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MEMORY CARD MANUAL FOR SPECTRUM III HYBRID MAGSTRIPE/SMART CARD READER/WRITER

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Hybrid MSR and Smart Card Reader/Writer Users Manual

The intent of this manual is to be used as a guide for interfacing with ID TECH's family of Intelligent Hybrid Insert readers. These readers are designated Spectrum readers. If one is programming a PC/SC reader, for the most part, it will be unnecessary to know the details of the communication between the PC and the reader. The standard PC/SC interface is briefly described in this document. If one has already programmed a PC/SC reader into your application and you now wish to change readers perhaps to add triple track magnetic stripe reading or memory cards then one should study the interface to the ID TECH provided hybrid reader DLL. This should allow easy integration of these features into your application. If your application currently supports a magnetic stripe reader using an OPOS driver you should be able to immediately access the magnetic stripe data and you may add of smart card access features through PC/SC.

1. INTRODUCTION – SMART CARD READER/WRITER

ID TECH's Intelligent Hybrid Insert Reader supports both magnetic stripe card reading, and smart cards or IC cards. The reader will either communicate with the host using RS232 or USB. The reader communicates with the host through an RS232 port using a generic protocol. The USB reader communicates with a USB driver running on a Windows PC. The following sections define the required protocols for communicating with, and performing operations to an IC card. Check with your ID TECH® representative for information on the types of IC cards supported.

If the reader is to be used in PC/SC mode much of the material in this manual is unnecessary because the PC/SC driver converts the PC/SC commands to the commands used natively by the reader. This makes it very convenient for the programmer to develop an application not knowing which reader will be used. The PC/SC interface only defines T=0 and T=1 microprocessor interface cards. For functions that access the other features of the reader beyond these cards such as magnetic stripe reading, latching, memory cards and SAM support PC/SC interfaces supports these functions with Vendor specific calls. A DLL is available that aids the programmer in interfacing to these functions.

This document also describes the PC/SC programming and sample programs that shows how to access the features. These sample programs are available on request.

The PC/SC driver supports Windows 2000 and Windows XP (32 bit only).

DEFINITIONS AND APPLICABLE DOCUMENTS

1.1. Definitions

All numeric characters are presented in Hexadecimal.

ASCII	American Standard Characters for Information Exchange
ATR	Answer To Reset—the power on response from a ICC
Asynchronous card	a microprocessor ICC, that follows ISO7816-3
EMV	Europay-MasterCard-Visa—Financial transaction certification
Host	The Personal Computer to which the reader is attached.
IFD	Interface Device—this is how ISO 7816 refers to the reader.
ICC	Integrated Circuit Card
LRC	Longitudinal Redundancy Check
Microprocessor card	Either T=0 or T=1 asynchronous card
Memory card	An ICC, commands supported vary by manufacturer, generally simpler and less expensive than microprocessor cards.
MSR	Magnetic Stripe Reader
PC/SC or PCSC	Personal Computer/Smart Card interface, an industry standard
PSC	Programmable Security Code
RS232	Reference Standard serial communication
SAM	Secure Application Module also called Secure Access Module.
Smart Card	ICC, includes both memory and microprocessor cards
Synchronous card	see Memory card.
USB	Universal Serial Bus—a high speed connection to the host that also provides the reader with power
Transport code	A password used between the ICC manufacturer and the card initialization company.

2. PC/SC GENERAL DESCRIPTION

2.1. Operation

The ID Tech Hybrid Reader is easy to operate. Make sure the reader is properly connected and receiving sufficient power. The green LED will indicate that it is ready to read (if the LED is in reader control mode).

2.1.1. Smart Card Access

To read a smart card, just following these simple steps:

- Insert the smart card into the reader as far as it will go.
- Use smart card commands to communicate with reader after the card has been inserted all the way.

3. TRANSMISSION PROTOCOL FOR ICC CARDS

Following are the command/response protocols for communication between the hybrid reader (ICC media) and host. The protocol used by this reader is turbo TLP-224. All commands and characters are presented in 'Hex'. Note: Maximum buffer size for read is 256 bytes and for write is 255 bytes.

