

# USER MANUAL

**mifare**<sup>®</sup>

**Demo Software for Win32**

**MIFAREWND.EXE**

Revision 1.0

November 2001

Preliminary

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**MIFARE<sup>®</sup> Demo Software for Win32****MIFAREWND**

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## 1 INTRODUCTION

### 1.1 Scope

This document describes how to use the MIFAREWND demonstration program in combination with Philips Semiconductors MIFARE<sup>®</sup> readers. The description is focused on the MF RD700 Pegoda reader although the program itself supports the complete MIFARE<sup>®</sup> reader infrastructure. The MF RD700 Pegoda reader is delivered in 2 evaluation kits, the MF EV700 and the MF EV800.

MIFAREWND.EXE is a Visual C++ 6.0 application that uses PC-Libraries for Win32 environments. This application shows the functionality of the basic function libraries based on the MF RC500 and the low level libraries based on the Core Modules in order to understand the MIFARE<sup>®</sup> system on a basic level.

MIFAREWND is supported by different operating systems as Windows 98, Windows ME, Windows NT 4.0 and Windows 2000 depending on the different reader connect to the PC.

The MF RD 700 Pegoda reader is a USB reader. The included libraries are supported by Windows 98 and Windows 2000.

A detailed command and parameter reference for the used commands can be found in the description of the basic function libraries for the MF RC500 as well as the data sheets and applications notes for the Pegoda reader different supported chip card ICs.

### 1.2 Supported hardware

The MiFAREWND demonstration software supports the complete MIFARE<sup>®</sup> product range including all existing reader and card products.

#### Read/Write Devices (RWDs) :

- MIFARE<sup>®</sup> evaluation kits MF EV700 and MF EV800
- MIFARE<sup>®</sup> Serial reader MF RD260 and MF RD560

#### Standard Card ICs:

- MIFARE<sup>®</sup> Standard MF1 IC S50
- MIFARE<sup>®</sup> Light MF1 IC L10
- MIFARE<sup>®</sup> ultralight MF0 IC U1
- MIFARE<sup>®</sup> Plus MF1 IC P60
- MIFARE<sup>®</sup> Pro MF2 IC D80
- MIFARE<sup>®</sup> PROX MF P8RF5016

The functional description of all supported reader and card products is not part of that document. For a detailed description please refer to the products' data sheets.

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Relevant documents are:

MIFARE<sup>®</sup> Standard Card IC MF1ICS50 Functional Specification

MIFARE<sup>®</sup> ultralight MF0 ICU1 Contactless Single-trip Ticket IC MF0 IC U1

MIFARE<sup>®</sup> MF RC500; Highly Integrated ISO 14443A Reader IC

MIFARE<sup>®</sup> PRO, MF2 IC D8x, Dual Interface Smart Card IC, Product Specification

MIFARE<sup>®</sup> PROX; P8RF5016; Secure 8-bit Smart Card Controller

MIFARE<sup>®</sup> MFRD560 Product Specification Serial Reader for Proximity Range

MIFARE<sup>®</sup> Serial Reader MF RD260 Short Range

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## 2 OPERATING INSTRUCTIONS

Several operating instructions give the possibility to adapt the MIFAREWND demonstration program to a specific environment.

### 2.1 List of terms and abbreviations

Term / Abbreviation	Definition
RWD	reader write device , defines the contactless reader
UID	unique identifier, defines the unique cards serial number
T=CL	synonym for the open protocol according to ISO14443-4

Table 2-1. List of terms and abbreviations

### 2.2 Menu 'File'

3 different operating modes of the MIFAREWND can be enabled:

Operating Mode	short description
New Mifare	opens a window which allows you to perform basic Mifare commands
New T=CL	opens a window offering ISO 14443-4 protocol operations
New Contact	opens a window offering the possibility to connect a contact reader according to ISO 7816 protocol operations.
Exit	exits the program

Table 2-2. MIFAREWND Operating Modes

### 2.3 Menu 'Options'

#### 2.3.1 SETTINGS

Choose parameters used by the commands in the main window. The dialogs differ depending on the active window.

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2.3.1.1 *Command Parameter Settings*

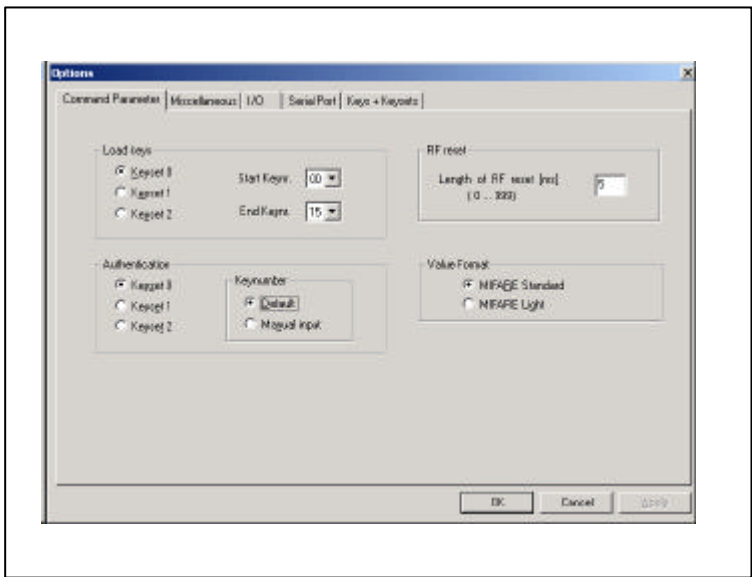


Figure 1. *Command Parameter Settings*

**Load Keys:**

Selects a key set to load the selected keys to the reader's key memory when clicking the *Load Keys* command in the mifare window. The key range might be selected by choosing the appropriate *Start* and *End Keynr* from the drop down boxes.

**Authentication:**

Select a key set to be used for the authentication commands *Auth Key A* and *Auth Key B*. Choosing *Default* key number uses the key corresponding to the Mifare Sector. Choosing *Manual Input* a dialog is opened after the authentication command asking for the selected key used for authentication. The default key number is calculated as follows:

```

if ( blockaddr < 128 )
    keynr = ( blockaddr / 4 ) % 16;
else
    keynr = ( ( blockaddr - 128 ) / 16 ) % 16;
    
```

**RF Reset:**

Select the RF Reset duration in milliseconds. The RF Reset switches off the MF RC500 antenna drivers for the specified time.

**Value Format:**

Select the value format that is used for encoding and decoding values by clicking the buttons *Prepare value* and *Show value*. The value format between the MIFARE<sup>®</sup> Standard and the MIFARE<sup>®</sup> Light cards differ because of the different memory structure for both card ICs for a detailed information on the value format refer to the data sheets of the products.

During the communication to a specific card the program detects the cards automatically and uses the correct value format.

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## 2.3.1.2 Miscellaneous

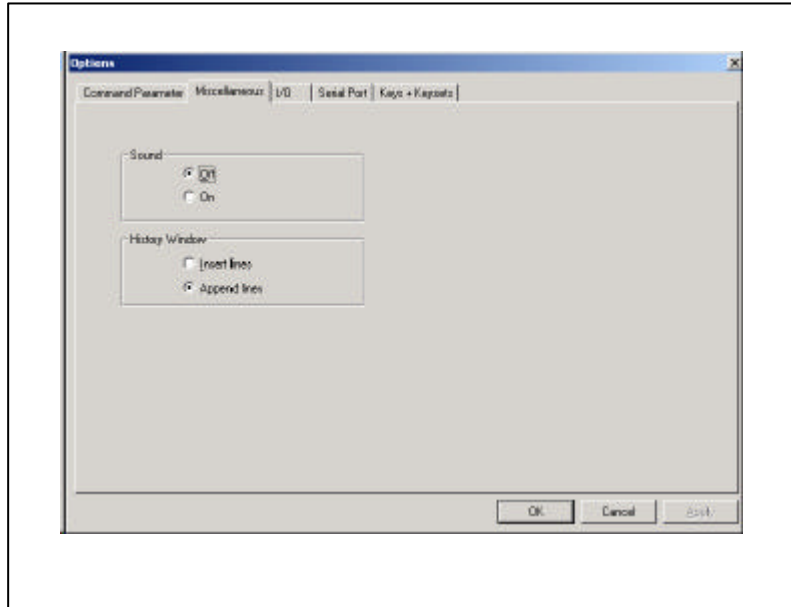


Figure 2. Miscellaneous Settings

**Sound:**

Beep notification on errors and high level functions as show cards and read/write.

