CASTLES TECHNOLOGY

VEGA3000 EFT-POS Terminal

Book 2

User Manual

Confidential

Version1.1

Sep 2018

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WARNING

Information in this document is subject to change without prior notice.

Revision History

Version	*Date*	*Descriptions*
1.0	Mar 13, 2018	Initial creation.
1.1	Sep 20, 2018	1. Correcting the description of page 9. 2. Add chapter “6. Appendix”. 3. Add battery caution in page 10.

Contents

1. Introduction

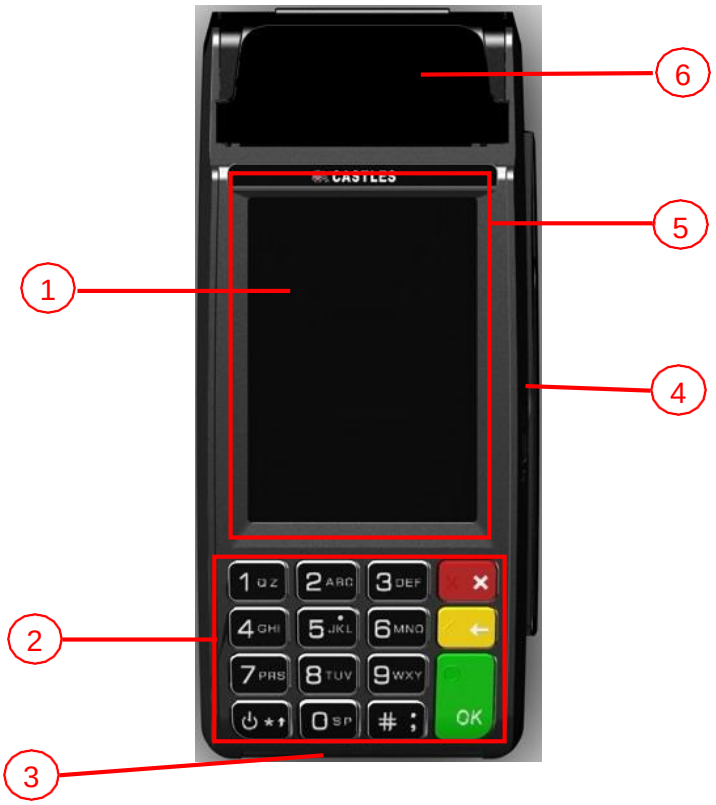
This document provides a guideline on operating and configuring Castles VEGA3000 terminal.

The scope of this document includes setting up the terminal, basic operation, application life cycle, and some advance features.

2. Hardware Setup

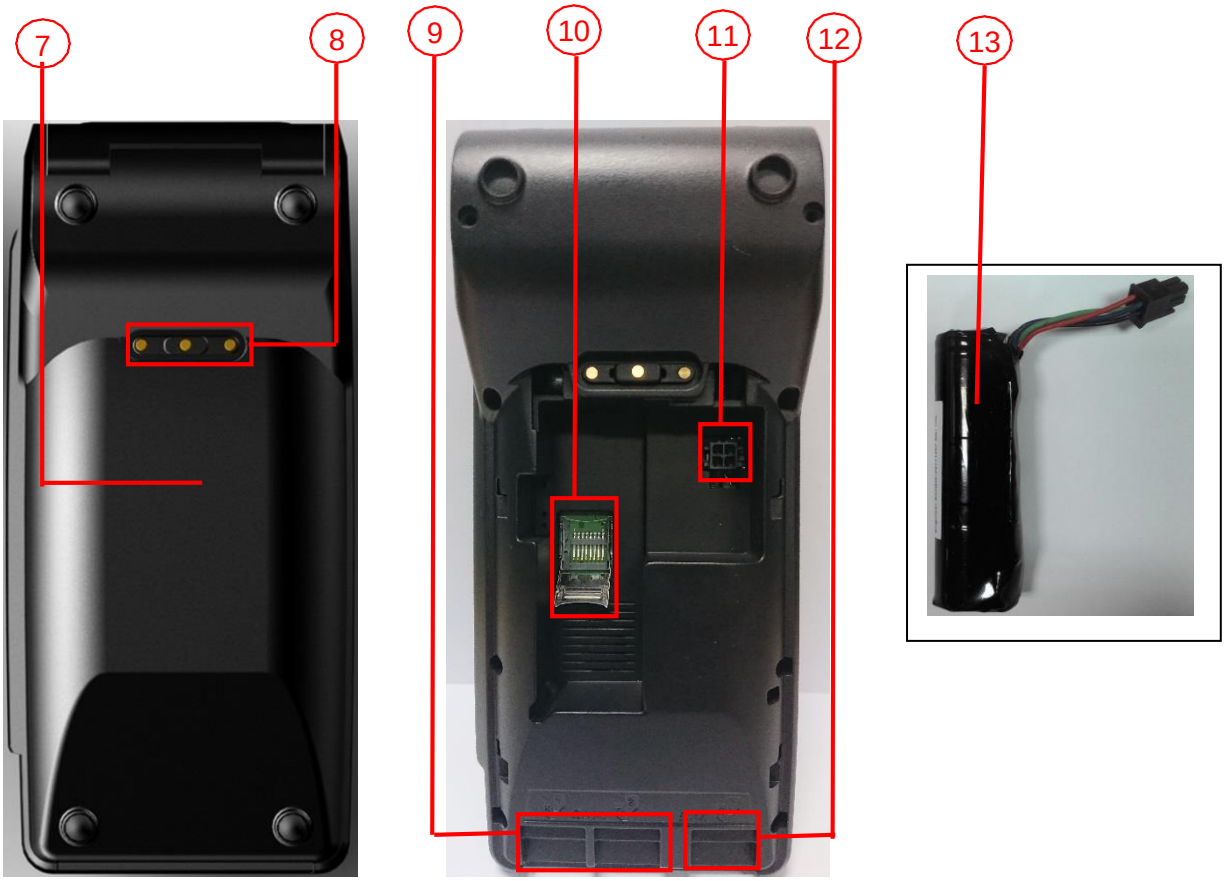
2.1. Parts of the Terminal

Front



1. **LCD Display (Color TFT)**
2. **Keypad**
3. **Smart Card Reader**
4. **Magnetic Stripe Reader**
5. **Contactless Card Landing Zone**
6. **Paper Roll Handle**

Rear



7. **Battery Cover**
8. **Charger Base Connector**
9. **SAM Slots**
10. **Micro SD Card Slot**
11. **Battery Connector**
12. **GSM SIM Card Slots**
13. **Rechargeable Battery**

Side

14. USB Port (Type C)

2.2. Inserting the Battery

Step 1: Remove battery cover

Step 2: Insert battery into compartment, battery contact point must align with battery connector.

Step 3: Reverse the operation of step 1 to install the battery cover.

Note: The battery must be installed. Otherwise, the printer function might not work normally.

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.

DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

2.3. Inserting the SAM Card

Step 1: Remove battery cover / back cover

Step 2: Insert SAM card into desire slot.

SAM 1 & 3:

Gold contact at upper side of card and facing down.

SAM 2 & 4:

Gold contact at upper side of card and facing up.

Step 3: Reverse the operation of step 1 to install the battery cover.

2.4. Inserting the Paper Roll

Step 1: Pull up paper roll box handle.

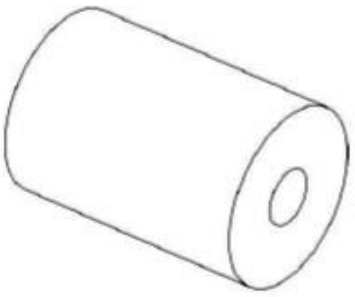
Step 2: Gentle open paper roll cover.

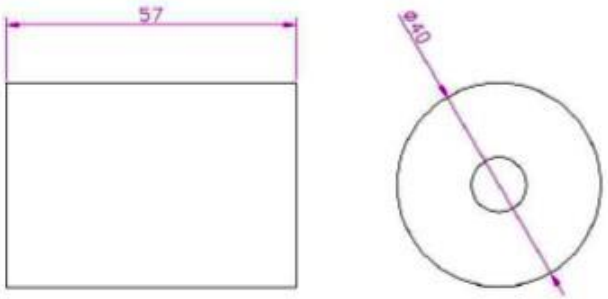
Step 3: Insert paper roll as direction showed.

Paper specification

Width: 57mm

Outside diameter: 40mm





2.5. Inserting the GSM SIM Card

Step 1: Remove battery cover / back cover

Step 2: Open SIM socket and insert GSM SIM card into desire slot.

SIM 1:

Gold contact at upper side of card and facing down.

SIM 2:

Gold contact at upper side of card and facing up.

Step 3: Reverse the operation of step 1 to install the battery cover.

2.6. Inserting the Memory card

Step 1: Remove battery cover / back cover

Step 2: Insert Micro SD memory card.

Micro SD:

Gold contact at lower side of card and facing down.

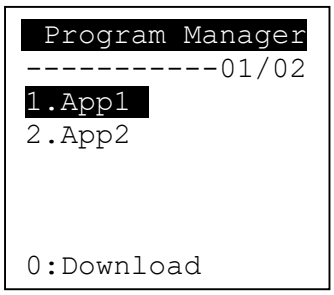
Step 3: Reverse the operation of step 1 to install the battery cover.

3. Basic Operation

3.1. Program Manager

Once the power is on in normal status, terminal will enter Program Manager if no default application selected. All user applications are listed in Program Manager. Users can select an application and run the application, view the application info, delete the application, or set application to the default one to run once the power is on. Users may enter System Menu to configure terminal settings.

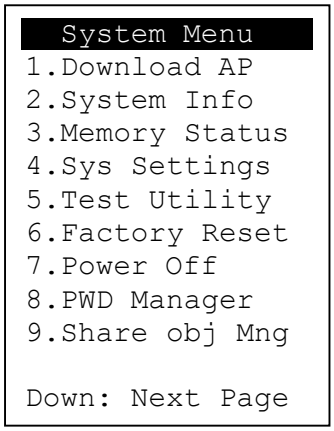
Program Manager



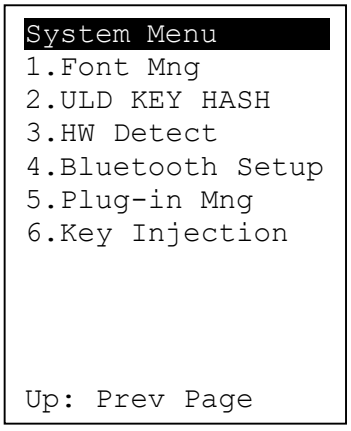
- Press [0] button to enter System Menu.
- Press [1] button to toggle default application selection.
- Press [2] button to delete application.
- Press [3] button to view application info.
- Press [OK] button to run application.
- Press [Power] or [·] as the up and down button to select application.