3.1. Example of LRC Calculation

LRC = Longitudinal Redundancy Check. Calculated by taking 'Exclusive OR' (Modulus 2) of all characters preceding it, total with LRC is equal to zero.

Example: Calculation of the LRC character

The following command means read 16 bytes of data from address 0000:

```
60 00 06 42 DA B0 00 00 10 5E 03
```

3.2. Successful Command

Host to Hybrid Reader

60	*XX*	*nnnnnnnnnnnnnnnnnnn*	*ZZ*	03
ACK	length	data(C-APDU)	LRC	03

Hybrid Reader to Host

60	*UU*	*nnnnnnnnnnnnnnnnnnn*	*SS*	*ZZ*	03
ACK	length	data(R-APDU)	Status	LRC	03

3.3. Unsuccessful Command

Host to Hybrid Reader

60	*XX*	*nnnnnnnnnnnnnnnnnnn*	*ZZ*	03
ACK	length	data(C-APDU)	LRC	03

Hybrid Reader to Host

E0	*UU*	*nnnnnnnnnnnnnnnnnnn*	*SS*	*ZZ*	03
NACK	length	data(R-APDU)	Status	LRC	03

Or

E0	02	*SS*	*ZZ*	03
NACK	Length	Status	LRC	03

The status either defines a successful transaction or gives an error code (see Table 2 – Response Code Summary and Explanation page 15).

3.4. Command Summaries

Table 1 – Memory Smart Card Command Summary			
ASCII	**HEX**	**Name**	**Use**
'B'	42	Communicate with memory card	Accessing, reading and writing memory cards
'M'	4D	ICC Power OFF	Power off microprocessor card
'n'	6E	ICC Power ON	Power on microprocessor card, return ATR

3.5. IC Command Descriptions

All IC reader commands follow the Turbo TLP-224 protocol and use the ISO 7816-4 Application Protocol Data Unit (APDU) or 7816-3 Transport Protocol Data Unit (TPDU) structure to communicate with the IC card.

IC Reader Memory Card Command Structure:

`60` <length> `42` <Command> `LRC 03`

This command is used to perform an operation on a memory card.

Definition of Commands:

<CLA>	ISO Class byte
<INS>	ISO instruction code
<P1>	ISO Parameter 1, usage varies with commands
<P2>	ISO Parameter 2, usage varies with commands
<Lc>	The number of bytes present in the data field of the command APDU
<Le>	The maximum number of bytes expected in the data field of the response APDU.
<P3>	ISO Parameter 3, length of data Lc or maximum length of expected reply Le
<Data>	Data to send, varies with commands
<NAD>	ISO Node Address always 0 for T=1 protocol
<PCB>	ISO Protocol Control Byte for T=1 protocol
<LEN>	Length byte for T=1 protocol
<INF>	Information field for T=1 protocol
<EDC>	Error detection code of the block, only LRC is supported.

Response Structure:
<Data>(Optional)<SW1 SW2>

<Data>	Response data usually Le bytes if operation was successful
<SW1>	Status byte 1
<SW2>	Status byte 2

3.5.1. Set Card Option [53 10]

`60 00 04 53 10 01` <*Setting*> `LRC 03`

Note: A single byte setting is defined as follows.

Bit Position	'0'	'1'
0~2	Unused	
5	**1.8V Off**	1.8V On
4	**EMV Card**	ISO Card
5	**3V Off**	3V On
6	**5V On**	5V Off
7	**Microprocessor Card**	Memory Card

EMV card is subject to do all the check described on EMV 3.1.1 specification, and the card follows the specification. It is only applicable to microprocessor cards, this manual is for memory cards.

On power up a microprocessor card with both 3V and 5V option are "On". The reader will try 3V first then if it fails it will try 5V.

On memory cards only the lowest voltage will be used if more than one memory card voltage is selected. Only 3V will be used on a memory card if both 3V and 5V options are "On".