**History Window:**

Select whether to append lines at the bottom or insert lines at the top of history windows.



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### 2.3.1.3 I/O

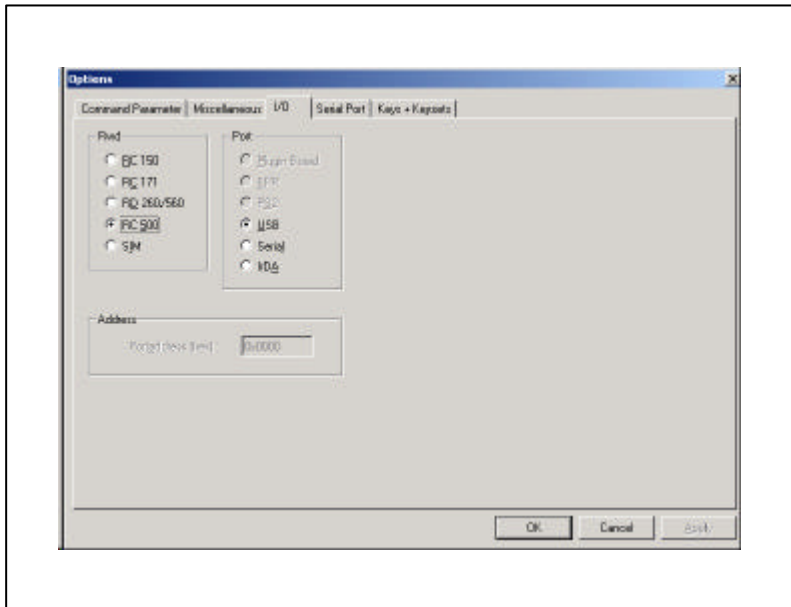


Figure 3. I/O Settings

**RWD:**

RWD stands for read write devices.

This option selects which RWD is used for the application. The MIFAREWND software supports different read write devices. The Pegoda reader is based on the MF RC500. To enable the Pegoda reader the MF RC 500 has to be selected.

**Port:**

Select the port to which your RWD is connected. The different RWD communicate via different host serial or parallel interfaces. The default configuration for the Pegoda reader has to be set to USB.

**Address:**

This option is available for parallel port RWDs only. Set the corresponding I/O address in hexadecimal notation.

Note: Invalid addresses may cause unpredictable behavior and may lead to system crashes.

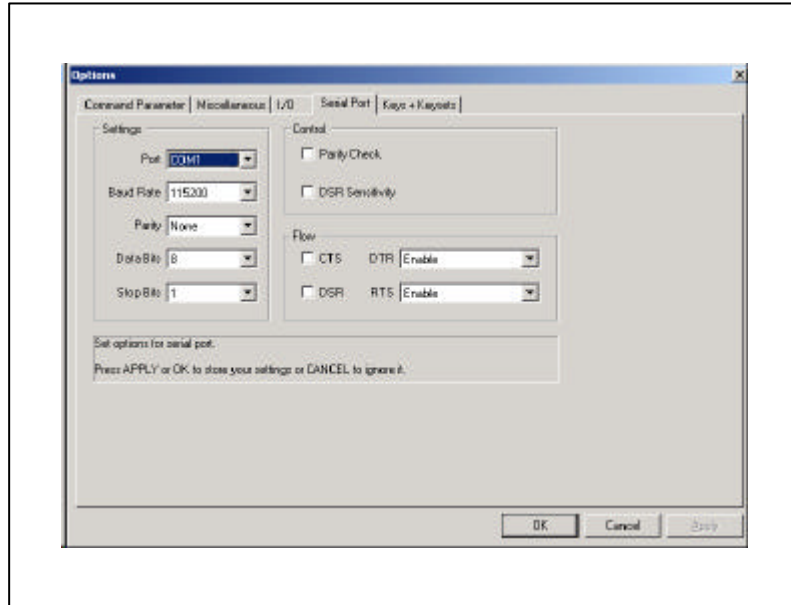
**MIFARE<sup>®</sup> Demo Software for Win32****MIFAREWND****2.3.1.4 Serial Port**

Figure 4. Serial Port Settings

**Settings:**

Select the serial COM Port to which the RWD is attached and the Baud rate to be used for communications. The optional settings like parity, data bits, stop bits may not be changed. The default configuration is:

Parity: none  
Data bits: 8  
Stop bits: 1

**Control:**

Enables or disables parity check and DSR Sensitivity. No settings have to be made.

**Flow:**

Defines the CTS, DSA, DTR and RTS parameters. No settings have to be made.

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## 2.3.1.5 Keys + Keysets

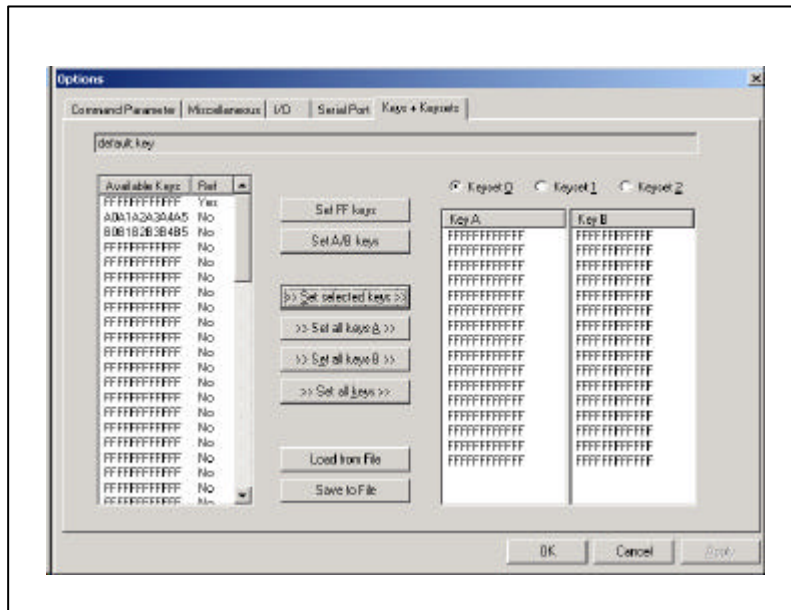


Figure 5. Key and keyset settings

The top line shows the file used to read and save keys and keyset assignments. Different files can be selected by the *Load from File* and *Save to File* commands. The standard keyset *default.key* is stored in the MIFAREWND directory. If load key is used the program opens the MIFAREWND directory and displays all \*.key files. If the user generates a new keyset and save to file is used the program stores the file as a key file using the extension \*.key.

The left list box 'available keys' shows all available keys in the first column and status information of the current usage in the second column. Clicking a key with the mouse lets the user change a key.

Note that any references to this key will also change.

The listed boxes at the right hand side represent the RWD's keysets. Keysets 0 to 1 can be selected and the selection determines which keyset is currently shown. To assign a key to a specified position in a keyset first select the key in the list of available keys and then choose the target position in the keyset. Then click the *Set Selected Keys* command.

The *Set FF Keys* command sets the first key in the list of available keys all keys from the current keyset to FFFFFFFFFFFFFFFF.

The *Set A/B Keys* command sets the second key in the list of available keys all keys A from the current keyset to A0A1A2A3A4A5 and the third key in the list of available keys all keys B from the current keyset to B0B1B2B3B4B5.

The *Set All keys A* command sets all keys A of the current keyset to the currently selected key from the list of available keys.

The *Set All keys B* command sets all keys B of the current keyset to the currently selected key from the list of available keys.

The *Set All keys* command sets all keys of the current keyset to the currently selected key from the list of available keys.