System Menu

Page 1



Page 2

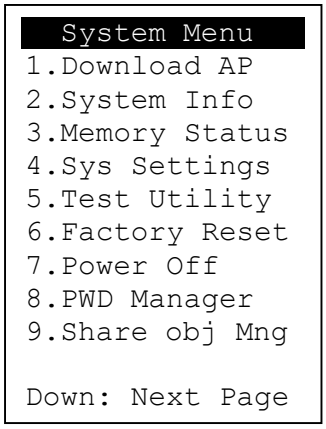


- Press [·] button to page 2.

3.2. Download AP

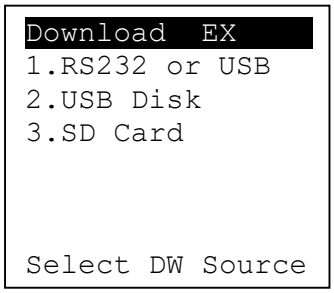
Download user application or kernel modules firmware.

System Menu



- Press [1] button to enter Download AP menu.

Download AP Menu



Select download source:

- Press [1] button to select source as RS232 or USB connection and enter ULD download mode.
- Press [2] button to select source as USB disk.
- Press [3] button to select source as SD card.

3.3. System Info

View kernel module firmware information.

System Menu

```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
8.PWD Manager
9.Share obj Mng

Down: Next Page
```

- Press [2] button to enter System Info menu.

System Info Menu

Page 1

```
  SYSTEM INFO
---Kernel Ver---
BIOS    : VR0026
SULD    : VRF026
LINUXKNL: VR0029
ROOTFS  : VRM119
PEDST   : VR0027
```

Page 2

```
  SYSTEM INFO
--- KOVer  ---
SECURITY: VRA126
KMS     : VRA127
DRV     : VRAK47
USB     : N/A
CIF     : VRA524
SAM     : VRA433
CL      : VR0018
SC      : VR0011
```

Page 3

```
  SYSTEM INFO
--- SOVer---
UART     : VR0017
USBH     : VR0011
MODEM    : VRA218
ETHERNET : VRAC34
FONT     : VRAE31
LCD      : VRAK41
PRT      : VRA924
RTC      : VRA114
ULDPM    : VRA730
PPP MODEM: VRAH31
KMS      : VRAA32
FS       : VRA116
GSM    :   VRA730
BARCODE  : VRA013
```

- Press [·] button to next page.

Page 4

```
  SYSTEM INFO
--- SO Ver2 ---
TLS     : VRA215
CLVW    : VRA425
CTOSAPI : VRA040
```

Page 5

```
  SYSTEM INFO
---  HWMVer ---
CRDL/ETHE: N/A
CLM-MP   : N/A
  --- APVer ---
ULDPM   : VRMP35
```

Page 6

```
  SYSTEM    INFO
HUSBID: 0A6A050
CUSBID: N/A
--Factory S/N---
FFFFFFFFFFFFFFFF
```


Page 7

```
  SYSTEM INFO
-EXT SO Ver P.1 -
CRDLMDL  : VR0012
CACLENTRY: VR0012
CAMPP    : VR0007
CAVPW    : VR0022
CAAEP    : VR0004
CACJT    : VR0008
CAVAP    : VR0003
CACQP    : VR0002
CAIFH    : VR0003
CADDP    : VR0002
CAEMVL2  : VRA019
CAEMVL2AP: VR0011
CABARCODESCAN:VR0002
CAMMS    :VR0002
```

3.4. Memory Status

View terminal flash memory and RAM information.

System Menu

```
  System Menu
1.Download AP
2.System Info
3.Memory Status
4.Sys Settings
5.Test Utility
6.Factory Reset
7.Power Off
8.PWD Manager
9.Share obj Mng

Down: Next Page
```

- Press [3] button to enter Memory Status menu.

Memory Status Menu

```
 MEMORY STATUS
--FLASH Memory—
Total:  130688KB
Used :   96648KB

--SDRAM Memory—
Total:   65408KB
Used :   32148KB
```

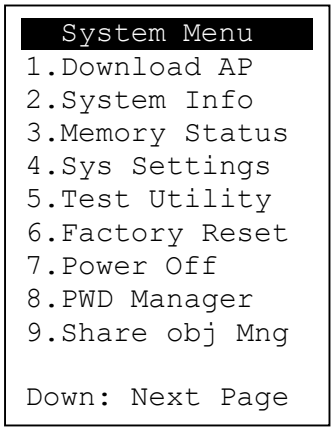
3.5. System Settings

View or change terminal system settings.

Setting	***Descriptions***
Key Sound	Enable (Y) or disable (N) the beep sound when pressing any key.
Exec DFLT AP	Enable (Y) or disable (N) execution of default selected application.
USB CDC Mode	Enable (Y) or disable (N) USB CDC mode.
FunKey PWD	Enable (Y) or disable (N) password protection to access function key (0 ~ 3) in Program Manager.
PMEnter PWD	Enable (Y) or disable (N) password protection to enter Program Manager.
SET USB Host	Enable (Y) or disable (N) USB host mode.
Base USB CDC	Enable (Y) or disable (N) USB CDC mode in base unit. [Portable model only]
List SHR Lib	Enable (Y) or disable (N) to list all shared libraries in Program Manager.
Key MNG Mode	**<TBC>**
Bat Threshld	Battery charging threshold value. [Portable model only]
Null Cradle	Enable (Y) if base is Type Acradle. [Portable model only]
Debug Mode	Enable (Y) or disable (N) console debug mode.
Debug Port	Serial port for console debug.
Mobil AutoON	Enable (Y) or disable (N) to auto turn on GSM module after start up the terminal.
Bklit Auto Off	Enable (Y) or disable (N) Auto OffLCDBacklight
Bklit Off Time	Thresholdof Auto Off LCD Backlight
PWR KEY OFF	Enable (Y) or disable (N) Power key rebooting
RTC Time Zone	Set Time Zone of Real Time Clock.
NTP Enable	Enable (Y) or disable (N) Network Time Protocol.

NTP Update Freq	Frequency of Network Time Protocol updating.
PWM Auto	Enable (Y) or disable (N) auto power management
PWM Mode	Set power management mode. (Not support)
PWM Time	Set power management time. (Not support)
BAT PROTECT MODE	Set battery protect mode. A:Auto(default), system will auto switch battery protect mode. N: Normal, without battery protect function mode. P: Protect, with battery protect function mode.
Auto Reboot	Enable terminal auto reboot.
Reboot Hour	Set reboot time of hour.
Reboot Min	Set reboot time of minute.

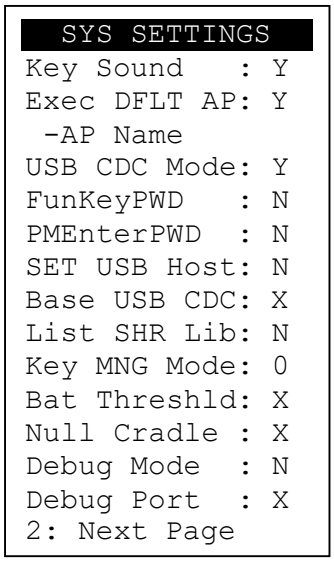
System Menu



- Press [4] button to enter System Settings menu.

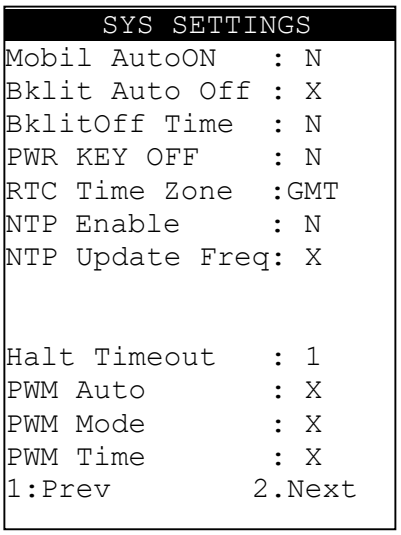
System Settings Menu

Page 1

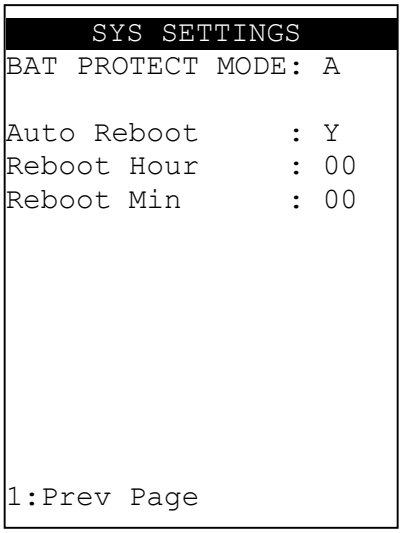


- Press [Power] or [·] button to select setting.
- Press [OK] button to change the setting value.
- Press [⇦] button to toggle Y ⇨ N ⇨ Y.
- Press [2] button to next page.

Page 2



Page 3

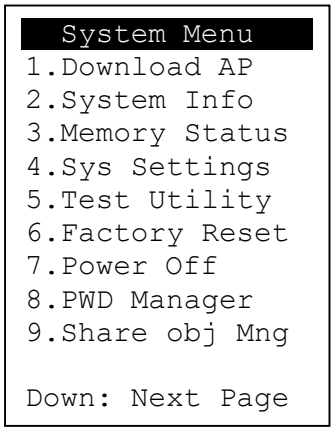


- Press [Power] or [·] button to select setting.
- Press [OK] button to change the setting value.
- Press [⇦] button to toggle Y ⇨ N ⇨ Y.
- Press [1] button to previous page.
- Press [2] button to next page.