Example: `60 00 04 53 10 01 80 A6 03` 5V memory card

Response is as follows:

`60 00 02` < *Return Status (2 bytes)*> `LRC 03`

`Example: 60 00 02 90 00 F2 03` command completed successfully

3.5.2. Set Memory Card Type [53 12]

`60 00 04 53 12 01` <*Setting*> `LRC 03`

Note: A single byte setting is defined as follows.

00	**3-byte I^2C memory card**
01	4-byte I^2C memory card
02	SLE4428 and SLE4418 cards
03	SLE4442 and SLE4432 cards
04	GPM276 card
05	GPM271 card
06	SLE4404 and AT88SC101 cards
07	SLE4406, SLE4436, SLE5536 card

Example: `60 00 04 53 12 01 00 24 03` 4-byte I^2C memory card

Response is as follows:

`60 00 02` <*Return Status (2 bytes)*> `LRC 03`

`Example: 60 00 02 90 00 F2 03` command completed successfully

3.5.3. Power On Command [6E]

`60 00 <Length> 6E [<Option>] [<PPS>] LRC 03`

The power on command is generally used to get the ATR from a microprocessor card. Memory cards do not require a power on command because the card is automatically powered on as it is accessed, but a few memory cards support ATR like responses. For the cards that do not support ATR like responses the reader defaults to returning the first 4 bytes of the data from the card. The power on command has optional parameters but these are useful only for microprocessor cards.

Response is as follows:
60 00 <*ATR Length*> <*ATR string*> `LRC 03`
Example: `60 00 15 3B 6F 00 00 80 25 A0 00 00 00 68 54 08 00 0B 00 82 90 00 90 00 99 03`

3.5.4. Power Off Command [4D]

`60 00 01 4D 2C 03`
This command is used to power down the current selected card. It works for any type of card.

Response is as follows:
`60 00 02 90 00 F2 03`command completed successfully

3.6. Memory Card Commands

3.6.1. General

Memory card commands consist of the memory command identifier ('B' or 42h) and an ISO APDU. The reader interprets the command based on current selected memory card type and performs the requested operation. The reader returns ISO7816 status (SW1, SW2) after finishing the operation.

Following are the memory commands that are supported:

3.6.2. Verify Programmable Security Code (PSC) [42 DA 20]

`60` <length> `42 DA 20` <P1> <P2> <PSC length> <PSC> `LRC 03`
For SLE4428 and SLE4442 card, P1 and P2 are `00`.
For AT88SC101 card, P1 is the count of consecutive unsuccessful attempts allowed before further attempts should be denied. P2 is the byte address of the Password on the card.
For SLE4406 card, P1 is 0 and P2 is a new value for error counter, must have at least one more bit of zeros than before for success.

For SLE4428 card, the PSC is 2 bytes long. For SLE4442 and SLE4406 card, the PSC is 3 bytes long.

'Length' is a two byte counter, which indicates length of data from 20 to end of PSC. The most significant byte comes first.

Many operations on the card are blocked until a correct PSC has been presented.

This command is used to verify the programmable Security Code. Each failed attempt writes one more bit of the Error Counter to zero. When all bits are zero, the PSC will be no longer accessible. This means the card is dead.

Response is as follows:
`60 00 02` *Return Status* `LRC 03`

3.6.3. Authenticate [42 DA 88]

`60 00 length 42 DA 88` key m <challenge length> challenge `LRC 03`
This command is for SLE4406 card only.
The authenticate command is used to read a card authentication certificate from a SLE4406 card, where:
Key to be used for the computation of the authentication certificate:

<00> key 1 with no cipher block chaining
<01> key 2 with no cipher block chaining
<80> key 1 with cipher block chaining (SLE5536 only)
<81> key 2 with cipher block chaining (SLE5536 only)

m is number of clk pulses for each bit of authentication data compute by the card.

3.6.4. Read Binary [42 DA B0]

`60 00 06 42 DA B0` <Addr_h> <Addr_l> <Length> `LRC 03`
The read binary command is used to read data from the card, where:
'Addr_h, Addr_l' indicates the address where data should be read.
'Addr_h' indicates high byte of the 2 bytes address.
'Addr_l' indicates low byte of the 2 bytes address.
'Length' indicates length of data to be read from the card.

