

# SDXC-IP exFAT Demo Instruction on ML505/506

Rev1.0 11-Nov-10

This document describes exFAT demo by using SDXC-IP. This demo uses bit-file to run on ML505/506.

## 1 Environment

For real board evaluation of SDXC-IP with exFAT data format reference design, environment shown in

Figure 1 is required.

- ML506/505 Platform
- iMPACT Software in ISE Suite version 10.1.03 or newer
- SDXC-IP Demo board, provided by DesignGateway
- SD Card
- Serial cross-cable

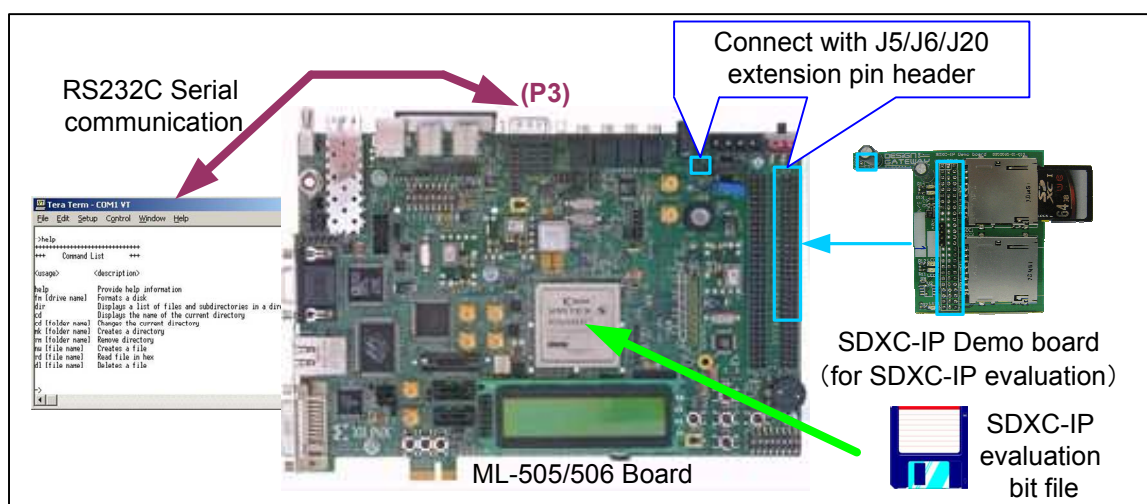


Figure 1 Evaluation environment using reference design bit-file

**Note:** For evaluation version, IP-Core has 1-hour time limitation to use. After 1-hour use, IP-core will stop any data transfer.

## 2 Evaluation procedure

- Check all system is power off
- Connect download cable (USB Platform Cable) from JTAG pin (J1) on ML505/506 to PC.
- Connect Cross-serial cable from COM1 port on ML505/506 to Serial port on PC.
- Remove two jumpers at J20 on ML505/506
- Connect SDXC-IP Demo board to ML505/506 board, as shown in Figure 2.
  - CON1 of SDXC-IP Demo board to pin3-4 of J20 on ML505/506 board
  - CON2-3 of SDXC-IP Demo board to J5-J6 on ML505/506 board

Note: SDXC-IP Demo board can be requested from Design Gateway.

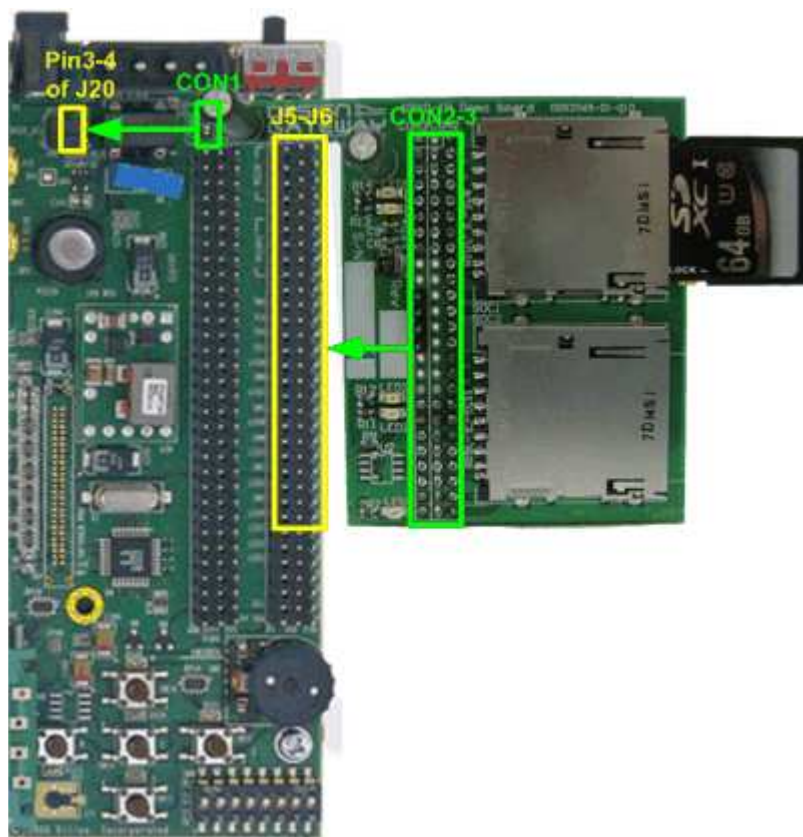


Figure 2 SDXC-IP demo board connection with ML505/506 board

- Insert SD Card to SDXC-IP Demo board.
- Power up ML505/506 board and open serial monitoring software such as HyperTerminal. Terminal settings should be Baud Rate=115,200 Data=8 bit Non-Parity Stop=1.
- Download bit-file to ML505/506 by using iMPACT Software.
- After FPGA start operation, LED5 on SDXC-IP Demo board will be ON, as shown in Figure 3.
- Check LED status on ML505/506 board at LED0-2 which should be all ON and ERR LEDs are all OFF, as shown in Figure 4. Each LED is described as follows.