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## 2.3.2 MF RC500 REGISTER UI

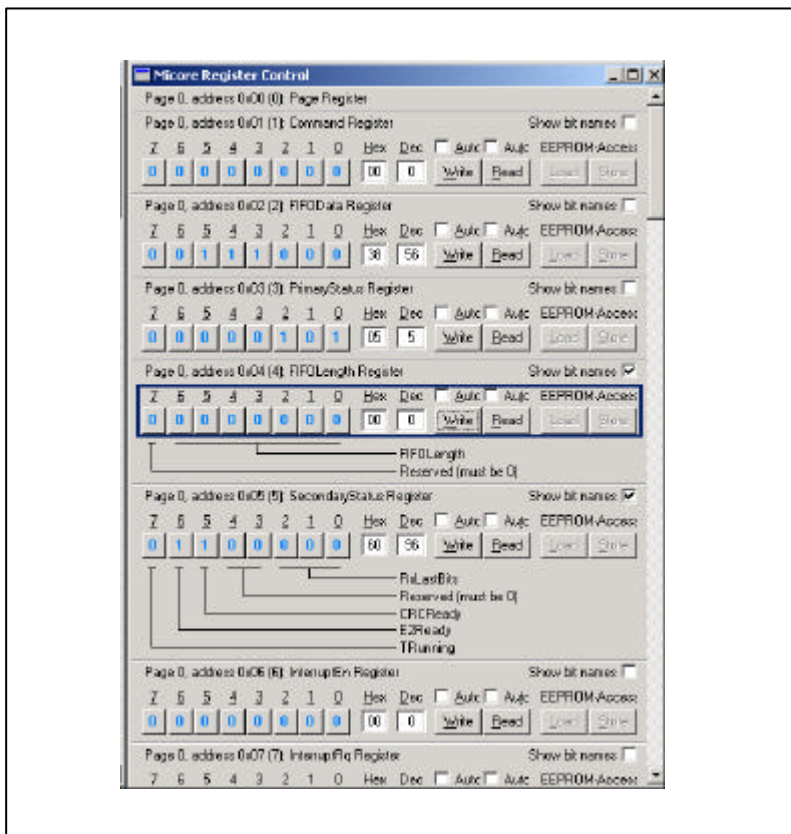


Figure 6. MF RC500 Register settings

This options dialog is only available working with the Pegoda reader based on the MF RC500.

This command opens a separate window with a view of all Rc500 registers giving the user the possibility to read out the actual register settings and to change the settings as well.

**Read:**  
reads back the actual register value

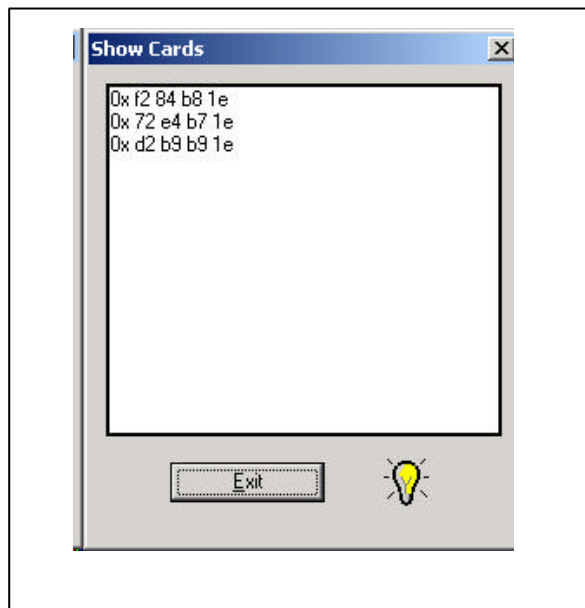
**Show bit names:**  
shows the relevant bit name.

**Write:**  
write the new values to the specific register.

**NOTE: Changing the content of the control registers is influencing the functionality of the MIFARE Pegoda reader.**

**MIFARE<sup>®</sup> Demo Software for Win32****MIFAREWND****2.4 Menu 'High-Level'**

Performs High-Level Functions to show the use of the Low Level Routines.

**2.4.1 SHOW CARDS**

*Figure 7. Show Cards*

This option shows the UIDs of all cards in the field. The UIDs are shown in hexadecimal and the least significant byte (LSB) first. Cascaded UIDs are also supported in this high level function.

The following loop of commands is executed until the exit button is pressed:

1. RF Reset
2. Request idle
3. Anticollision
4. Select
5. Halt

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2.4.2 READ/WRITE

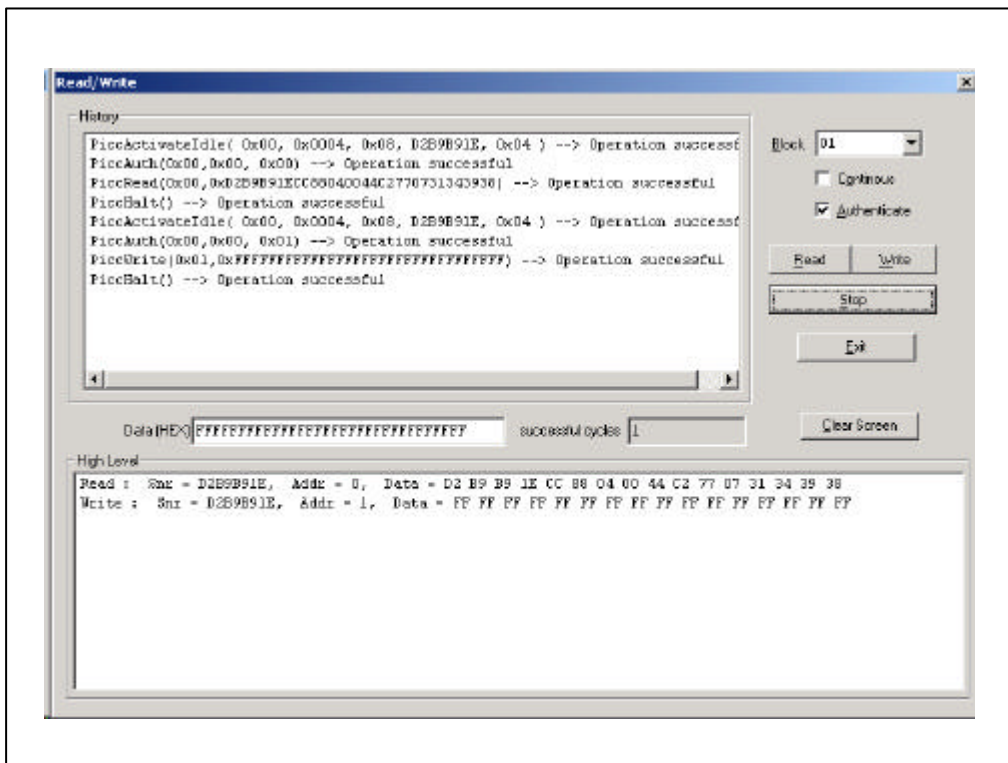


Figure 8. Read Write

This command opens a dialog box, which performs High Level Read or Write operations. It displays a combo box to select the block address to work on and option fields to enable or disable Authentication and continuous execution mode. Data to be written is entered in the corresponding text field. This field also displays the data read. Two history windows are shown. The upper window displays the low-level command sequences, the lower window displays high level information such as the UID and data, which is read or written.

The sequence is as follows:

- 6. RF Reset
- 7. Activate Idle
- 8. Authenticate ( if enabled )
- 9. Read / Write
- 10. Halt

Continuous mode only:

- 11. Activate Wakeup
- and continues from step 3

**Stop:**  
Stops the current operation.

**Clear Screen:**  
Clears the history windows.

**Exit:**  
Exits the Read/Write dialog

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**2.5 Menu 'Window'**

Commands for enabling or disabling the bottom Status bar reposition the visible windows and select an active window.

**2.6 Menu '?'**

Display program information containing the current version number of the application itself and all used dynamic link libraries.

