWIN**

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