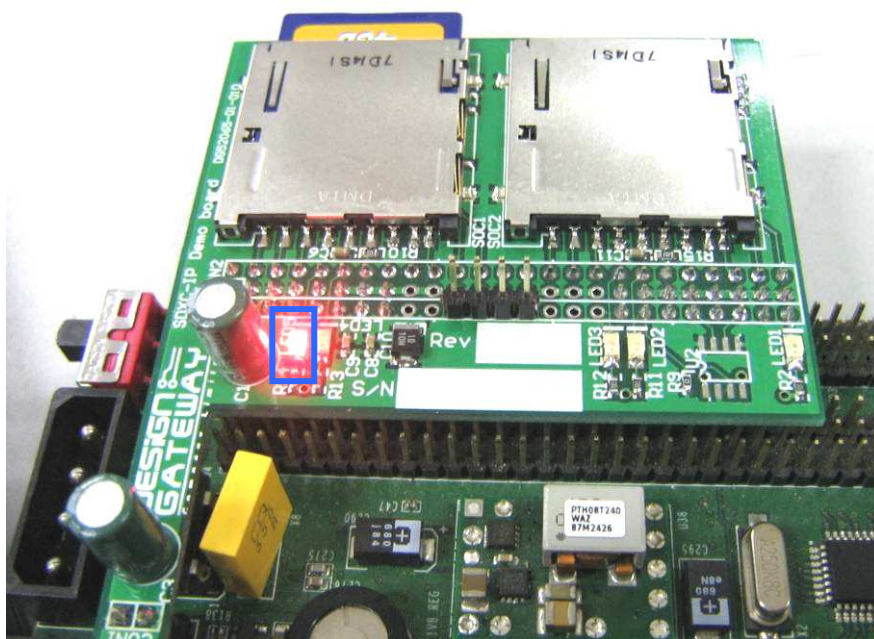


Figure 3 RED LED on SDXC-IP demo board turn-on after configuration

LED	ON	OFF
LED0	OK	No SD Card is detected. Please re-insert card to SD slot or check SD card.
LED1	Idle	SDXC-IP is busy status from initialize, read, or write command.
LED2	OK	DDR2 cannot initialize. Please check DDR2 on ML505/506 board.
ERR1	Error from SDXC-IP.	OK
ERR2	1-hour timeout	OK

Table 1 LED Status of SDXC-IP Raw data design on ML505/506 board

**Note:**

- Please see in SDXC-IP datasheet for more details about error when ERR1 LED ON.
- ERR2 LED is ON after 1-hour timeout. Please re-configuration FPGA to re-run system.

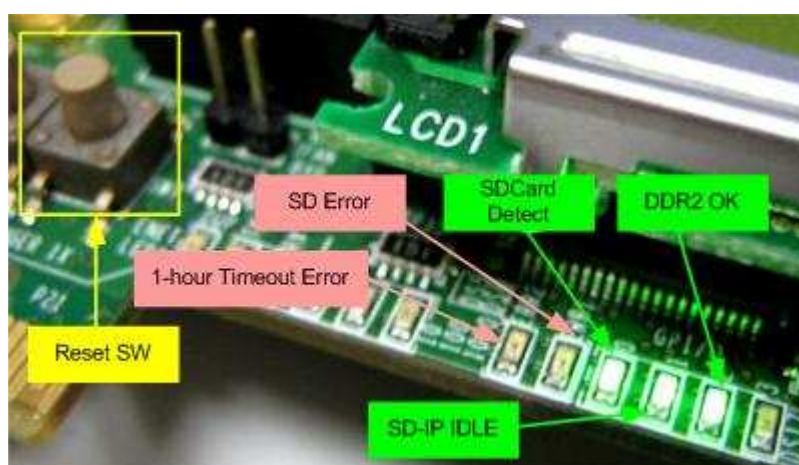


Figure 4 Reset Switch and LED status on ML505/506 board

- At serial console on PC, Card capacity is displayed with boot-up menu.
  - User need to input current date to be information on formatted card or created file and folder in this demo.
  - If exFAT is not found on SD Card, Format SD Card menu will be requested. User need to input 'y' to start format operation of SD Card before running next step as shown in the left window of Figure 5.
  - All command lists are displayed and system is ready to receive command from user when exFAT is found on SD Card as shown in the right window of Figure 5.

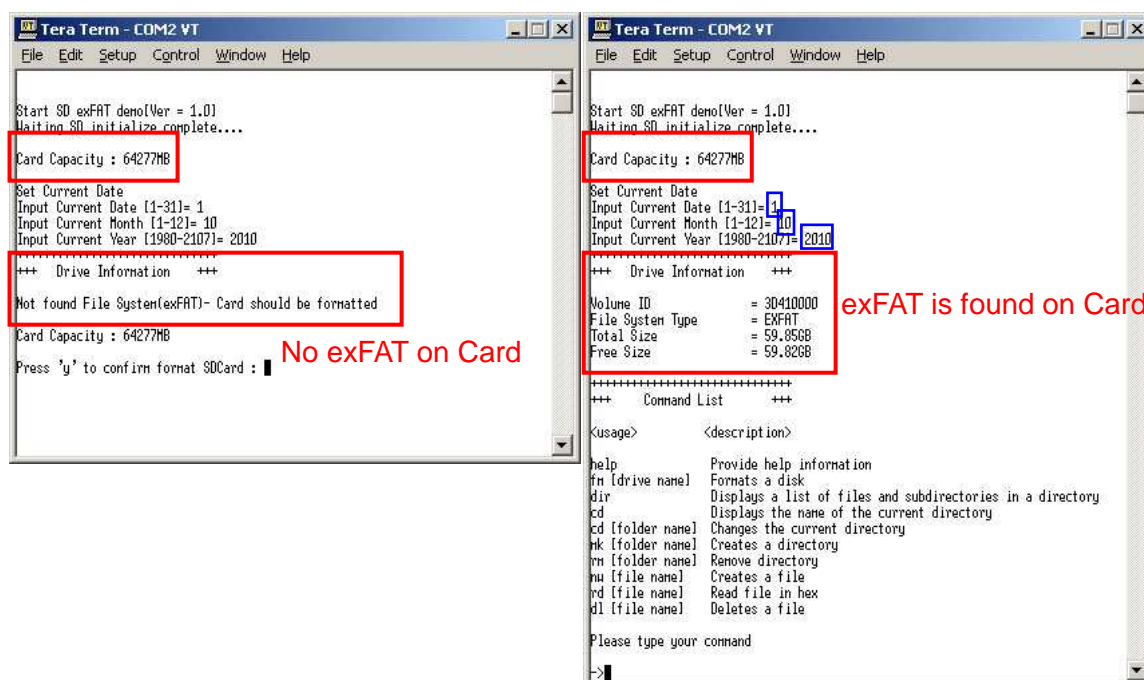


Figure 5 Boot up window when Card Size not valid

## 3 Command List

### 3.1 HELP

Command Format: -> help

This command is used to display all command lists and their descriptions in this demo, as shown in Figure 6.