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**2.7 Mifare Window**

The MIFARE<sup>®</sup> Windows is basic display for the MIFAREWND program. It covers all functionality in the communication to the PEGODA reader as well as all MIFARE<sup>®</sup> Classic commands. Furthermore the basic ISO14443-4 commands are defined as well

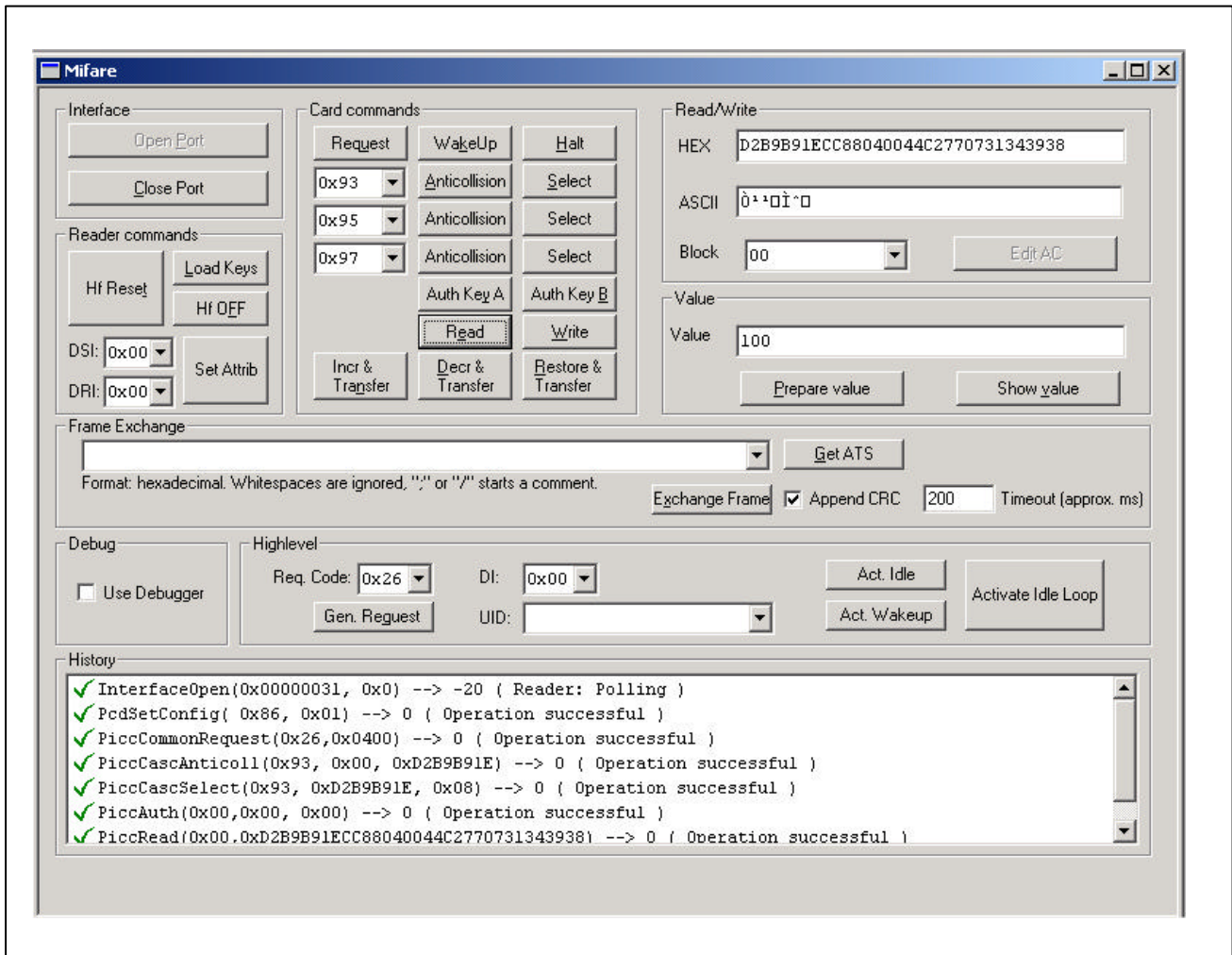


Figure 9. MIFARE<sup>®</sup> Communication Window

**2.7.1 INTERFACE**

**Open Port:**

Open the interface port specified in *Options*→*Settings*→*I/O*. Serial port settings can be changed in *Options*→*Settings*→*Serial Port*. After successful operation, all buttons are enabled and the communication to reader itself is established.

**Close Port:**

Close the hardware interface port. This command disables any button except *Open Port*.



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### 2.7.2 HISTORY

All commands are logged into this window. To select whether to append or insert lines see *Options*→*Settings*→*Miscellaneous*→*History window*.

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2.7.3 READER COMMANDS

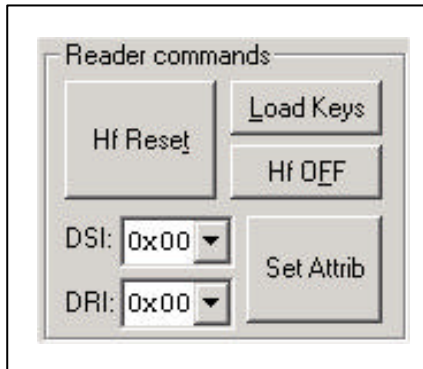


Figure 10. Reader Commands

**RF Reset:**

Turn the RF field off and on again.  
The time interval can be changed in *Options*→*Settings*→*Command Parameter*

**RF Off:**

Turn the RF field off. To turn it on again, use *RF Reset*.

**Load Keys:**

Load keys into the Reader ASIC. The used keyset as well as the used keys can be set by *Options*→*Settings*→*Command Parameter*.  
The keys and the keysets itself can be changed in *Options*→*Settings*→*Keys + Keysets*.

**DSI /DRI:**

DSI: Divider Send Integer as defined in ISO 14443-4. Defines the Baud rate the card shall use for communication to the reader.

DRI: Divider Receive Integer as defined in ISO 14443-4. Defines the Baud rate the reader shall use for communication to the card.

The dividers are coded as follows:

DSI	DRI	Baud rate [kBd]
0	0	106
1	1	212
2	2	424
3	3	848

**Note:** The default configuration of the Pegoda reader does not support this command. This command is intended to be used by a reader IC covering the higher Baud rate communication e.g. the MF RC530 in combination with a  $\mu$ Controller based card as the MIFARE<sup>®</sup> ProX

**Set Attrib:**

Sets the RWD to use the Baud rates selected in DSI and DRI.

**Note:** *Set Attrib* sets the RWDs Baud rates only, it does not change the communication speed. Thus no further communication may be possible until the RWD and cards use the same configuration.

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2.7.4 CARD COMMANDS

The card commands include all command valid for a MIFARE<sup>®</sup> classic card communication.

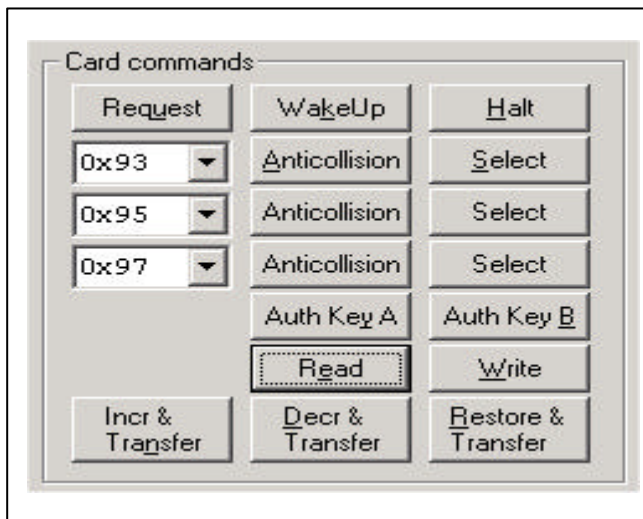


Figure 11. MIFARE<sup>®</sup> Classic Card Commands

**Request:**  
Performs a *Request IDLE* command according to ISO14443A-3.

**Wakeup:**  
Performs *Request ALL* command according to ISO14443A-3.

**Halt:**  
Performs a *Halt* command according to ISO14443A-3.

**Anticollision and Select:**  
Anticollision and Select commands according to the ISO14443A-3. The ISO14443A defines 3 different command codes depending on the length of the UID. Standard Anticollision / Select command codes are:

HexCode	Cascade Level according to ISO 14443 A	UID length
0x93	Cascade Level 0	4
0x95	Cascade Level 1	7
0x97	Cascade Level 2	10

Note: The support of the cascaded UIDs depends on the used card IC. Refer to the product specification to find out whether the commands are supported or not.

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**Auth Key A / Auth Key B:**

Performs a MIFARE<sup>®</sup> Classic authentication command using key A or key B on the address specified in block *Read / Write*.

To change Authentication settings see *Options*→*Settings*→*Command Parameter* and *Options*→*Settings*→*Keys + Keysets*.

Note: The allowed operations following to the passed authentication are related to the installed access conditions.

**Read:**

Performs the MIFARE<sup>®</sup> Classic read-command from block address specified in frame *Read / Write*. The Data is displayed in hexadecimal- and ASCII-notation simultaneously.

**Write:**

Performs MIFARE<sup>®</sup> Classic write-command to block address and data specified in frame *Read / Write*. Data can be edited in either ASCII or hexadecimal notation.