3.6.5. Read Binary with Protection Bit [42 DA C2]

`60 00 06 42 DA C2` <Addr_h> <Addr_l> <Length> `LRC 03`

Note: This command is for SLE4428 card only.

The read binary with protection bit command is used to read data and its status from the card, where:

'Addr_h, Addr_l' indicates the address where data should be read.

'Addr_h' indicates high byte of the 2 bytes address.

'Addr_l' indicates low byte of the 2 bytes address.

'Length' indicates length of data to be read from the card.

This command returns even bytes of data (less than <length>). A 'two byte' set is returned for each byte in the card, the first byte is card data, and the second byte is protection bit. '0' in protection bit means "prohibit further write", and '1' in protection bit means "allow further write".

3.6.6. Read Protection Bit [42 DA B1]

60 00 06 42 DA B1 00 00 04 4B 03

Note: This command is for SLE4442 card only.

The read protection bit command is used to read 32 protection bits:

'0' in protection bit means "prohibit further write", and '1' in protection bit means "allow further write" on corresponding protection memory.

3.6.7. Read Security Memory [42 DA B2]

60 00 06 42 DA B2 00 00 04 48 03

Note: This command is for SLE4442 card only.

The read security memory command is used to read 4 bytes of security memory:

PSC will be returned as 00 before successfully verifying PSC.

3.6.8. Write Binary [42 DA D0]

60 <Command Length (2 bytes)> 42 DA D0 <Addr_h> <Addr_l> <Data Length> <Data> LRC 03

The write binary command is used to write data to the card, where:

'Addr_h, Addr_l' indicates the address where data should be written.

'Addr_h' indicates high byte of the 2-byte address.

'Addr_l' indicates low byte of the 2-byte address.

'Data Length' indicates length of data to be written to the card.

'Data' indicates data to be written to the card.

'Command Length' is a two-byte counter, which indicates length of command from 42 to the end of <Data>. The most significant byte comes first.

3.6.9. Write Binary with Protection Bit [42 DA C1]

`60 <`Command Length (2 bytes)> `42 DA C1` <Addr_h> <Addr_l> <Data Length> <Data> `LRC 03`

Note: This command is for SLE4428 and SLE4442 card only.

The write binary with protection bit command is used to write data to the card and prohibit further writing to the specified addresses, where:

'Addr_h, Addr_l' indicates the address where data should be written.

'Addr_h' indicates high byte of the 2-byte address.

'Addr_l' indicates low byte of the 2-byte address.

'Data Length' indicates length of data to be written to the card.

'Data' indicates data to be written to the card.

'Command Length' is a two-byte counter, which indicates length of command from 42 to the end of <data>. The most significant byte comes first.

3.6.10. Write Security Memory [42 DA D1]

`60` <Command Length)<two bytes> `42 DA D1 00` <Addr> <Data Length> <Data> `LRC 03`

Note: This command is SLE4442 card only.

The write binary with protection bit command is used to write data to the card and prohibit further writing to the specified addresses, where:

'Addr' indicates address where data should be written.

'Data Length' indicates length of data to be written to the card.

'Data' indicates security data to be written to the card.

'Command Length' is a two-byte counter, which indicates length of command from 42 through end of <Data>. The most significant byte comes first.

This command will be executed only if PSC has been successfully verified before.

3.6.11. Erase Command [42 DA 0E]

`60 00 06 42 DA 0E 00` <*Addr*> <*Data Length*> `LRC 03`

Note: This command is for GPM271, GPM276 and AT88SC101 card.

A successful (90 00) return status does not mean data was erased. The user should read them after erase operation to determine if erase was effective.

The erase command is used to erase data at the specified address.
Where:

'Addr' indicates address where data should be erased.

'Data Length' indicates length of data to be erased on the card.

3.6.12. Decrease Counter Command [42 DA DC]

`60 00 06 42 DA DC 00 P2 P3 LRC 03`

Note: This command is for the GPM271, GPM276 and SLE4436 card types only.