3.6. Test Utility

Diagnose terminal hardware components.

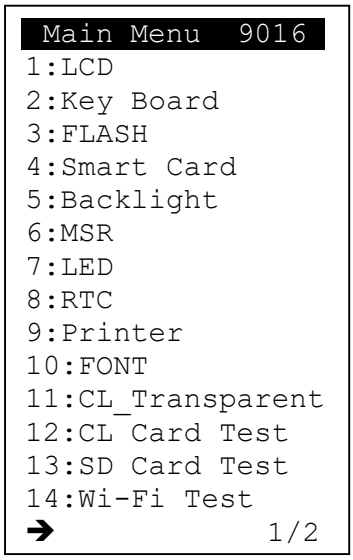
System Menu



- Press [5] button to enter Test Utility menu.

Test Utility Menu

Page 1

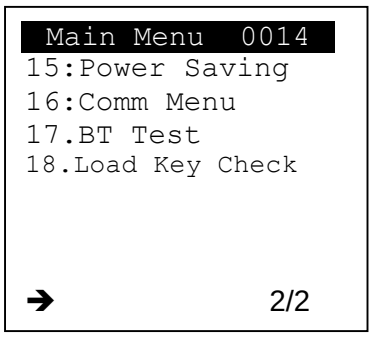


- Press [1] and [OK] button to diagnose LCD.
- Press [2] and [OK] button to diagnose keyboard.
- Press [3] and [OK] button to diagnose flash memory.
- Press [4] and [OK] button to diagnose smart card module.
- Press [5] and [OK] button to diagnose backlight.
- Press [6] and [OK] button to diagnose magnetic stripe reader.

- Press [7] and [OK] button to diagnose LED.
- Press [8] and [OK] button to diagnose real time clock.
- Press [9] and [OK] button to diagnose printer.
- Press [1], [0] and [OK] button to view font.
- Press [1], [1] and [OK] button to diagnose contactless reader in transparent mode.
- Press [1], [2] and [OK] button to diagnose contactless card.
- Press [1], [3] and [OK] button to diagnose SD memory card.
- Press [1], [4] and [OK] button to test Wi-Fi.
- Press [·] button to next page.

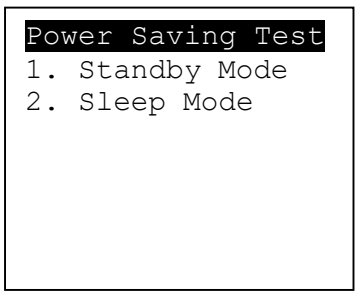
Note: Default password for changing RTC is 8418.

Page 2



- Press [1], [5] and [OK] button to enter Power Saving Test Menu.
- Press [1], [6] and [OK] button to enter Communication Test Menu.
- Press [1], [7] and [OK] button to enter Bluetooth Test Menu.
- Press [1], [8] and [OK] button to check the ULD key.
- Press [Power] button to previous page.
- Press [X] button to exit.

Power Saving Test Menu



- Press [1] button to Standby Mode.
- Press [2] button to Sleep Mode.

Communication Test Menu

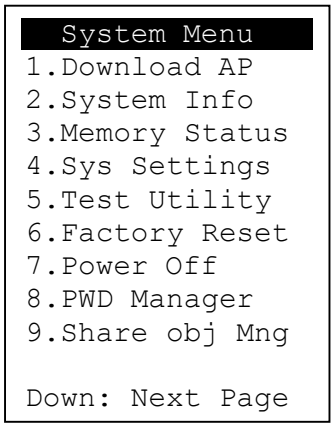
```
Communicate Test
1. COM1  2. Com2
3. Com3
4. Ethernet Test
5. USB      Test
6. Modem    Test
7. GPRS     Test
8. All      Test
```

- Press [1] button to diagnose Com 1.
- Press [2] button to diagnose Com 2.
- Press [3] button to diagnose Com 3.
- Press [4] button to diagnose Ethernet module.
- Press [5] button to diagnose USB.
- Press [6] button to diagnose modem.
- Press [7] button to diagnose GPRS.
- Press [8] button to diagnose all, from item 1 to 7.

3.7. Factory Reset

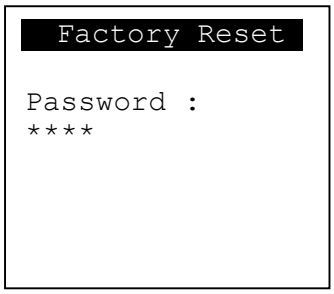
Perform factory reset, all user application, fonts and data will be deleted.

System Menu



- Press [6] button to enter Factory Reset menu.

Factory Reset Menu

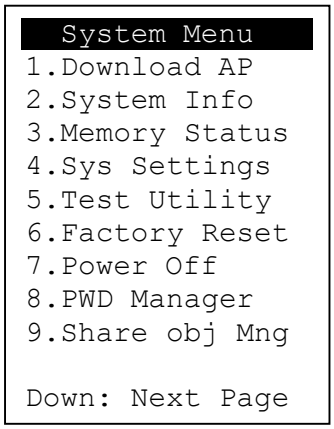


- Enter factory reset password. ***Default password: 00000000***

3.8. Power Off

Power off terminal.

System Menu

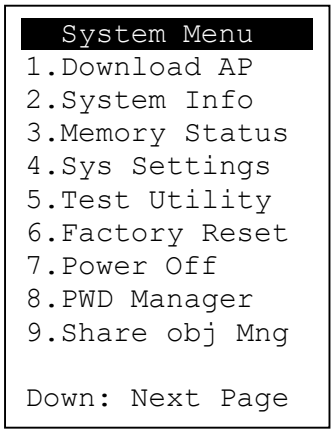


- Press [7] button to power off terminal.

3.9. Password Manager

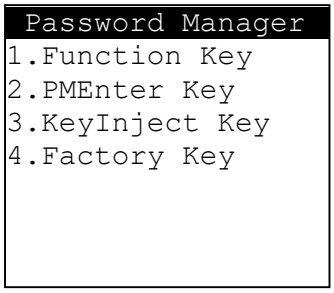
Change the access password.

System Menu



- Press [8] button to enter Password Manager Menu.

Password Manager

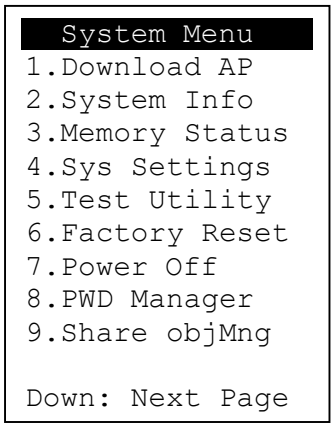


- Press [1] button to change Function Key.
- Press [2] button to change PMEnter Key.
- Press [3] button to change KeyInject Key.
- Press [4] button to change Factory Key.

3.10. Share Object Management

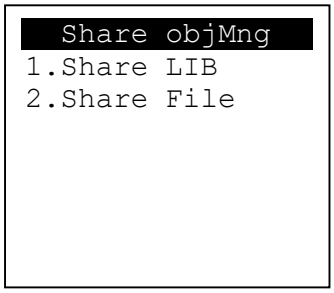
View share object in terminal.

System Menu



- Press [9] button to enter Share Object Management menu.

Share Object Management Menu

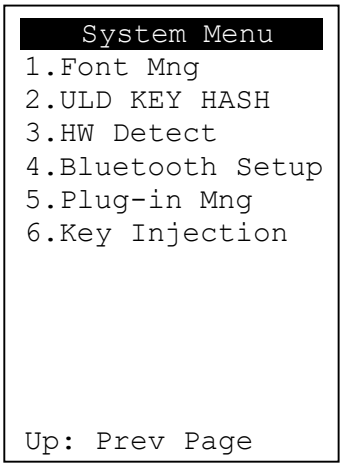


- Press [1] button to view shared library.
- Press [2] button to view shared file.

3.11. Font Mng

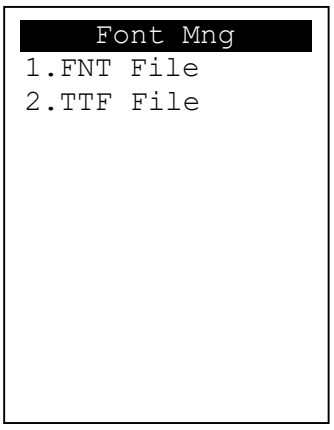
View Font Management.

System Menu (Page 2)



- Press [1] button to view Font Management.

Font Management

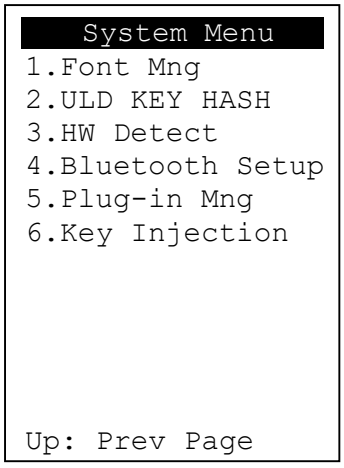


- Press [1] button to view FNT Font list.
- Press [2] button to view TTF Font list.

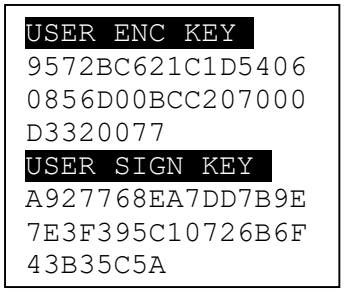
3.12. ULD Key Hash

View ULD user keyset hash value.

System Menu (Page 2)



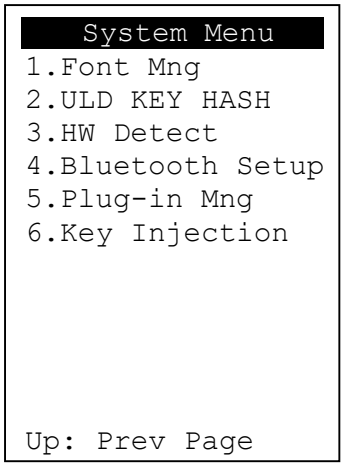
- Press [2] button to view hash value.