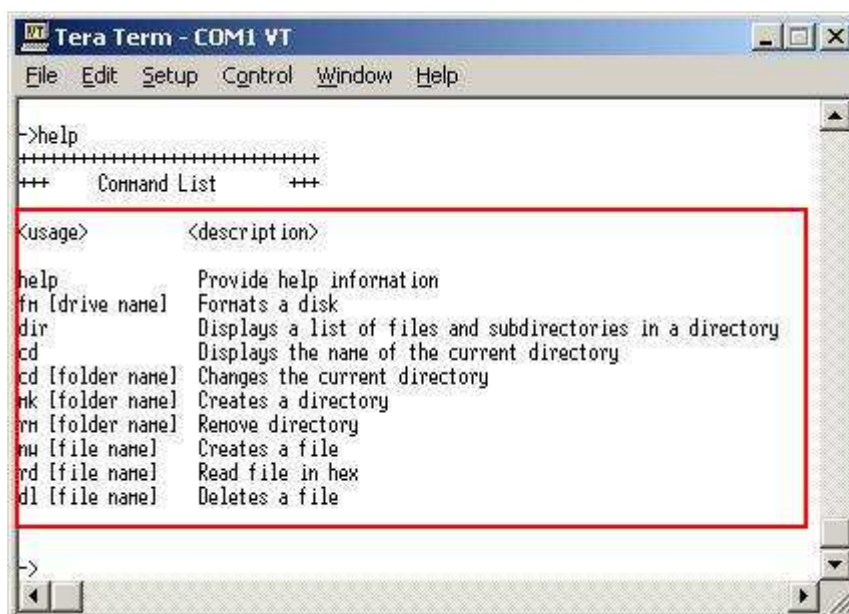


Figure 6 Help command

### 3.2 FORMAT

Command Format: -> fm [drive name]

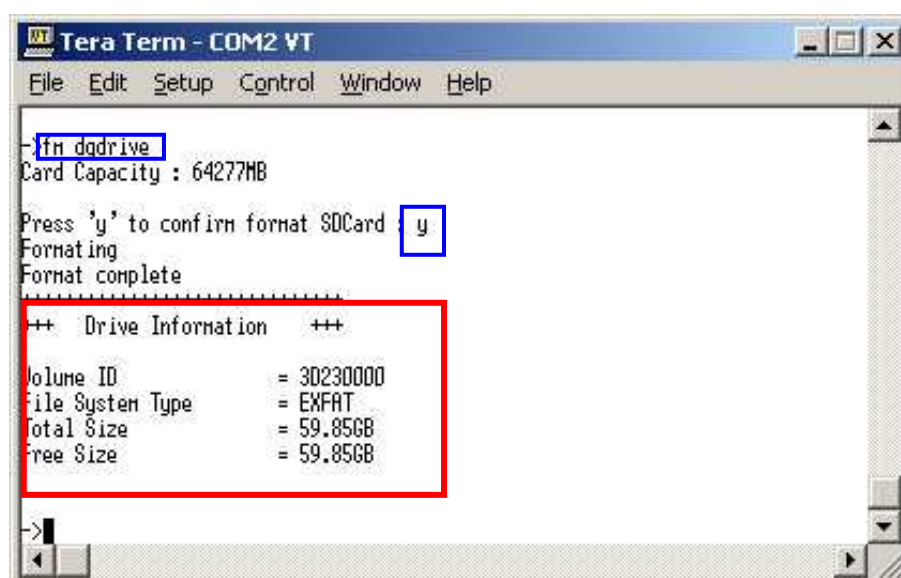


Figure 7 Format command

This command is used to format SD Card to exFAT format. The inputs for this command are follows.

- Drive name: Up to 11 Characters can be used to be drive name.
- Input 'y': Press 'y' to confirm and start format operation.

As shown in Figure 7, "Format complete" message and Drive information will be displayed after format operation complete.

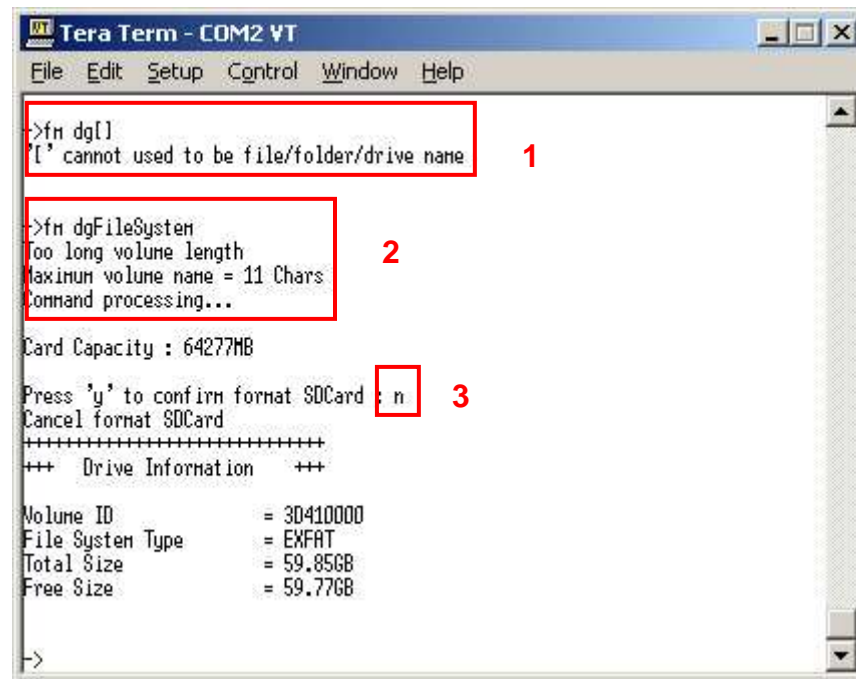


Figure 8 Unusual input during Format command

The unusual inputs are displayed in Figure 8.