P2 and P3 must be 0 for GPM271 and GPM276 card. The decrease counter is used to decrease one count on the GPM271 and GPM 276 card types.

P2 and P3 are count to be decreased on SLE4436 card, P2 is higher byte.

3.6.13. Restore Counter Command [42 DA D4]

`60 00 06 42 DA D4 00 00 00 2A 03`

Note: This command is for the GPM271 and GPM276 card types only.

The restore counter command is used to restore counter on the GPM 271 and GPM 276 card types when the pull out flag is on.

3.6.14. C4 Control Command [42 DA D4]

`60 00 06 42 DA C4 <Value> 00 00 LRC 03`

Note: This command is for SLE4404 or AT88SC101 card type only.

This command is used to control the state of the C4 line and blowing fuses.

'Values' indicates the C4 status. <01> will set C4 to high, and <00> will set C4 to low state.

3.6.15. Fuse Command [42 DA D4]

`60 00 06 42 DA C4 FE <Byte_Addr> <Bit_Addr> LRC 03`

Note: This command is for SLE4404 or AT88SC101 card type only.

This command is used to blown a fuse.
<Byte_Addr>, <Bit_Addr> indicates byte and bit address a fuse bit to be brown.

3.7. Return Status and Explanation

Table 2 – Response Code Summary and Explanation	
Code	Definition
C0 xx	Magnetic Card Data with envelop
B0 0x	Card insert Notification
90 0x	Operation completed successfully (All Operations)
8C 0x	TCK error
8B 0x	Unsupported TAx, TBx, TCx, TDx
89 0x	ATR too long
88 0x	Power not ready for T=0 microprocessor card
87 0x	Protocol not supported by the reader
86 0x	Unsupported Fi or Di in PPS
85 0x	PPS confirmation error
84 0x	Parity error in reception
83 0x	Parity Error in transmission
82 0x	Unknown TS
81 0x	Time out
80 15	Not enough counter to decrease for SLE4406 card
80 13	SLE4406 parameter error
6E 00	CLA not supported
6D 0x	INS not supported
69 0x	Command not supported
67 0x	Warning, Value read is different from value written
66 88	Invalid PSC presented
66 87	No more retries
66 86	No more counter to decrease
2F 0x	Fault alarm received
2D 0x	Memory card not supported
2C 0x	Card not present
2B 0x	Address not supported
2A 0x	Command received correctly, but could not complete
00 79	Driver reported time out error

See Sp3_return_status.doc for a full list of error responses. Fault alarm will be reported if removing an IC card with power on or supply voltage drop, short circuit, overheating has been detected.

4. DIALOG STRUCTURE

This section defines the command format for communicating with the Spectrum III reader, and for changing the default setup configuration.

For sending Setup Commands from the application program to the Spectrum III reader, the serial communication parameter default setting is 38400, None, 8, 1. Setup commands include the Sending Commands that change the reader configuration settings and Receiving Command that retrieve the current reader configuration settings to the application program.

4.1. Turbo TLP-224 protocol is Used When Sending Setup Commands.

4.1.1. Sending Command

`60` <Length> `53` [<FuncID> <Len> <FuncData>…] `LRC 03`

Where:

<Length> = is a two-byte counter from 53 to the end of <FuncData>.

<FuncID> = is a one byte Function ID, which identifies the particular function or settings affected

<Len> = is a one-byte length count for the data block "<FuncData>"

<FuncData> = is the data block for the function

4.1.2. Receiving Command

60 <Length> 52 <FuncID> LRC 03

Where:

<Length> = is a two-byte counter from 52 to the end of <FuncData>.

<FuncID> = is a one byte Function ID which identifies the particular function or settings affected

<Len> = is a one-byte length count for the data block "<FuncData>"

<FuncData> = is the data block for the function 03 = 03

The overall LRC (Modulus 2 = Exclusive OR) checksum (from `60` to LRC) should be zero. See 3.1. Example of LRC Calculation page 7.