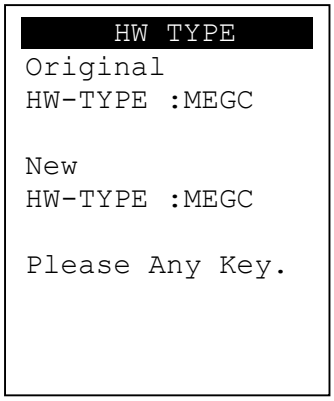
3.13. Hardware Detect

View the hardware type of the terminal.

System Menu (Page 2)



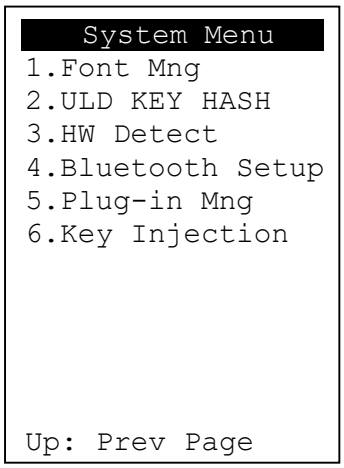
- Press [3] button to view the hardware type of the terminal.



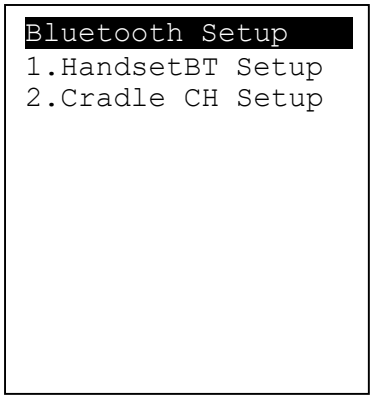
3.14. Bluetooth Setup

Set the settings of Bluetooth. This function will be available after installing the BT plug-in patch.

System Menu (Page 2)



- Press [4] go to the Bluetooth setup menu.

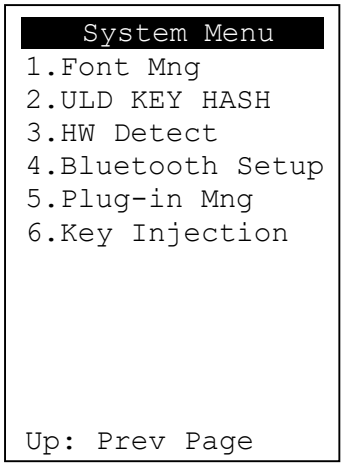


- Press [1] go to the Handset BT setup menu.
- Press [2] go to the Cradle CH setup menu.

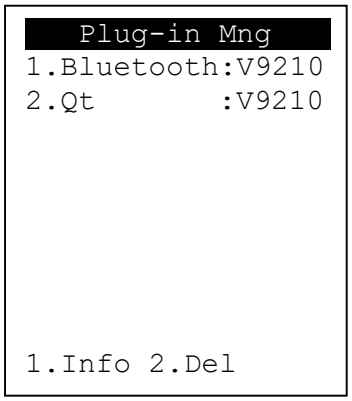
3.15. Plug-in Mng

View Plug-in Management.

System Menu (Page 2)



- Press [5] button to view Plug-in Management.

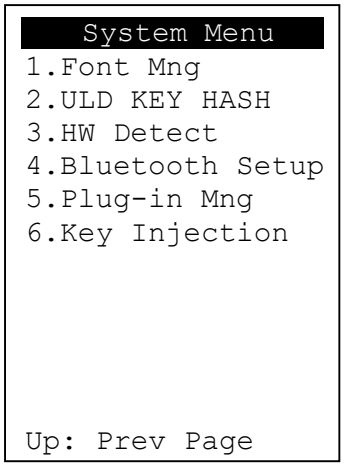


- Press [Power] or [·] button to select item.
- Press [1] button to get item information.
- Press [2] button to delete item.

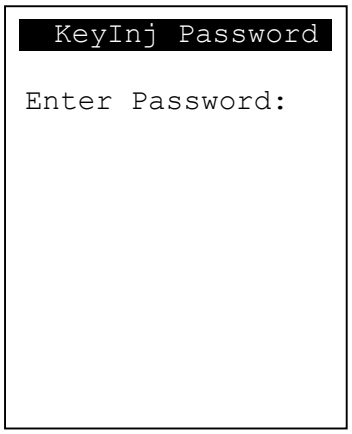
3.16. Key Injection

View Key Injection Menu. **This function is for castles internal only. User or developer cannot use this function.**

System Menu (Page 2)



- Press [6] button to view Key Injection Menu.



4. Secure File Loading

Castles implemented an interface in terminal named User Loader (ULD) to provide secure file loading to system memory. Loading of user application, kernel firmware, font and others must use User Loader.

The loading process is secure by signing the files using ULD Key System.

4.1. ULD Key System

The ULD Key System uses two key sets for securely managing the kernel updating and application downloading. Each key set contains two RSA key pairs. One is used for key encryption and the other is used for signature. These two key sets are specified as below:

ULD Manufacturer Key Set

- ULD Manufacturer Key Encryption Key (RSA)
- ULD Manufacturer Signature Key (RSA)

ULD User Key Set

- ULD User Key Encryption Key (RSA)
- ULD User Signature Key (RSA)

For VEGA3000, the RSA key length is 2048 bits.

4.1.1. ULD Manufacturer Key

The system consists of several kernel modules. These kernel modules are provided by the Manufacturer, and released in CAP format file with encryption and signing via ULD Manufacturer Keys.

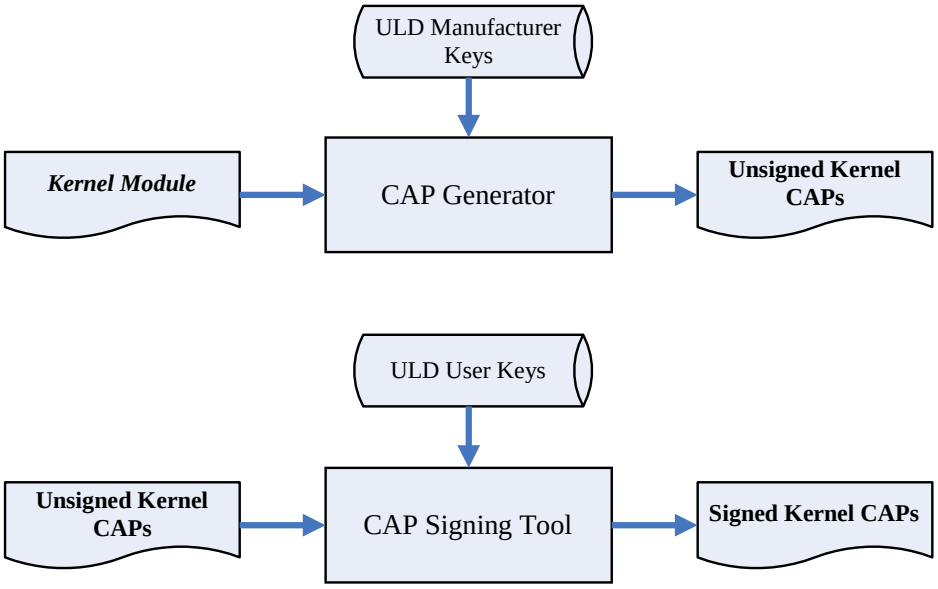
The ULD Manufacturer keys are managed and maintained by the manufacturer. The manufacturer uses these keys to generate kernel CAP files for updating the system. However, the system is not permitted to be updated with these kernel CAP files directly generated by the manufacturer. This is because only the user can have the privilege to decide whether the system is to be updated. Therefore, before system updating, the kernel CAP files must be “signed” via ULD User Key to get the user permission. For simple expression, we call the kernel CAP files

generated by the manufacturer as “unsigned kernel CAP(s)” and call the kernel CAP files “signed” by the user later as “signed kennel CAP(s)”.

Notes:

1. The kernel modules are encrypted by a random-generated 3DES key, which is retrieved from the Key Encryption Block of the CAP by ULD Manufacturer Key Encryption Key, not directly encrypted by ULD RSA Key.

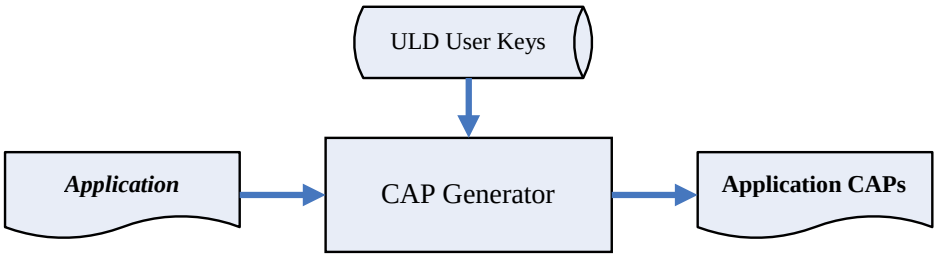
2. The “sign” action via ULD User Keys actually is done by” the second encryption”. “The second encryption” is done by using the random-generated 3DES key, which is encrypted by ULD User Key Encryption Key, to perform Triple DES encryption again on the cipher data segment of the kernel CAP files. This ensures that the system cannot retrieve the correct data from the kernel CAPs without the user permission.



4.1.2. ULD User Key

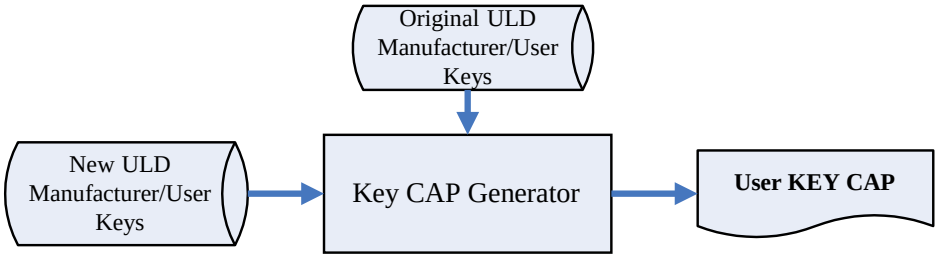
ULD User Key are used to encrypt and sign the user/shared applications. In addition, they are as goalkeepers to prevent the system updating without user permission. This is done by the kernel CAPs which are encrypted and signed by the manufacturer having to perform the “signed’ action via ULD User Keys.