- [1] Reserved character: "Reserved character' cannot used to be drive name" is displayed and operation will be cancelled. User need to re-input drive name without that reserved character.
- [2] Too long name: When drive name is more than 11 Characters, the 12<sup>th</sup> character is not used and format operation starts automatically. Warning message and "Command processing..." message will be displayed before starting operation.
- [3] Cancel: Other value except 'y' is received during confirmation process. Format Operation will be cancelled.

### 3.3 DIR

Command Format: -> dir

This command is used to display list of all files and subdirectories with its information of current directory. No input is required for this command.

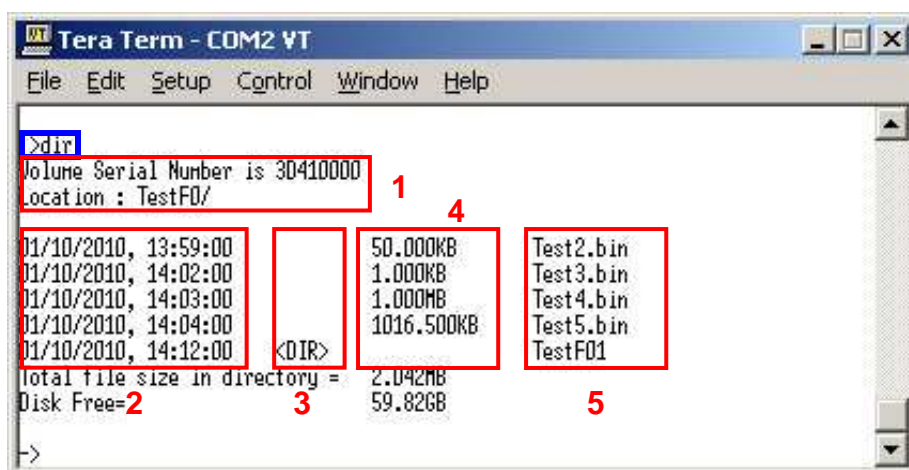


Figure 9 DIR command

As shown in Figure 9, output from using this command is follows.

- [1] Volume Serial Number: Constant value setting from software.
- Location: Display current directory path.
- [2] Modified date and time of all files and subdirectories.
- [3] <DIR> is displayed only for subdirectory name.
- [4] File size in byte, KB, MB, or GB unit.
- [5] Subdirectory name and file name with file extension.
- Total file sizes and disk free space size are also displayed in the bottom of window.

### 3.4 CD

Command Format: -> cd, cd .., or cd [Subdirectory name]

This command is used to display current directory path or change current directory. There are three command formats to use, i.e.

- [1] 'cd': display path of current directory.
- [2] 'cd [Subdirectory name]': Change current directory to that subdirectory name. Maximum "Subdirectory name" is 255 Characters.
- [3] 'cd ..': Change current directory to its parent directory.

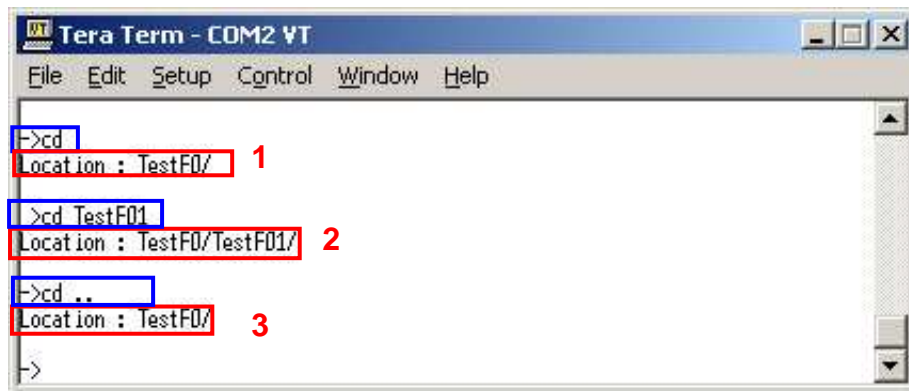


Figure 10 CD command

As shown in Figure 10, "Location: current directory path" will be displayed when operation complete.

The unusual inputs are displayed in Figure 11.

- [1] Wrong name: "folder not found" is displayed when subdirectory name is not found in current directory.
- [2] No parent directory: "folder not found" is displayed when current directory is root directory and "cd .." is input to go to parent directory.

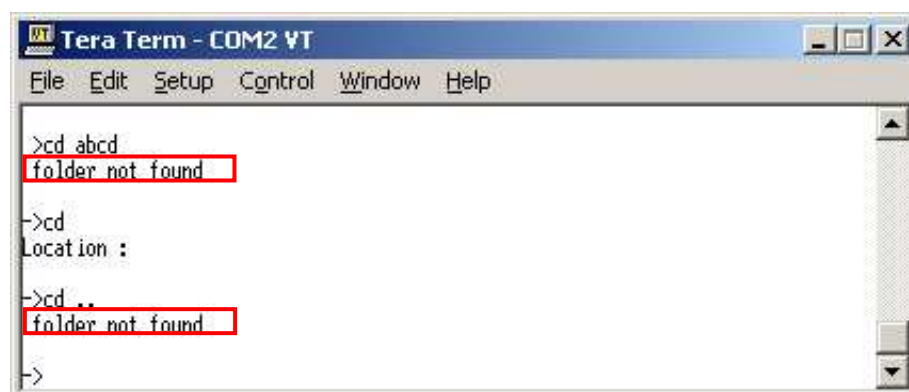


Figure 11 Unusual input during CD command

### 3.5 MAKE

Command Format: -> mk [folder name]

This command is used to create new folder in current directory. The inputs for this command are follows.

- Folder name: Up to 255 Characters can be used to be folder name.
- Input current hour: Set hour of created time for root directory. Valid from [0-23].
- Input current minute: Set minute of created time for root directory. Valid from [0-59].