**Incr. & transfer:**

Performs increment- and transfer-command. For increasing, the block address specified in frame *Read / Write* is used. After pressing the button, a dialog box for entering the block address used for transfer-command is displayed. Data in textbox *Value* is used as parameter for the increment-command.

Note: The increment command requires a valid value block stored at the specific card address. To write a value block to the card the write command has to be used.

**Decr. & Transfer:**

Performs decrement- and transfer-command. For decreasing, the block address specified in frame *Read / Write* is used. After pressing the button, a dialog box to choose whether to use automatic backup management or select a block address used for transfer-command is displayed. Data in textbox *Value* is used as parameter for the decrement-command.

Note: The decrement command requires a valid value block stored at the specific card address. To write a value block to the card the write command has to be used

**Restore & transfer:**

Performs restore- and transfer-command. For restore, the block address specified in frame *Read / Write* is used. After pressing the button, a dialog box for entering the block address used for transfer-command is displayed.

Note: The decrement command requires a valid value block stored at the specific card address. To write a value block to the card the write command has to be used

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## 2.7.5 READ / WRITE

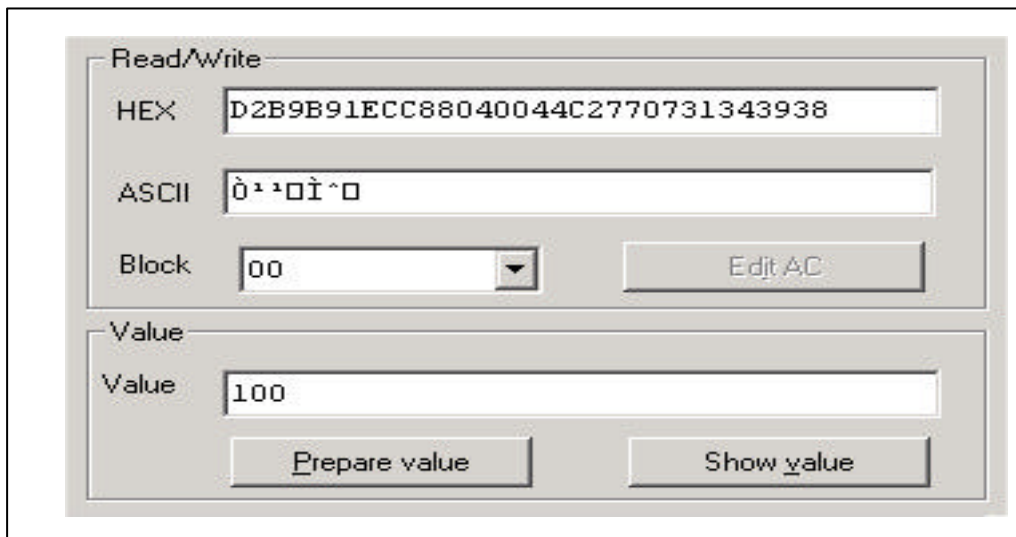


Figure 12. Read / Write

**HEX:**

This textbox displays data in hexadecimal notation and is used for input and output: enter data that shall be written to MIFARE<sup>®</sup> card before pressing the *Write* button. On the other hand, data from the card is displayed after pressing the *Read* button.

**ASCII:**

This textbox displays data in ASCII-format and is linked to textbox *HEX*: once you have changed the contents in this textbox, the content in textbox *HEX* will be changed simultaneously and vice versa.

**Block:**

Choose the block address that is used for *Read*, *Write*, *Increment*, *Decrement* and *Restore*. It is also possible to enter a block address greater than 63. To draw attention to block addresses corresponding to sector trailers, those block addresses are displayed as 4-digit-numbers.

**Edit AC:**

If *Block* contains an address of a sector trailer, this button opens a window for editing access-conditions, see 2.8.

**Value:**

This textbox displays data in decimal notation and is used for input and output.

**Prepare Value:**

The value entered in textbox *Value* is formatted as value-block and written to both *HEX* and *ASCII* fields in frame *Read / Write*.

**Button Show value:**

If data in the *HEX* field is formatted as value-format, the corresponding value is written to textbox *Value*. In case of no value format, the message 'no value format' is displayed.

2.8 Access Conditions

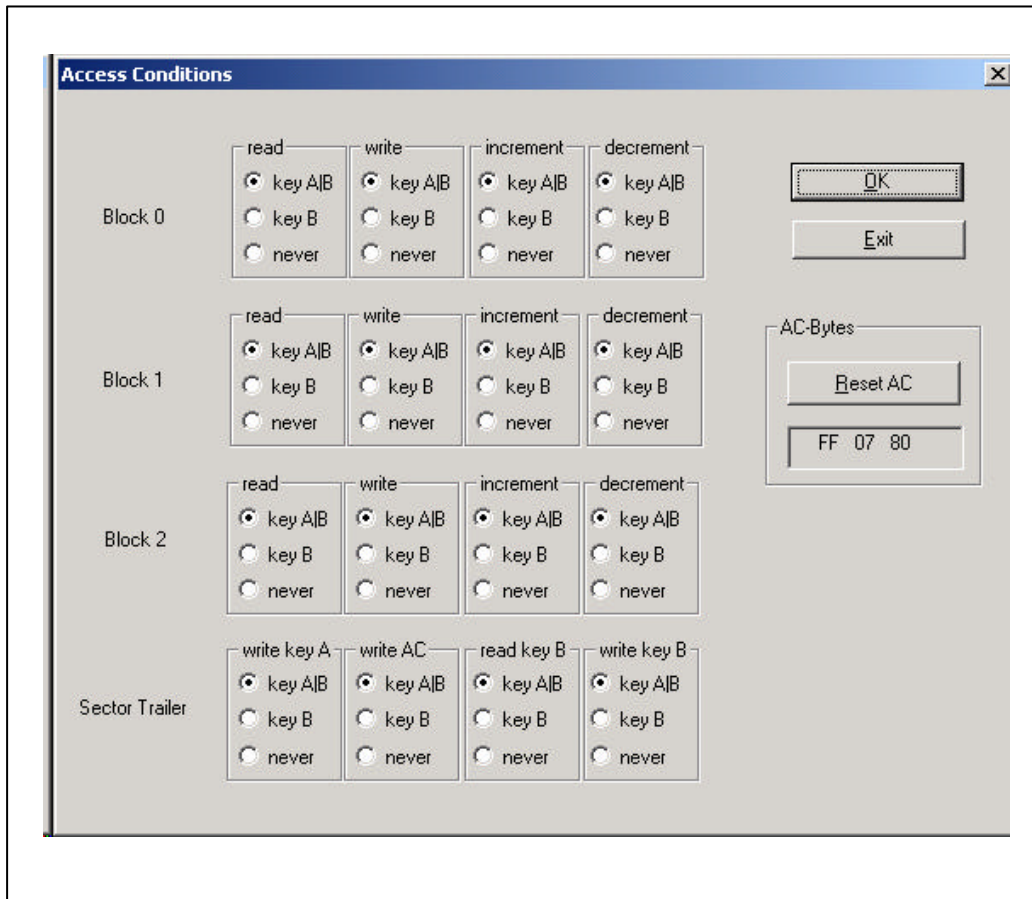


Figure 13. Access Conditions

Having selected a block address of a sector trailer and pressing the button *Edit AC*, the bytes No. 7, 8 and 9 of data displayed in textbox *HEX* are extracted and decoded into access conditions.

Change the access conditions by using the option buttons. After each change, the access conditions are coded into the 3 access condition bytes and displayed in the textbox of frame *AC bytes*.

Invalid access conditions are automatically corrected.