Notes: Applications are encrypted by a random-generated 3DES key, which is retrieved from the Key Encryption Block of the CAP by ULD User Key Encryption Key, not directly encrypted by ULD RSA Key.



4.1.3. Key Change

The ULD RSA Keys are able to be changed. The system uses a special CAP file, KEY CAP, for the manufacturer and user to change their own keys. The KEY CAP contains a new set of ULD keys (Key Encryption Key and Signature Key). These new keys are encrypted and signed via the original keys. In other words, if the user would like to change the ULD User Keys, they have to use their original ULD User Keys with the new ULD User Keys to generate a KEY CAP.



4.2. File Signing

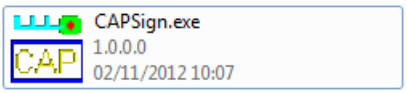
4.2.1. Signing Kernel Module

Castles will release new version of kernel module in “unsigned” form. This files required to sign with ULD User Key before it can load to terminal.

Castles Technology provides a tool named “CAP Signing Tool” to perform this task.

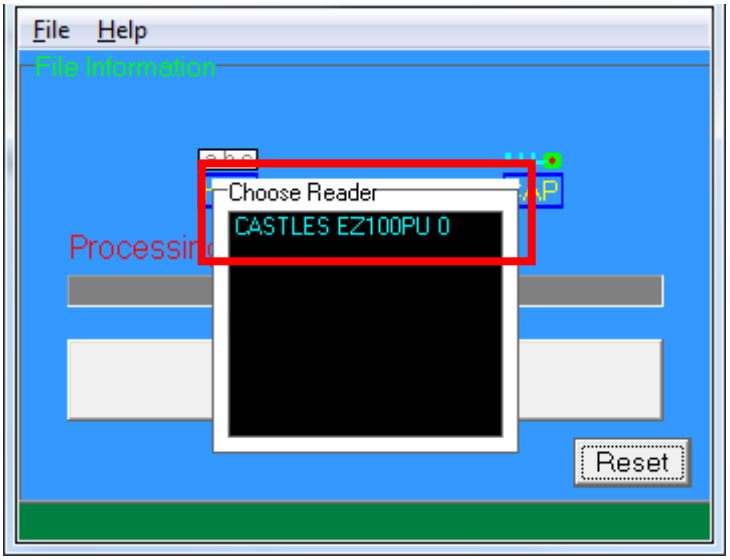
The CAP Signing Tool is located at:
C:\Program Files\Castles\VEGA3000\tools\Signing Tool

- Run CAP Signing Tool

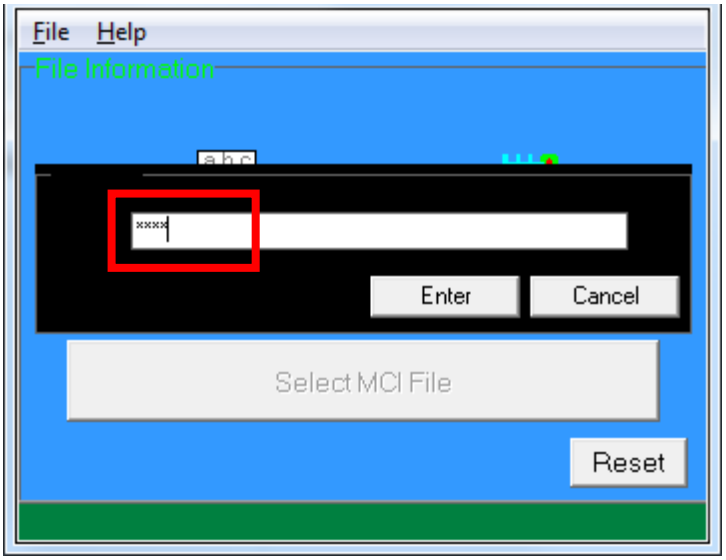


(VEGA3000)

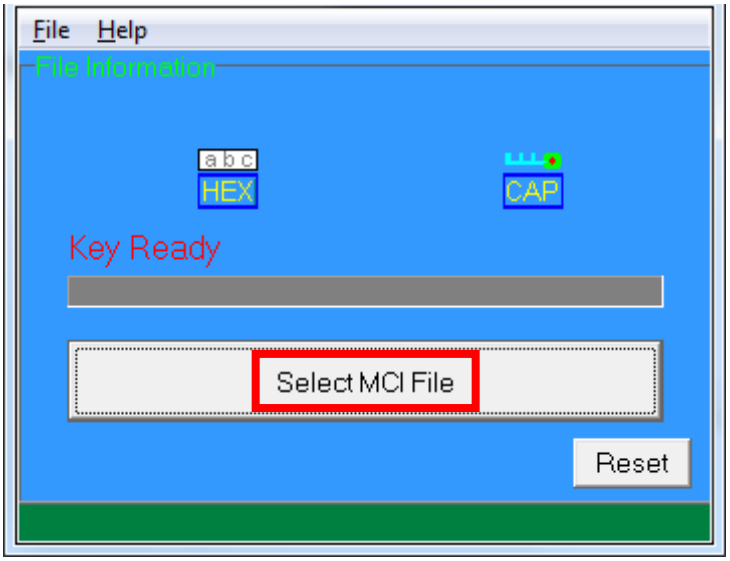
- Insert Key Card and select smart card reader



- Enter Key Card PIN



- CAP Signing Tool is ready, press “Select MCI File” button to browse the file.



- Output file will be located in “signed” folder.

4.2.2. Signing User Files

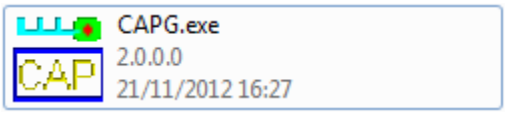
Following files are required to sign before load to terminal. This is to ensure the application data and codes confidential and integrity. The output file will be “CAP” file which format is defined by Castles.

- User application
- User application data files
- User application library
- Font file
- Share library
- Share files
- System setting
- Key CAP (Manufacturer ULD Key Set)

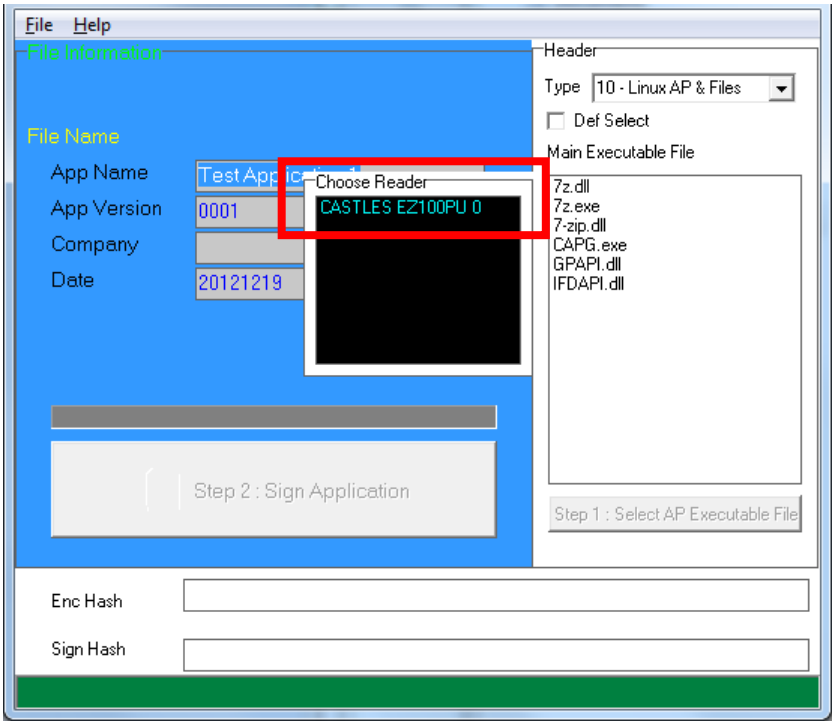
Castles Technology provided a tool named “CAP Generator” to perform this task.

The CAP Generator is located at:
C:\Program Files\Castles\VEGA3000\tools\CAPG (KeyCard)