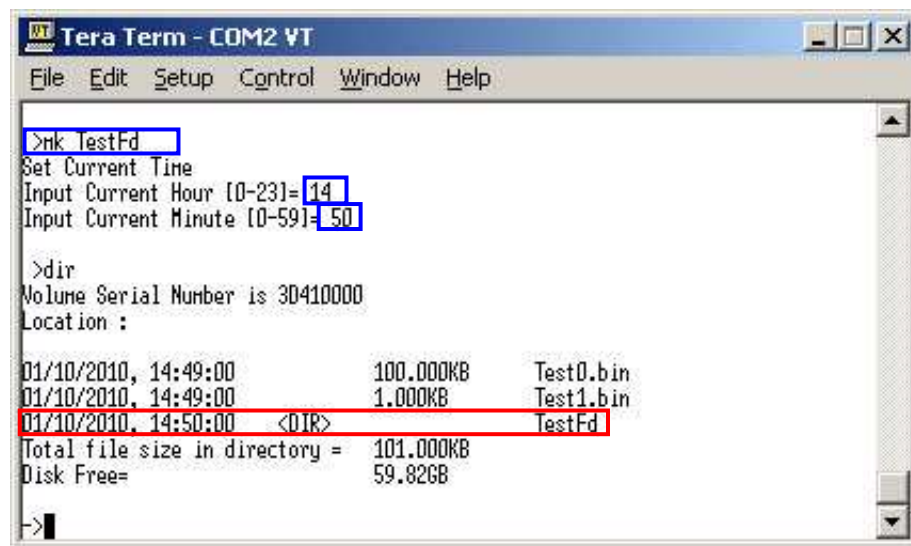


Figure 12 Make command

Similar to Format command, the unusual inputs are displayed in Figure 13.

- [1] Reserved character: "Reserved character" cannot be used to be folder name" is displayed and operation will be cancelled. User need to re-input folder name without that reserved character.
- [2] Too long name: When folder name is more than 255 Characters, the 256<sup>th</sup> character is not used and folder creation operation starts automatically. Warning message and "Command processing..." message will be displayed before starting operation.
- [3] Invalid time setting: When Hour or Minute value is not in valid range, Time setting process will be recursive until receiving valid input. The example of this situation is displayed in 'New' command.
- [4] Folder Exist: "File or Folder Already Exist. Specify Different File or Folder name" is displayed and operation will be cancelled. User need to re-input unused folder name.

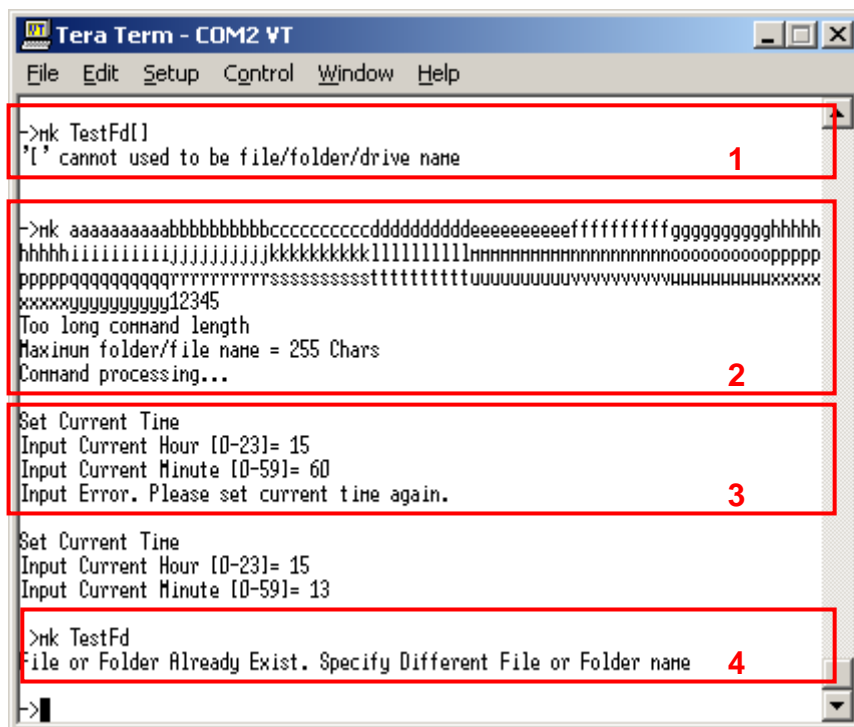


Figure 13 Unusual input during Make command

### 3.6 REMOVE

Command Format: -> rm [folder name]

This command is used to delete folder and all files and subdirectories within its folder. The inputs for this command are follows.

- Folder name: Available folder in current directory. Maximum folder name is equal to 255 Characters.
- Input 'y': Press 'y' to confirm and start folder removing operation.

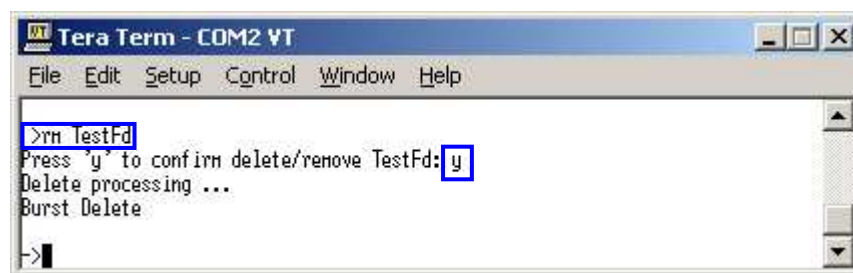


Figure 14 Remove command

As shown in Figure 14, "Delete processing" message is displayed before operation start.

The unusual inputs are displayed in Figure 15.

- [1] Wrong name: "folder not found" is displayed when subdirectory name is not found in current directory.
- [2] Cancel: Other value except 'y' is received during confirmation process. Remove operation will be cancelled.

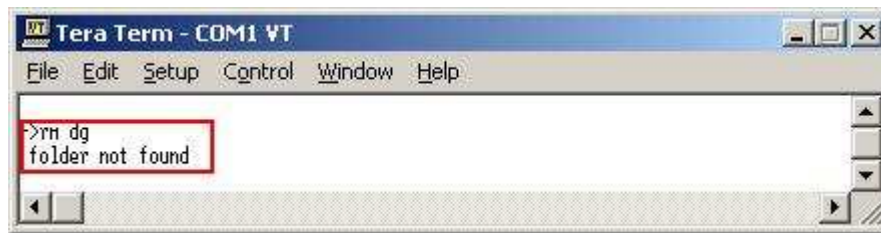


Figure 15 Unusual input during Remove command

### 3.7 NEW

Command Format: -> nw [filename]

This command is used to create new file in current directory which can run 2 modes, i.e. Burst write and Single write.