4.2. Receiving Command Description

All reader Receiving Commands are listed in the following format: `60 00 02 52` <*FuncID*> `LRC 03`

4.2.1. Retrieve Current Settings [52 1F]

60 00 02 52 1F 2F 03

This command does not have any <FuncData>. It retrieves all current settings. The Spectrum 3 reader sends back an <ACK> and <Response>.

<Response> format:
The current setting data block is a collection of many Function-Setting blocks <FuncSETBLOCK> as follows:
`60` <*Length*> <*FuncSETBLOCK1*>…<*FuncSETBLOCKn*> `LRC 03`

Each Function-Setting block <FuncSETBLOCK> has the following format:
<*FuncID*> <*Len*> <*FuncData*>

Where:
<Length> is a two bytes counter, which indicates bytes of all <FuncSETBLOCK>. The most significant byte comes first.
<FuncID> is a one byte Function ID identifies the setting(s) for the function.
<Len> is a one-byte length count for the following function-setting block <FuncData>.
<FuncData> is the current setting for this function. It has the same format as in the Sending Command for this function. See SENDING COMMAND LIST for details.
<FuncSETBLOCK> are in the order of their function ID <FuncID>.

5. HYBRID READER DEMO SOFTWARE

5.1. General Description

There are three demonstration programs depending on whether the reader is operated in PC/SC mode or not. The first is called Demo@ and should be used when the reader is not operated in PnP mode, which enables PC/SC mode. The second is the PC/SC Visual C++ Demonstration Program and the third is the PC/SC Visual Basic Demo Program. These programs not only demonstrate how the reader functions, they also are sample code that can be used to develop an application to integrate the Spectrum 3 into a system.

5.2. Demo Program Non-PC/SC

ID TECH has written a software program that allows the user to perform simple read operations with both smart and magnetic cards, and write to the smart card. This software program reads commands from a pre-defined test script, line by line, and displays the command with notes on the screen. It then converts the command into a complete command string and sends it to the hybrid reader unit being tested.

In the smart card script, every line that starts with a TAB is a command line. The command line must be in the same format as defined in section 3.5 IC Command Descriptions page 8, without 60, length, 03 and LRC elements. Every line that not starting with a TAB is a "comment" line. Text notes may be put before a command line.

The test command and notes can also be input via the keyboard. 60, length, 03 and LRC will be added to command automatically.

For the user's interface and in the log file, each non-printable character will be represented by a backslash followed by two hex numbers, for example, `\07`, and `\E3`.

For evaluation and test purpose, the ID TECH Hybrid Reader ships with demonstration software and a test card. These can be used to change the reader's operational parameter and ensure that it is working correctly.

You will need the following:

An ID TECH Spectrum II Hybrid Insert Reader with a DB-9 cable and a 5-volt AC/DC power adapter.

A PC running Windows 95, 98, 2000, Me, NT or XP with a serial port.

The smart card test card shipped with the unit.

The ID TECH demonstration software.
Note: For programming the ID TECH reader in a custom application, a DLL is available upon request.

5.2.1. Using the Demonstration Software

To install the demonstration software, insert the disk into the computer's drive, run setup and select OK. Then follow the instructions on the screen. Once the software has been installed, select Start/Programs.

Click on "Configurate Demo Software for Spectrum 3".

Plug the reader's DB-9 connector into the serial port of the host computer.

Plug the 5V power adapter into a wall outlet and then connect it to the DB-9 cable.

Once the reader is powered, its LED should light amber (PC/SC mode) or green (non PC/SC mode). (If the LED is off, then the reader is configured for the LED to be controlled by the host PC).

Type in port number from the "Serial Port Selection" window.

Click OK on "Baud Rate Confirmation" window.

Choose either **ASCII** or Hex from DISPLAY MODE. If ASCII is chosen, a printable character will be displayed in ASCII code. If Hex is chosen, all characters will be displayed in HEX code.

From the menu bar, select which set of commands you wish to test first. You can choose from HybridReaderCommands, MagneticStripeReaderCommands, and SmartCardCommands.