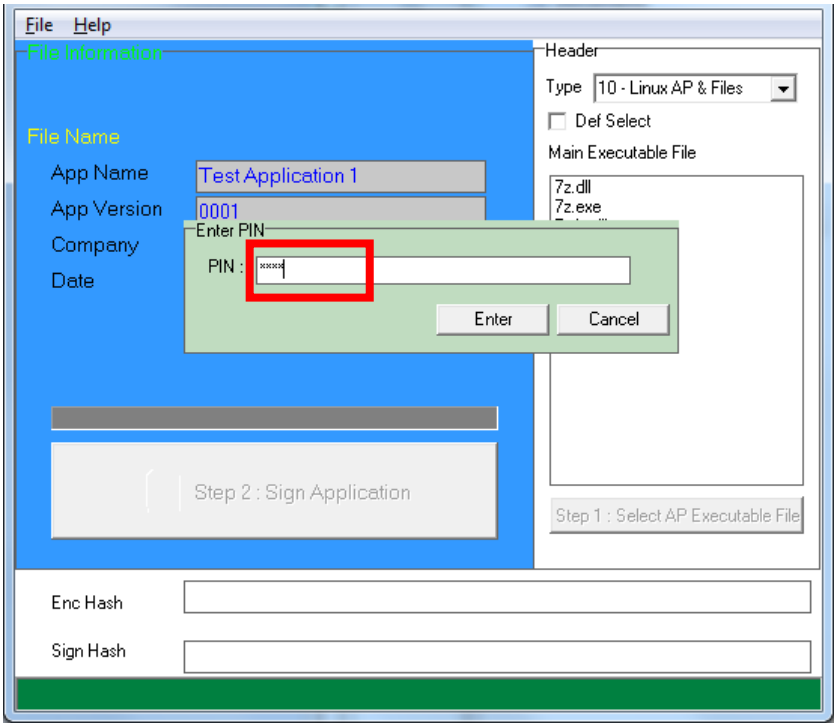
- Run CAP Generator



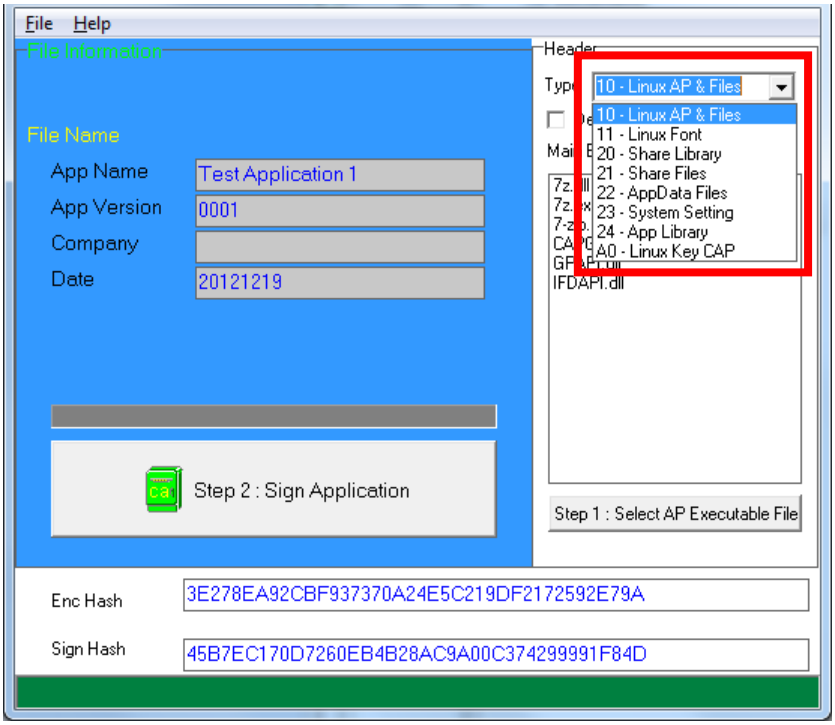
- Insert Key Card and select smart card reader



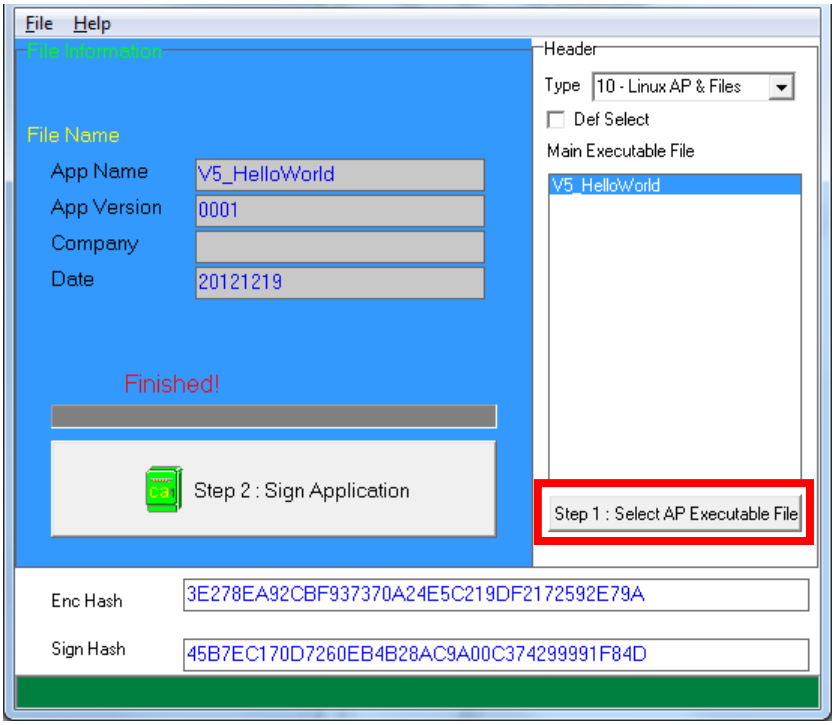
- Enter Key Card PIN



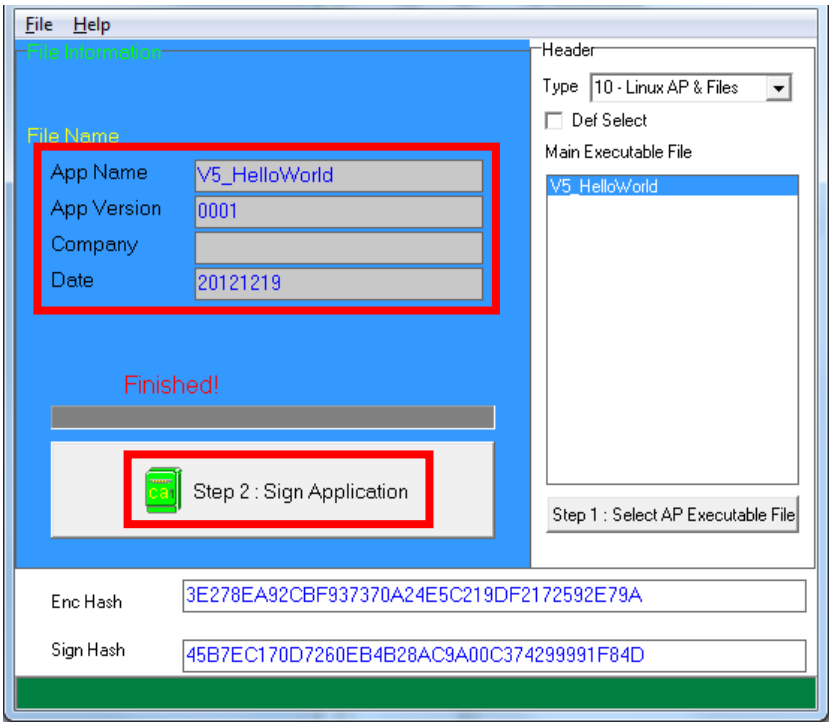
- CAP Generator is ready, select the correct Type from the list.



- Press “Step 1: Select AP Executable File” to select file to sign. This is valid for all the files to sign.



- Enter file details and press “Step 2: Sign Application” to sign the file. This is valid for all the files to sign.



- The output file will be in a set. A “mci” file with one or more “CAP” files. The CAP file contents the signed file binaries, where MCI file contents the list of CAP files.

App.CAP

App.mci

Note: If user would like to load multiple set of signed file, create a new file with extension of “mmci”. Then put the mmci file contents with the list of mci file.

MultiApp.mmci

4.3. File Loading

There are several ways of loading file to VEGA3000terminal.

- Download by User Loader
- Download by removable media
- Download by user application
- Download by Castles TMS

User Loader is a tool provided by Castles Technology. It's the formal way to download file to terminal.

User may implement their own ways of updating application or files using CTOS API provided, **CTOS_UpdateFromMMCI().**

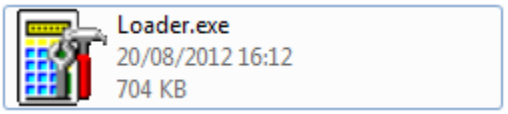
Castles TMS (CTMS or CASTLES Terminal Management System) is provided by Castles Technology. It uses to perform remote download via Ethernet, GPRS/UMTS or modem.

4.3.1. Download by User Loader

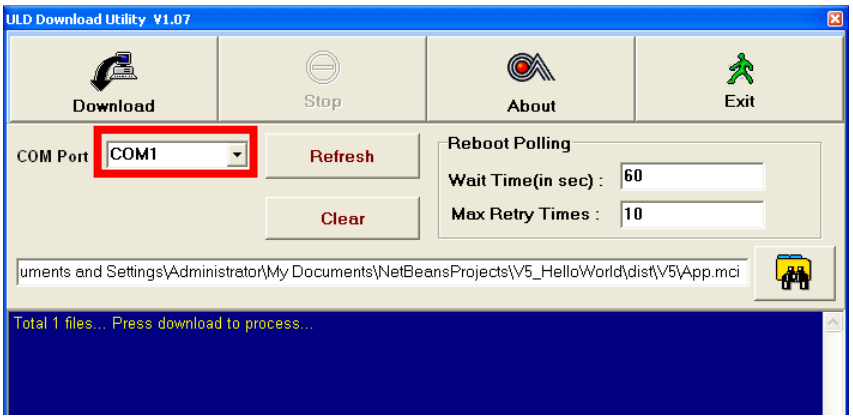
The User Loader works for VEGA3000.

The Loader is located at:
C:\Program Files\Castles\VEGA3000\tools\Loader

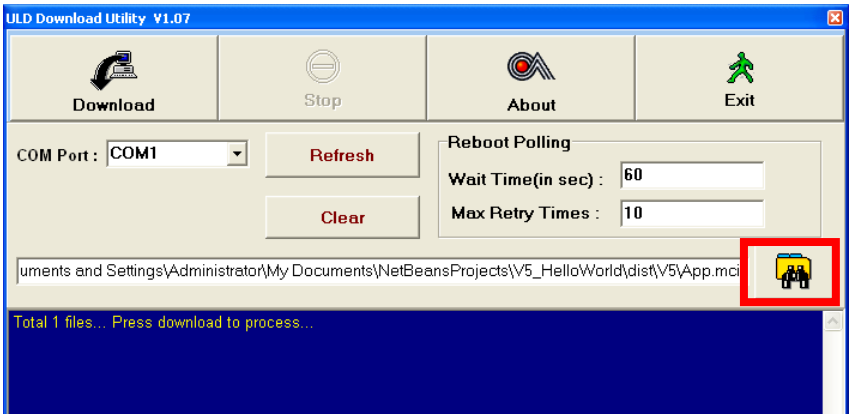
- Run User Loader



- Select COM port

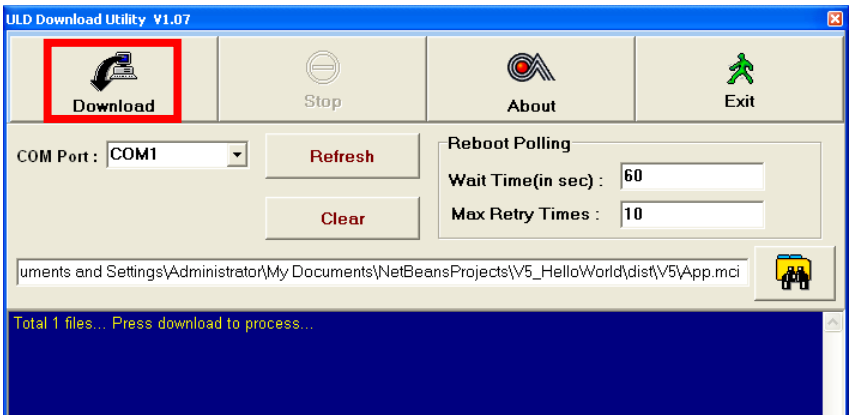


- Browse and select mci file or mmci file



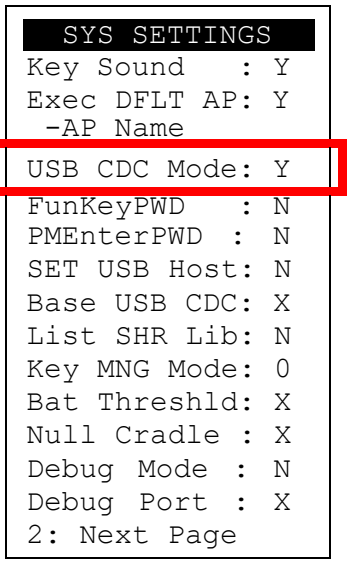
- Setup terminal to enter download mode
  - Press [0] button in Program Manager (PM)
  - Press [1] button to select “1. Download AP“
  - Press [1] button again to select download via RS232 or USB

- Press “Download” button to start.