[1] Burst write is used when free space in card is large enough and continuous to store new file. Transfer speed will be equal to higher than Single write.

[2] Single write is used when free space in card is split into small piece which is not enough to store new file in one piece.

The inputs for this command are follows.

- File name: Up to 255 Characters can be used to be file name.
- Input current hour: Set hour of created time for root directory. Valid from [0-23].
- Input current minute: Set minute of created time for root directory. Valid from [0-59].
- Input File size in sector unit (512 byte): Set file size in sector unit. Total file size will be equal to (Inputx512) byte.
- Input test fill pattern for this file: '0' for 32-bit increment data, '1' for 32-bit decrement data, and '2' for dummy data (no defined).
- Input confirmation to write in single mode. Press 'y' to confirm and start to create new file. Other input received will cancel operation.

"Burst Write" or "Single Write" will be displayed to show write mode after receiving all valid inputs, as shown in Figure 16 and Figure 17 consecutively. Transfer speed will be displayed after file creation completed.

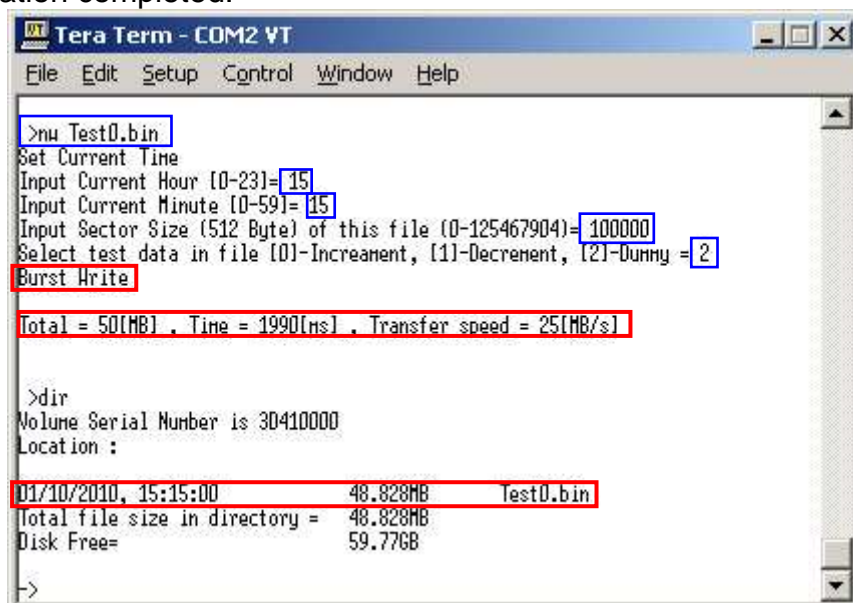


Figure 16 New command in Burst Write mode

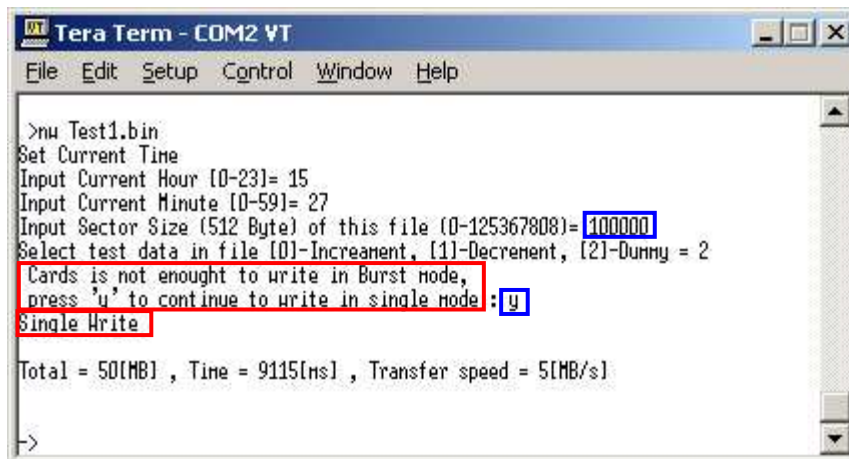


Figure 17 New command in Single Write mode

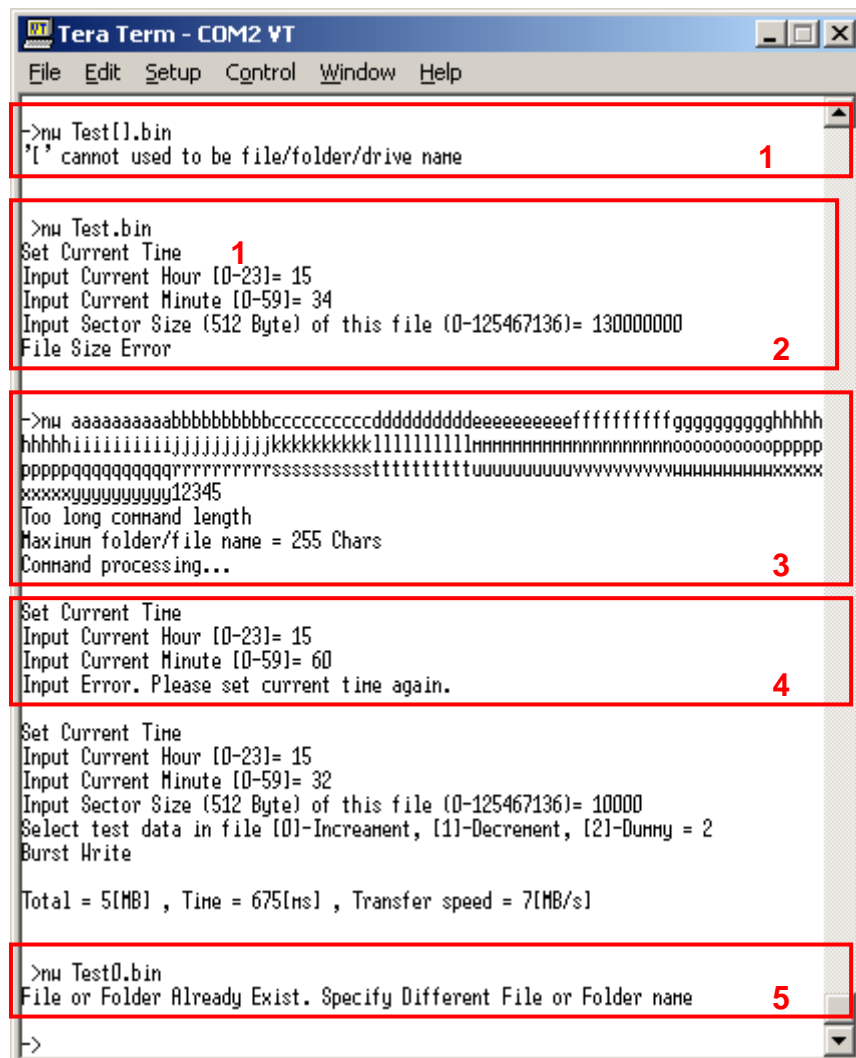


Figure 18 Unusual input during New command

Similar to Format and Make command, the unusual inputs are displayed in Figure 18.