**Button *Reset AC*:** Resets access conditions to standard value 'FF 07 80' (i.e. everything is allowed).

**Button *OK*:** Copies the 3 access condition bytes back to data in textbox *HEX*.

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2.8.1 FRAME EXCHANGE

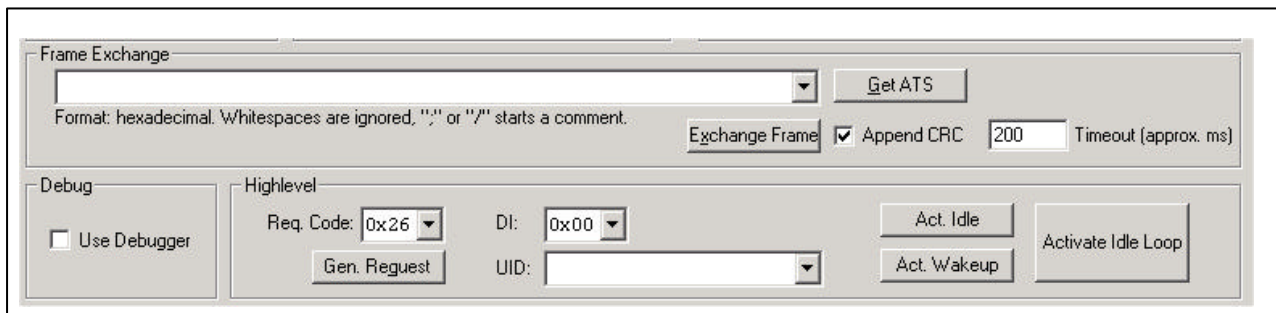


Figure 14. Frame Exchange according to ISO 14443-4

**Frame exchange:**

Enter data to exchange in hexadecimal notation. A semicolon or forward slash sign a comment line, white spaces are ignored.

**Exchange Frame:**

Performs a *Block Exchange* according to ISO14443-4 to send the data entered in the text field.

**Get ATS:**

Sends 0xE000 (ISO 14443-4 RATS).

**Append CRC:**

Enables or disables the RWD's CRC generation.

**Timeout:**

Specifies the time interval in milliseconds to wait for an answer.

**Request Code:**

Specify a *Request Code* used for a Generic Request command below. 0x26 for Request Idle, 0x52 for wake up request.

**Generic Request:**

Performs a *Request* with the *Request Code* specified in the Request Code combo box.

**DI:**

Select a Baud rate divider integer used for *Activate Idle*, *Activate Wakeup* and *Activate Idle Loop*. For coding detail see the table in chapter 3.6.2 – DSI.

**UID:**

Enter a UID used in *Activate Wakeup*. *Activate Idle* and *Activate Idle Loop* will store activated card UIDs in this combo box.

**Activate Idle:**

Performs a *Request*, *Anticollision*, and *Select* sequence to activate a card.

**Activate Wakeup:**

Performs a *Request*, *Select* using the current UID sequence to activate a card.

**Activate Idle Loop:**

Performs *Activate Idle* until a card is activated or a 5 second long timeout occurs.

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2.9 T=CL Window

The T=CL window offers commands for basic ISO 14443-4 protocol operation.

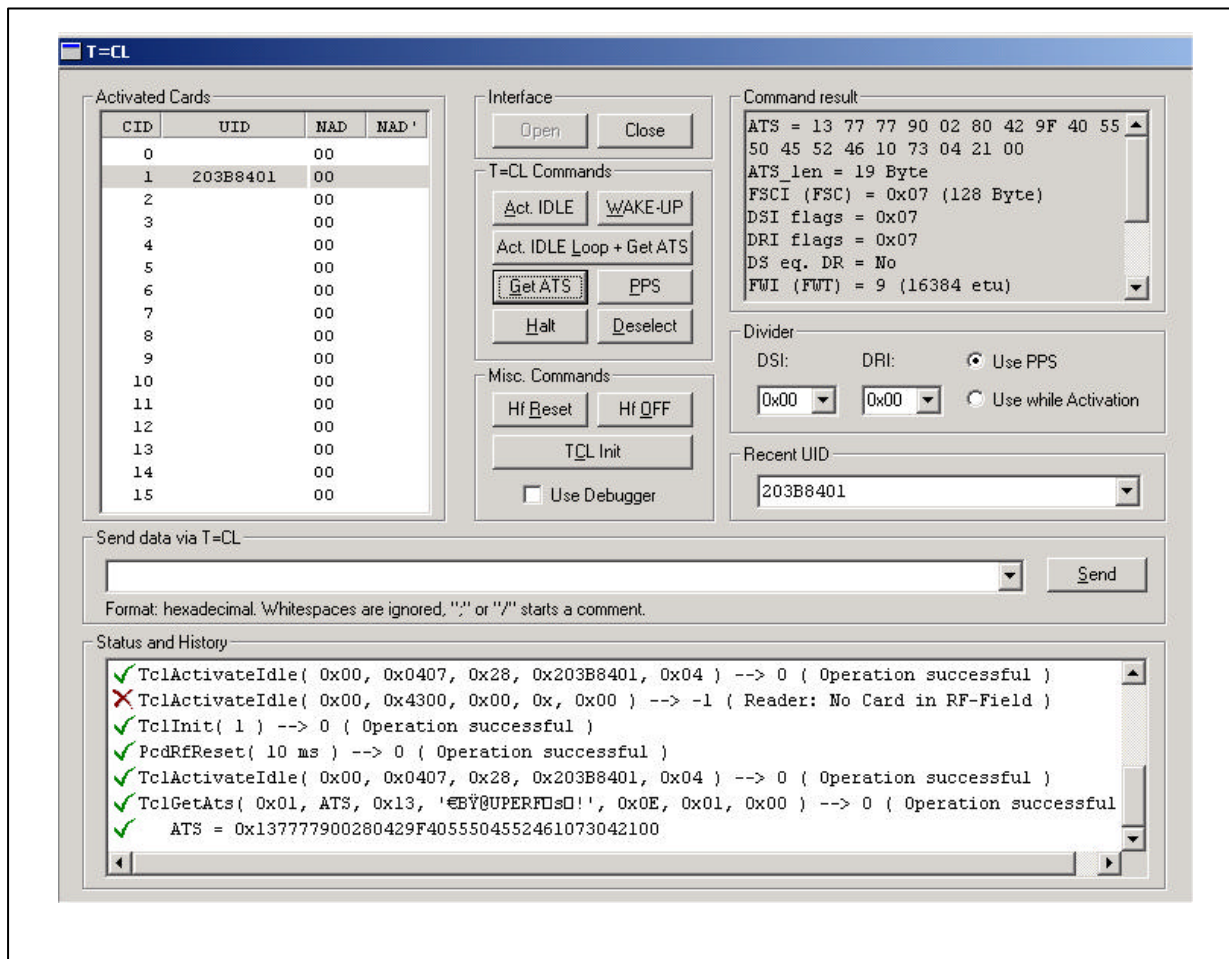


Figure 15. T=CL frame

2.9.1 INTERFACE

**Open:**

Open the port specified in *Options*→*Settings*→*I/O*. Serial port settings can be changed in *Options*→*Settings*→*Serial Port*. After successful operation, all buttons are enabled.

**Close:**

Close the hardware interface port. This command disables any button except *Open*.



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**2.9.2 MISCELLANEOUS COMMANDS****RF Reset:**

Turn the RF field off and on again. The time interval can be changed in *Options*→*Settings*→*Command Parameter*

**RF Off:**

Turn the RF field off. To turn it on again, use *RF Reset*.

**T=CL Init:**

Initialize the T=CL library. This removes any activated card from the list and resets the T=CL library.

**Use Debugger:**

Enable/disable Philips Debug client usage.

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2.9.3 ACTIVATED CARDS

This shows the list of currently activated cards. Any T=CL command uses the selected entry as CID for T=CL commands. To edit the Node Address for sending click the corresponding line.