Note: To download using USB cable, terminal must enable CDC mode.

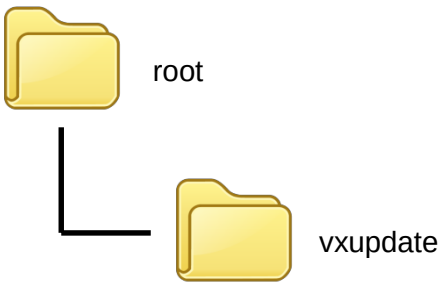
Set USB CDC Mode to Y.



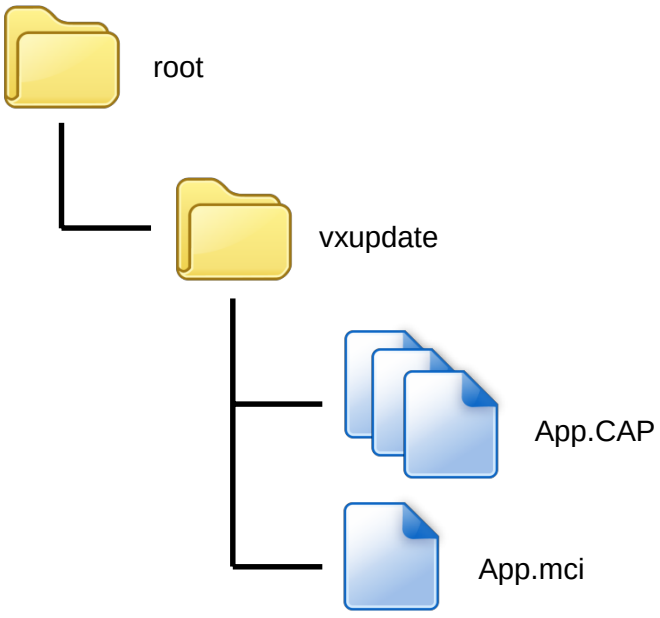
4.3.2. Download by Removable Media

The file download process can be achieved without PC by using removable media, USB flash drive or Micro SD memory card. We recommend don't put unwanted file to removable media, as it will increase the time during detection.

- Create a folder name "vxupdate" under root directory.



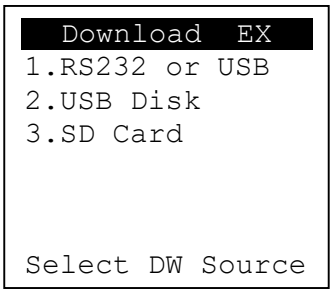
- Place the mci file and cap file to "vxupdate" folder.



Note: If user would like to load multiple application, create a new file with extension of "mmci". Then put the mmci file contents with the list of mci file.

- Insert removable media to terminal, and select the removable media type in “Download AP” menu.

  Download AP Menu

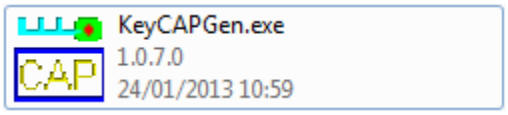
  - Press [2] button to select USB flash drive.
  - Press [3] button to select Micro SD card.

- Finally, terminal will process the file “vxupdate” folder.

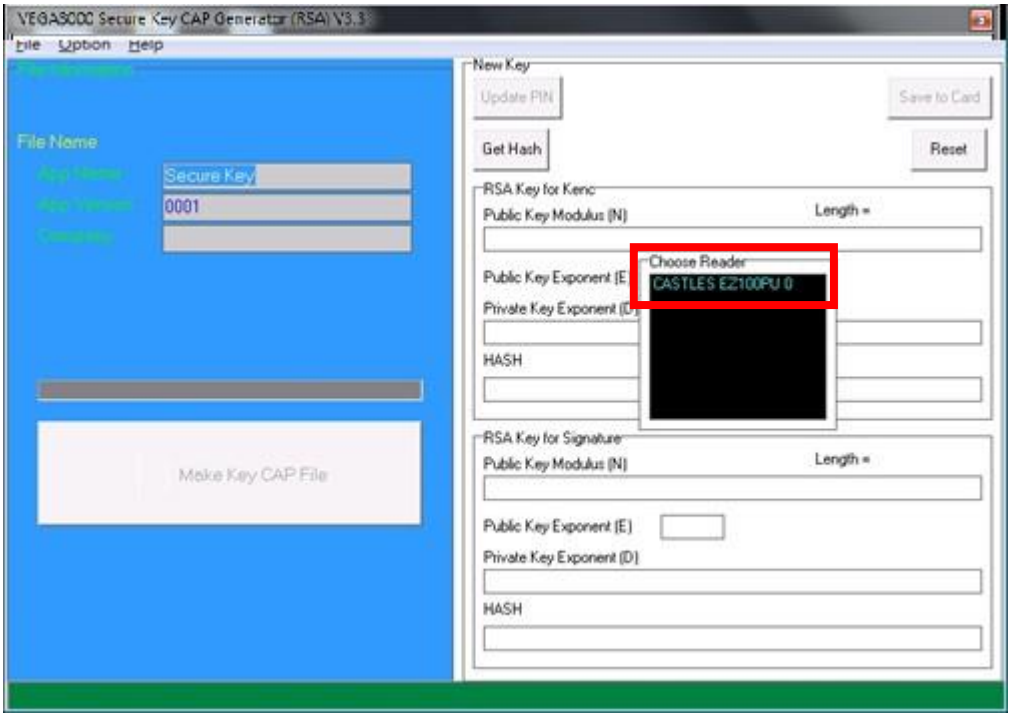
4.4. Changing ULD User Key

User may change their ULD User Key Set stored in Key Card. Castles Technology provided a tool named “Secure Key Generator” to perform this task.