- [1] Reserved character: “Reserved character’ cannot used to be file name” is displayed and operation will be cancelled. User need to re-input file name without that reserved character.
- [2] Invalid file size: “File Size Error” message is displayed when file size value is not in valid range. The operation will be cancelled.
- [3] Too long name: When file name is more than 255 Characters, the 256<sup>th</sup> character is not used and file creation operation starts automatically. Warning message and “Command processing...” message will be displayed before starting operation.
- [4] Invalid time setting: When Hour or Minute value is not in valid range, Time setting process will be recursive until receiving valid input.
- [5] File Exist: “File or Folder Already Exist. Specify Different File or Folder name” is displayed and operation will be cancelled. User need to re-input unused file name.

### 3.8 READ

Command Format: -> rd [filename]

This command is used to read data from “filename.bin” within current directory. There are 2 modes for this command, i.e. show data or verify data in this file. The inputs for this command are follows.

- File name: Available file name with file extension in current directory. Maximum file name is equal to 255 Characters.
- Select mode: Input ‘y’ to show 512-byte data within file and ‘n’ or others to verify data.
- Input next operation for show data mode: ‘n’ for reading next 512-byte data, ‘x’ for exit.
- Input verify mode: ‘0’ for 32-bit increment pattern, ‘1’ for 32-bit decrement pattern, and ‘2’ for skip verify mode to check read performance.

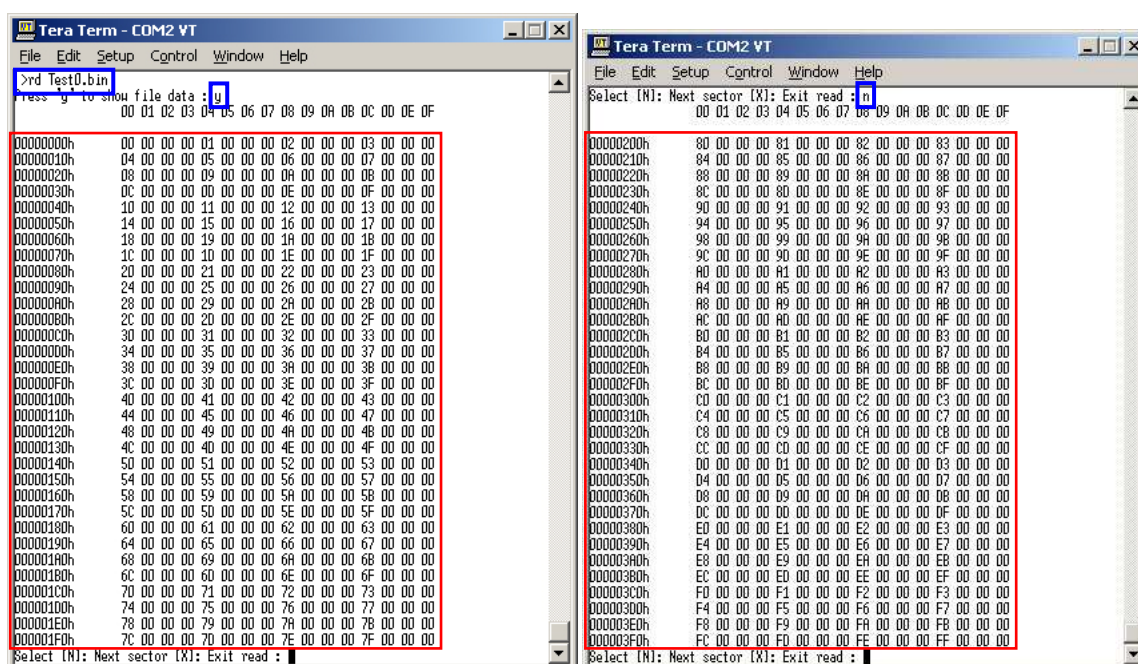


Figure 19 Read command : Show data

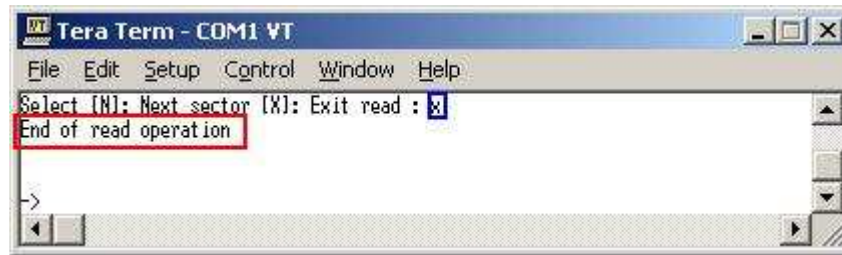


Figure 20 Read command : Cancel read

As shown in Figure 19, 512-byte data will be displayed after receiving valid command and selecting 'y' to show data. Next 512-byte data will be displayed after receiving 'n' character. If user input 'x' to exit read operation, "End of read operation" message will be displayed, as shown in Figure 20.

As shown in Figure 21, Read mode will be displayed after receiving valid command and selecting other inputs to run verify mode. "Verify Success" with transfer speed will be displayed after verify process complete and no error data detect. "Verify Fail" will be displayed instead if any error data detect, as shown in Figure 22. Figure 23 shows the example of no verify mode to check only transfer performance for read command.