There are two ways of sending commands to the reader: a) by selecting a command from the menu bar, or b) by entering a command via the keyboard and clicking the SEND button. (It is not necessary to enter the head of command, LRC, or ETX.)

The program will display a command in the Complete Command box. The program will display a response in the Reader's Output box.

When finished testing, select FILE/EXIT.

5.2.2. Testing Steps Using an I^2C Card

Select "HybridReadCommands/SetCardOption/5V Memory Card" from the menu bar. The command will display in the Complete Command box as follows:

\60\00\04\53\10\01\80\A6\03

The response will display in the READER'S OUPUT box as follows:

\60\00\02\90\00\F2\03 (If the HEX option is chosen)

'\00\02\90\00\F2\03 (If the ASCII option is chosen)

Select "HybridReadCommands/SetMemoryCardType/ 3 Bytes I^2C Card" from the menu bar. The command will display in the COMPLETE COMMAND box as follows:

\60\00\04\53\12\01\00\24\03

The response will display in the READER'S OUPUT box as follows:

\60\00\02\90\00\F2\03 (If the HEX option is chosen)

'\00\02\90\00\F2\03 (If the ASCII option is chosen)

Select "SmartCardCommands/Memory Card Commands/Read Binary/Read 32 Bytes" from the menu bar. The command will display in the COMPLETE COMMAND box as follows:

\60\00\06\42\DA\B0\00\30\11\6F\03

The response displayed in the READER'S OUTPUT box will vary.

Select "SmartCardCommands/Memory Card Commands/Write Binary/Write 32 Bytes of ID TECH Value Through Innovation" from the menu bar. The command will display in the COMPLETE COMMAND box as follows:

\60\00\26\42\DA\D0\02\60\20\49\44\20\54\45\43\48\20\56\61\6C\75\65\20\74\68\72\6F\75\67\68\20\49\6E\6E\6F\76\61\74\69\6F\6E\46\03

The response will display in the READER'S OUPUT box as follows:

\60\00\02\90\00\F2\03 (If the HEX option is chosen)

'\00\02\90\00\F2\03 (If the ASCII option is chosen)

Select "HybridReadCommands/Memory Card Commands/Read Binary/Read 32 Bytes" from the menu bar. The command will display in the COMPLETE COMMAND box as follows:

\60\00\06\42\DA\B0\00\30\20\6F\03

The response will display in the READER'S OUPUT box as follows:

\60\00\22\49\44\20\54\45\43\48\20\56\61\6C\75\65\20\74\68\72\6F\75\67\68\20\49\6E\6E\6F\76
\61\74\69\6F\6E\90\00\D8\03 (If the HEX option is chosen)

`\00"ID TECH Value through Innovation\90\00\D8\03 (If the ASCII option is chosen)

Select "SmartCardCommands/Power Off" from the menu bar. The command will display in the COMPLETE COMMAND box as follows:

\60\00\01\4D\2C\03

The response will display in the READER'S OUPUT box as follows:

\60\00\02\90\00\F2\03 (If the HEX option is chosen)

'\00\02\90\00\F2\03 (If the ASCII option is chosen)

6. INDEX

Limitations on the use of PC/SC and SAM

- No SAM card cannot be accessed unless there is a user card seated in the reader.
- Any SAM card that is powered is immediately powered down when the user card is unseated from the reader.
- The user card cannot be accessed unless it is selected. This means that when connecting to a SAM card, the best way is to send a SAM card selection command immediately before each SAM card command and to select the user connector immediately after each SAM card access.

Limitations on the use of PC/SC and memory cards

The best way to use memory cards in a PC/SC reader is to leave the card type selected as CPU card. The only limitation this places on the host application is that memory card ATR commands are not allowed. Memory card ATR commands are not required because all memory cards are powered on with any command sent to them. Second, most memory cards do not support ATR commands so the reader simulates these commands by reading the first four bytes on the card. The problem is that if the memory card type is selected the reader cannot connect to a CPU card. PC/SC driver does not know that the memory type is incorrect and will never allow the PC/SC application to attach to the memory card.