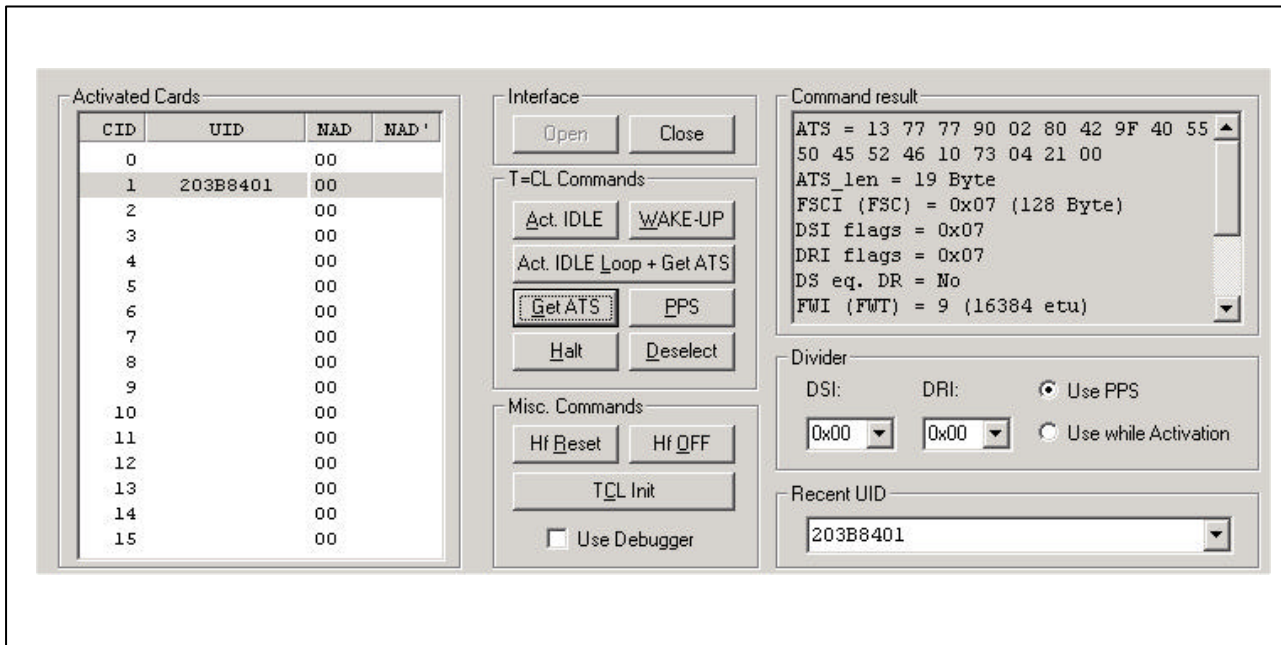


Figure 16. Activated Cards

The field *Activated Cards* shows the current activated cards.

CID defines the card identifier offering the possibility to activate several cards simultaneously.

If CID=0 no CID is used within the TCL blocks.

UID shows the UID of the current activated cards.

NAD defines the note address to be used optional within the TCL block sent to the card.

NAD' displays the last note address received from the card.

2.9.4 T=CL COMMANDS

**TCL Activate Idle:**

Performs an *Activate Idle* sequence and checks the Select Acknowledge for the presence of the ATS available bit. Activate Idle performs a *Request Idle, Anticollision, Select* command.

**TCL Activate Wakeup:**

Performs an *Activate Wakeup* sequence using the UID selected in the *Recent UID* box. Activate Wakeup performs a *Wake-Up Request, Anticollision, Select* command.

**Activate Idle Loop + Get ATS:**

Performs an *Activate Idle Loop* and *Get ATS* sequence. The *Activate Idle Loop* timeout is 5 seconds. To assign a specific CID select the corresponding entry in the *Activated Cards* lists.

Activate Idle Loop + Get ATS performs a *Request Idle, Anticollision, Select* and *RATS* command.

**Get ATS:**

Performs the *RATS* (Request for Answer to Select) – *ATS* (Answer to Select) Exchange and parses the ATS. To assign a specific CID select the corresponding entry in the *Activated Cards* lists.

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**PPS:**

Protocol and Parameter Selection.

Performs the PPS Exchange sequence using *DRI* and *DSI* as selected in the *Divider* frame.

RWD Baud rate Dividers are set for each T=CL command. Therefore it is not necessary to set the Dividers using *Set Attrib* in the Mifare window.

**Halt:**

Perform an ISO14443 –3 Halt command.

**Deselect:**

Perform an ISO 14443-4 Deselect sequence.

**2.9.5 COMMAND RESULT**

Shows information about for *Activate Idle*, *Activate Wakeup*, *Activate Idle Loop + Get ATS*, *Get ATS* and *Send* command results.

**2.9.6 DIVIDER****DSI:**

Divider Send Integer as defined in ISO 14443-4. Select the Baud rate at which a card will send data to the RWD. For the coding table see chapter 3.6.2 – DSI.

**DRI:**

Divider Receive Integer as defined in ISO 14443-4. Select the Baud rate at which a card will receive data from the RWD. For the coding table see chapter 3.6.2 – DSI.

**Use PPS/Activation:**

Select whether to use the *PPS* command or to activate the card at higher Baud rates.

Selecting to activate a card at a higher Baud rate disables the *DSI* field since activation at higher Baud rates sets both DSI and DRI.

Choosing PPS activates a card with divider 0 (106 kBd).

**2.9.7 RECENT UID**

Any successful activated card is listed in this field. *Wakeup* uses the UID selected in field.

**2.9.8 SEND DATA**

Exchange data via T=CL protocol. Data to send is taken from the text field and is assumed as hexadecimal notation. A semicolon or forward slash start a comment, white spaces are ignored.

**Send:**

Perform a T=CL exchange sequence.

**History:**

All commands are logged into this window. To select whether to append or insert lines see *Options*→*Settings*→*Miscellaneous*→*History window*.

2.10 Contact Window

The Contact Window offers commands to work with contact based cards.

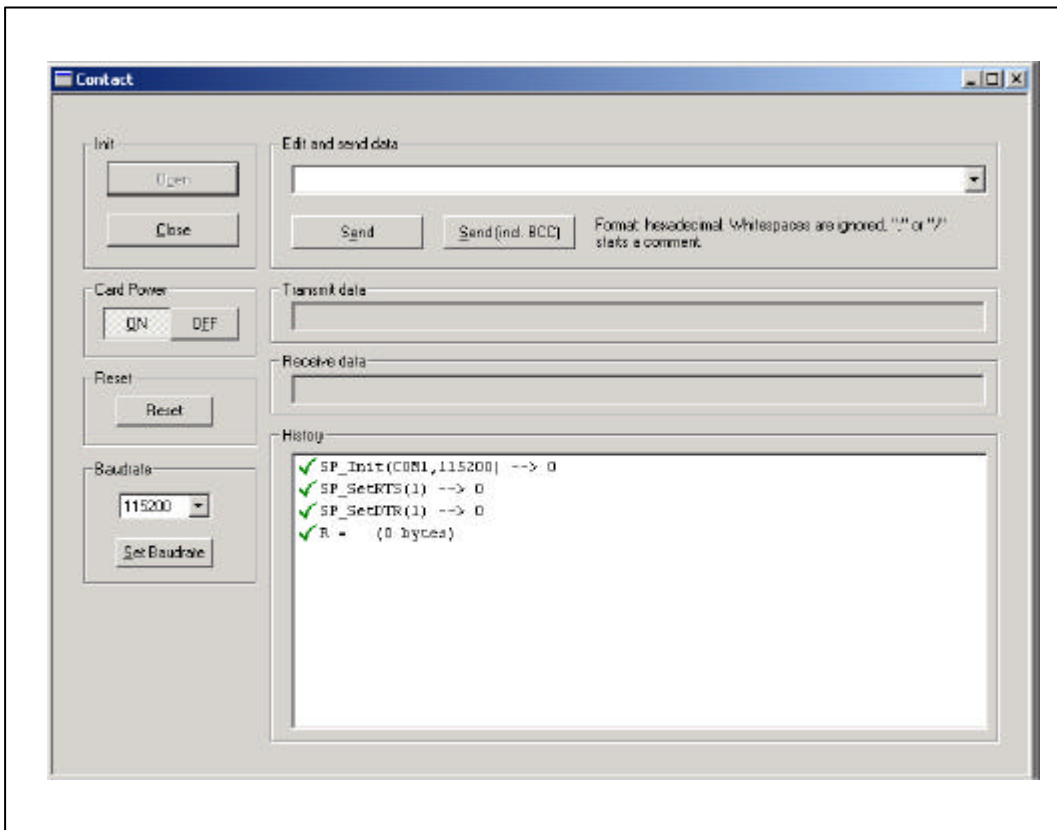


Figure 17. Contact Window

**Open:**

Open the serial port specified in *Options*→*Settings*→*Serial Port*. After successful operation, all buttons are enabled.

Note that only the *Port* and *Baud rate* settings apply. Any other option is ignored.

**Close:**

Close the serial port. This command disables any button except *Open*.

**Card Power:**

Turn card power on or off by setting or clearing RTS and DTR lines.

**Reset:**

Reset a card by clearing and setting the DTR line.

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**Baud rate:**

Change the serial ports current Baud rate.

**Edit and Send Data:**

Enter data to send in hexadecimal notation, white spaces are ignored.

**Send:**

Send data 'as is'.

**Send incl. BCC:**

Send data and append a check byte. The check byte is the result from XORing all data bytes.