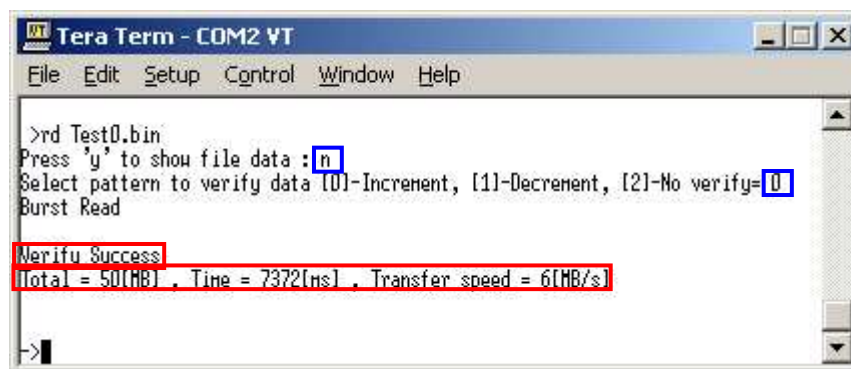


Figure 21 Read command : Verify Success

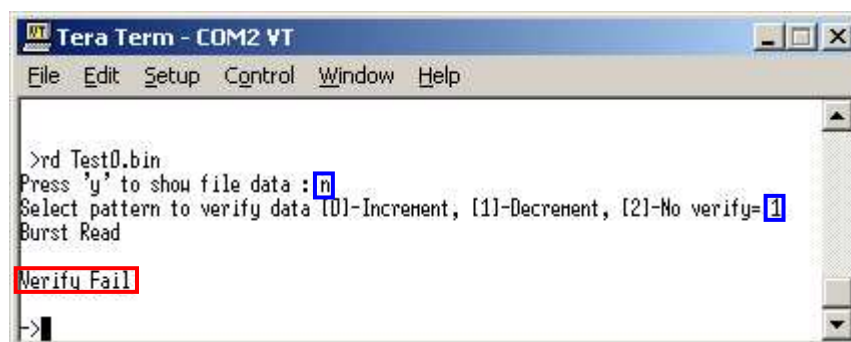


Figure 22 Read command : Verify Fail

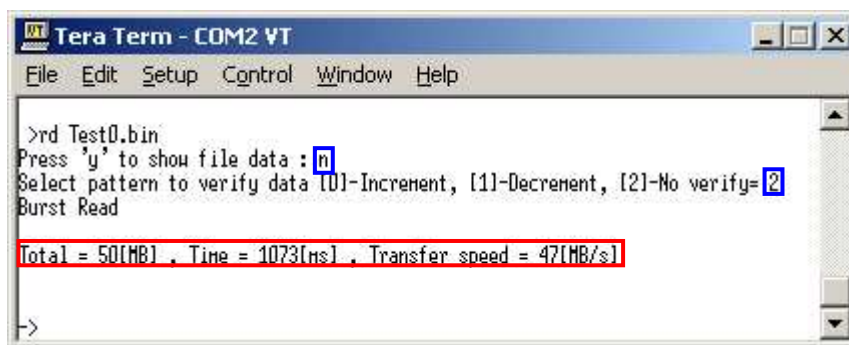


Figure 23 Read command : No verify

For unusual case, "file not found" will be displayed when file name is not found in current directory, as shown in Figure 24.

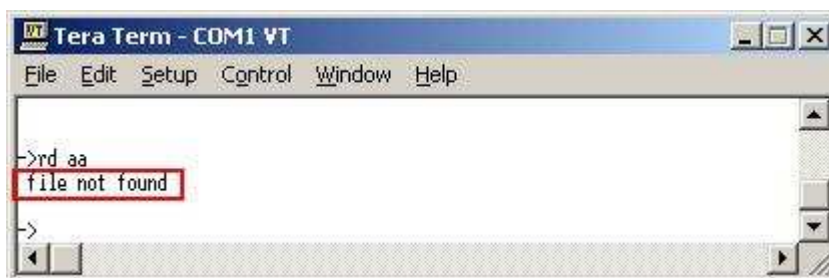


Figure 24 Read command : Invalid command

### 3.9 DELETE

Command Format: -> dl [file name]

This command is used to delete file in current directory. The inputs for this command are follows.

- File name: Available file name with file extension in current directory. Maximum file name is equal to 255 Characters.
- Input 'y': Press 'y' to confirm and start file delete operation.



Figure 25 Delete command : Burst Delete

As shown in Figure 25 and Figure 26, “Delete processing” and delete mode (“Burst Delete” or Single Delete”) message is displayed after receiving valid input.

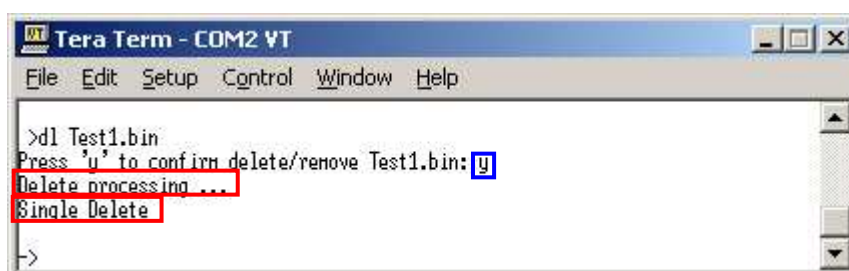


Figure 26 Delete command : Single Delete

Similar to Read command, “file not found” will be displayed when file name is not found in current directory, as shown in Figure 27.

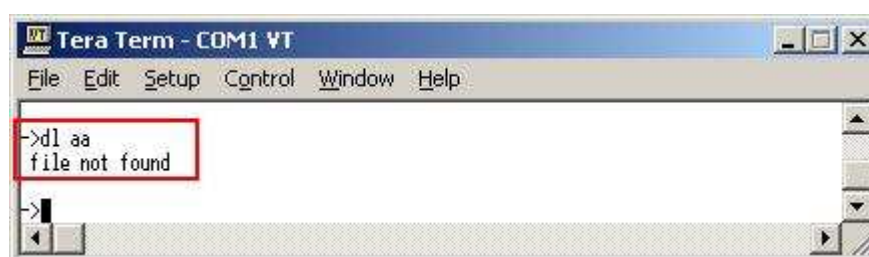


Figure 27 Unusual input during Delete command

## 4 Revision History

Revision	Date	Description
1.0	11-Nov-10	Initial version release