**Transmit data:**

Displays transmitted data.

**Receive data:**

Displays received data

**History:**

All commands are logged into this window. To select whether to append or insert lines see *Options*→>*Settings*→>*Miscellaneous*→>*History window*.

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**3 HOW TO ...****3.1 Initialize the RWD**

- Select RWD, port and address in *Options*→*Settings*→*I/O*
- For a RWD attached to the serial port choose a COM port and a Baud rate in *Options*→*Settings*→*Serial Port*.

Please note that any parameter except the *Port* and *Baud rate* settings are ignored.

- Check command parameters (*Options*→*Settings*→*Command parameters*): Set *Start. Keynr.* to '0' and *end. Keynr.* to '15' to load all keys to desired keyset.
- Check value of keys (*Options*→*Settings*→*Keys + Keysets*)
- Click button *Open Port*
- Click button *Load Keys*  
→ keys are loaded to RWD

**3.2 Read MIFARE<sup>®</sup> data**

- Select block address in combo box *Block*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Read*  
→ 16 bytes data are displayed in textboxes *HEX* and *ASCII*

**3.3 Write MIFARE<sup>®</sup> data**

- Select block address in combo box *Block*
- Enter desired data in textbox *HEX* or *ASCII*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Write*  
→ 16 bytes data is written to desired block

**3.4 Increment / decrement (MIFARE<sup>®</sup> STD.)**

Example: Value of 100 stored in block 01 shall be decreased by 5 and transferred to block 02.

- Check command parameters (*Options*→*Settings*→*Command parameters*): Select value format *MIFARE<sup>®</sup> Standard*.
- Select block address '01' in combo box *Block*
- Enter value '100' in textbox *Value*

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- Click button *Prepare value*  
→ '640000009BFFFFFF64000000FF00FF' is automatically written to textbox *HEX*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Write*  
→ value block is written to block 01
- Enter value '5' in textbox *Value*
- Click button *Decr. & transfer*  
→ the dialog box suggests block address 01 for transfer operation
- Enter value '02' in textbox *Transfer to block* and click button *OK*  
→ decrement- and transfer-commands are performed

Check operation by reading block 02:

- Select block address '02' in combo box *Block*
- Click button *Read*  
® '5F000000A0FFFFFF5F000000FF00FF' is displayed in textbox *HEX*.
- Click button *Show value*  
→ textbox *Value* displays '95'

For incrementing or restoring value blocks use the same procedure. You just have to click *Incr. & transfer* or *Restore & transfer* instead of *Decr. & Transfer*.

### 3.5 Change access conditions

Example: Change access conditions of sector 01.

For this purpose you have to read block 07, modify it and write it back.

- Select block address '07' in combo box *Block*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Read*  
→ 16 bytes data are displayed in textboxes *HEX* and *ASCII*
- Click button *Edit AC*  
→ window *Access Conditions* is opened
- Edit access conditions to desired functionality
- Click button *OK*  
→ window *Access Conditions* is closed and access condition bytes are copied to data in textbox *HEX*

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Note:

Key A is never readable and Key B only in some cases. Therefore you have to insert the keys in textbox *HEX* at the proper location before writing back data to block 07.

For example, the data '000000000000FF078069000000000000' may be displayed. Assuming 'A0A1A2A3A4A5' as Key A and 'B0B1B2B3B4B5' as Key B you have to edit data into 'A0A1A2A3A4A5FF078069B0B1B2B3B4B5'

Note: Writing 'bad' data to sector trailer results in irreversible loss of this sector!

- Click button *Write*  
→ 16 byte data are written to sector trailer

### 3.6 Change keys in one sector of a MIFARE<sup>®</sup> card

Example: Change keys of sector 02

For this purpose you have to read block 11, modify it and write it back.

- Select block address '11' in combo box *Block*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Read*  
→ 16 bytes data are displayed in textboxes *HEX* and *ASCII*
- Edit data: key A is represented by the first 6 bytes (first 12 hexadecimal digits) and key B by the last 6 bytes (last 12 hexadecimal digits)

Note: Writing 'bad' data to sector trailer results in irreversible loss of this sector!

- Click button *Write*  
→ 16 byte data are written to sector trailer

### 3.7 Load one key to RWD

Once you have changed keys in the card, you may also change the corresponding keys in the RWD to access the card again.

Example: Load key 'AABBCCDDEEFF' to Sector 02 / Key B / Keyset 1



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- Select *Options*→*Settings*→*Keys + Keysets*
- Enter desired key in *Available Keys* list.
- Select *Keyset 1*
- Select the third key in the *Key B* list.
- Click *Set selected keys*.
- Select the *Command Parameter* tab.
- Select frame *Load keys*, option *Keyset 1*, *Start. Keynr.* '02', *End. Keynr.* '02'
- Click button *OK*
- Click button *Load key* in main window  
→ key A and key B are written to the RWD at keyaddress 02 / Keyset 1.

Notes: *Start.keynr.* and *End. keynr.* are used as parameters for a loop.

With this software it is not possible to load only Key A or Key B into the specified keyaddress of the RWD.

### 3.8 Decode and encode access condition bytes

With a trick you can decode and encode access condition bytes without having any card in the field.

Example: Decode access condition bytes 'EE 18 71'

- Edit hexadecimal data in frame *HEX*: insert 'EE1871' beginning from digit no. 13 (corresponding to byte no. 7 of sector trailer)
- Select block address corresponding to any sector trailer, e.g. '0003', to enable the button *Edit AC*
- Click button *Edit AC*  
→ window *Access Conditions* is opened that shows the decoded access conditions
- Edit access conditions to desired functionality. Once you change the access conditions, the frame *AC bytes* shows the corresponding bytes

### 3.9 Read data (MIFARE<sup>®</sup> LIGHT)

Example: Read 8 bytes data from pages 2 and 3

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- Select page address '02' or '03' in combo box *Block*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Read*
- 16 bytes data are displayed in textboxes *HEX* and *ASCII*

Note: 8 bytes of data are shown twice.

You can either select page address 2 or 3 to read 8 bytes from page 2 and 3.

### 3.10 Write data (MIFARE<sup>®</sup> LIGHT)

Example: Write 4 bytes to page 2

- Select page address '02' in combo box *Block*
- Enter desired data in textbox *HEX* or *ASCII*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Write*  
→ 4 bytes data is written to desired block

Note: Only the first 4 bytes are relevant. The other 12 bytes are dummy bytes.

### 3.11 Decrement (MIFARE<sup>®</sup> LIGHT)

Example: Value of 100 stored in page 4 shall be decreased by 98.

- Check command parameters (*Options*→*Settings*→*Command parameters*): Select value format *MIFARE<sup>®</sup> Light*.
- Select block address '04' in combo box *Block*
- Enter value '100' in textbox *Value*
- Click button *Prepare value*  
→ '64009BFF' is automatically written to textbox *HEX*
- Click buttons *Request*, *Anticollision*, *Select*, *Authentication* and *Write*  
→ value block is written to page 4
- Enter value '98' in textbox *Value*
- Select block address '04' in combo box *Block*

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- Click button *Decr. & transfer*  
→ decrement-command including hardware backup management is performed

Check operation by reading page 4 and 5:

- Select block address '04' or '05' in combo box *Block*
- Click button *Read*  
® 'FFFFFFFF0200FDFFFFFFFFFFFFFFFF0200FDFF' is displayed in textbox *HEX*.
- Delete the first eight 'F' - digits to erase data of the invalid value block
- Now you can click the button *Show value*  
→ textbox *Value* displays '95'

Interpretation: The original value stored in page 4 was decreased and transferred to page 5. Now, page 5 contains the new value 0002 hex (2 decimal) and the original value was erased automatically. Therefore page 4 contains an invalid value format.

### 3.12 Decrement (MIFARE<sup>®</sup> PLUS / PRO)

Depending on the configuration programmed in the access condition matrix ACM either Decrement & transfer or Decrement with automatic backup management is applicable.

- Perform decrement sequence described in chapter 4.4
- In the Transfer dialog popping up after clicking *Decrement & Transfer* select whether to use automatic backup management or not. Selecting automatic backup management disables the manual transfer address selection.

## 4 REVISION HISTORY

REVISION	DATE	CPCN	PAGE	DESCRIPTION
1.0	November	-	37	first published version

Table 4-1: Document Revision History

## Definitions

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
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