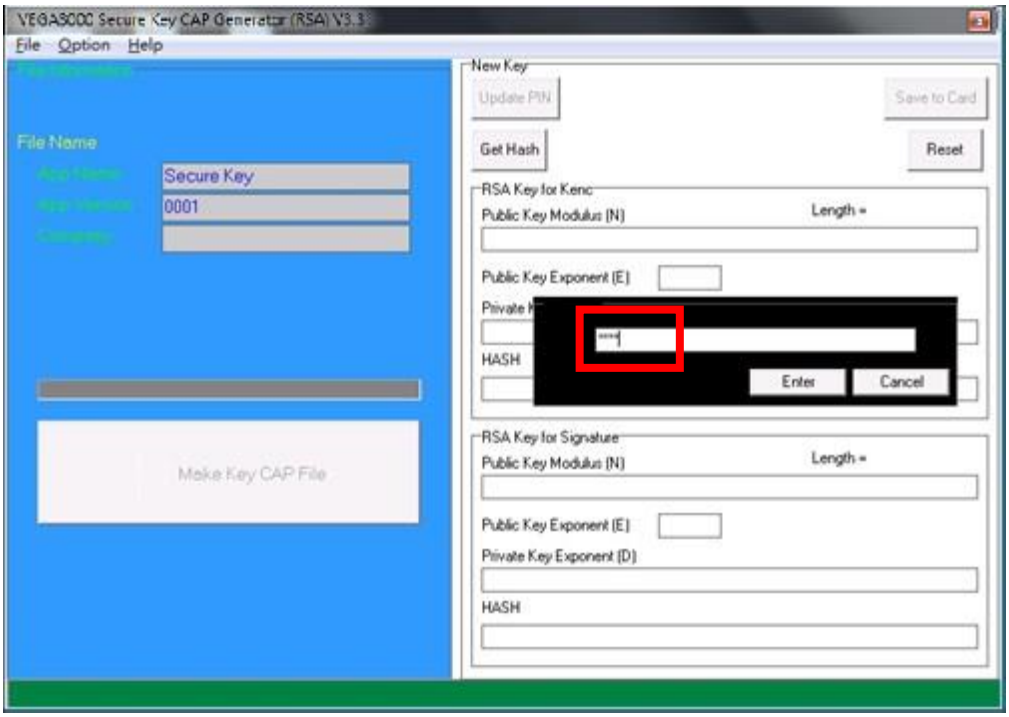
- Run Secure Key Generator



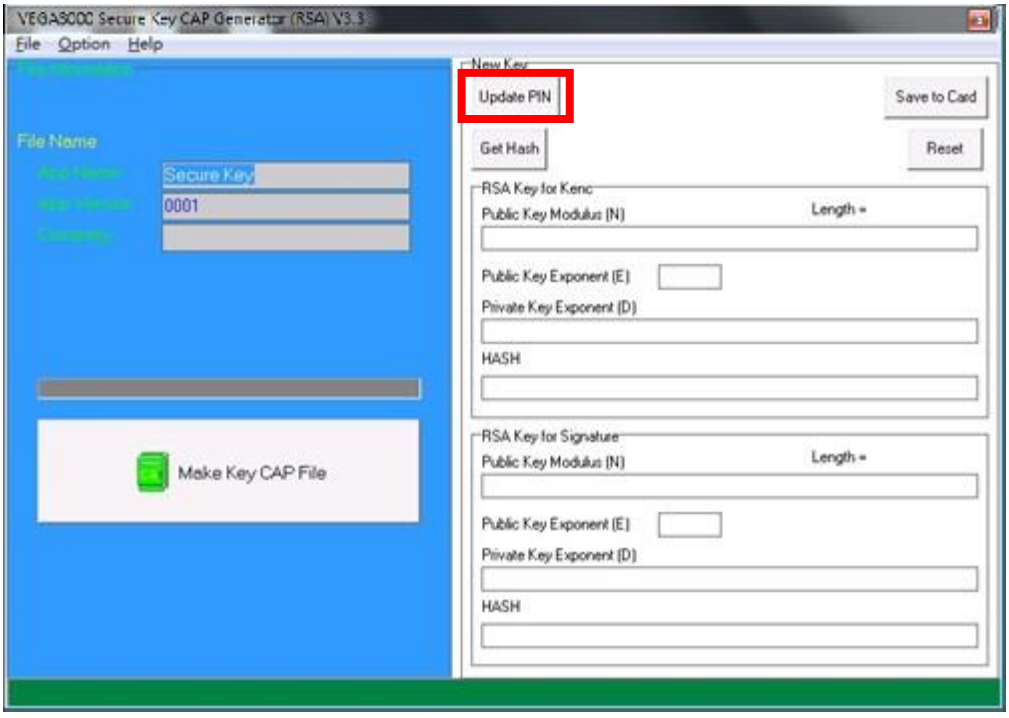
- Insert Key Card and select smart card reader



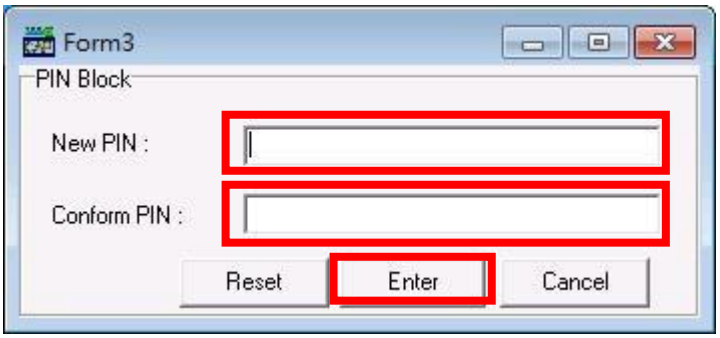
- Enter Key Card PIN, default PIN is “1234”.



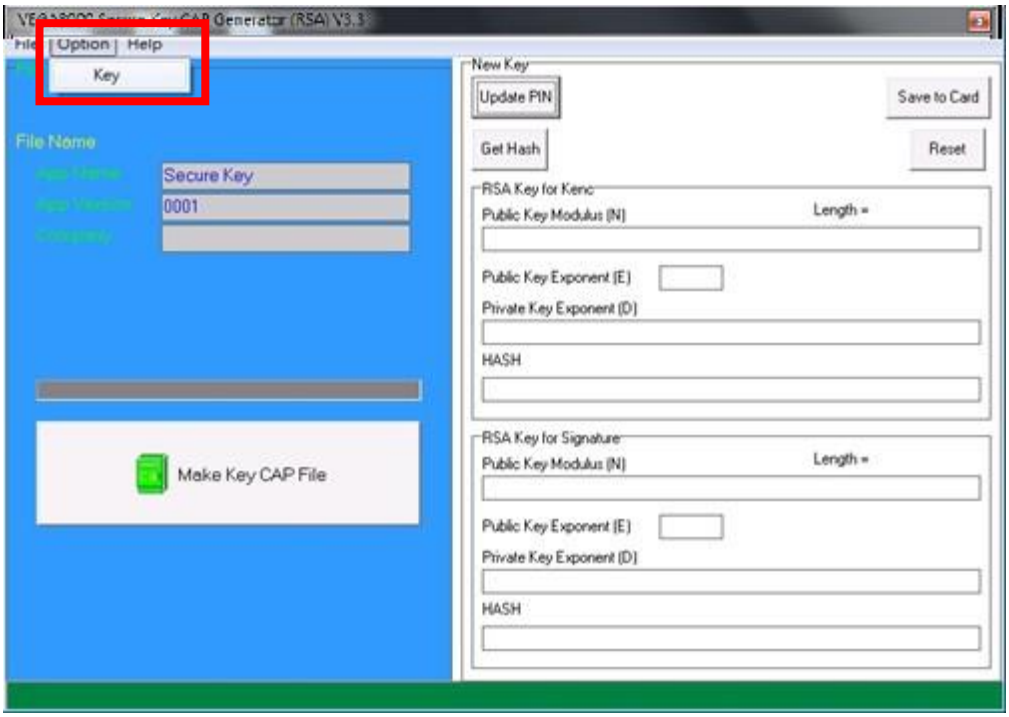
- To change Key Card PIN, press “Update PIN” button. If not, please skip this steps.

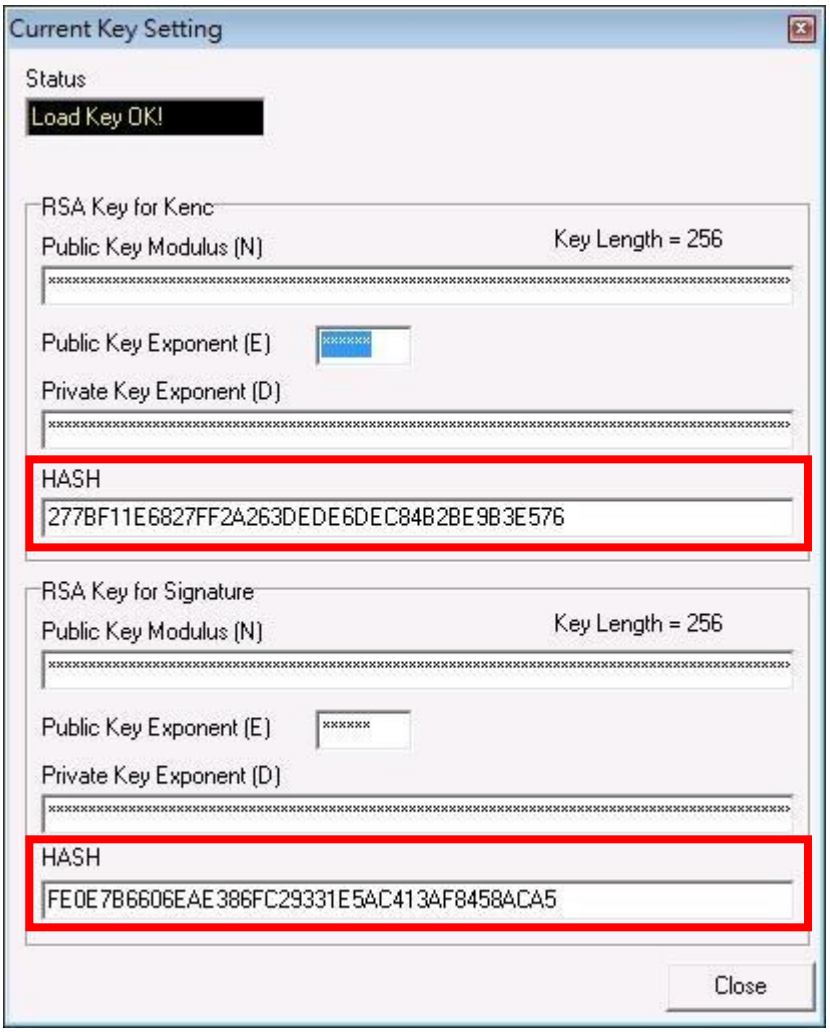


- Enter new PIN, enter new PIN again to confirm, then press [Enter] button to change PIN in Key Card.

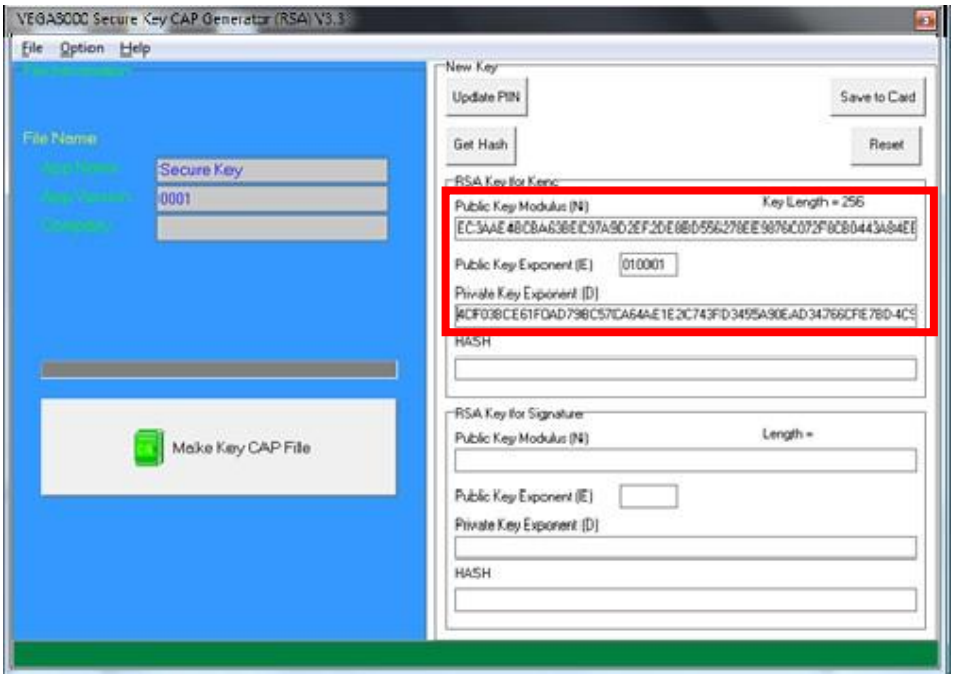


- To view current key set hash value, go to “Option” and select key.

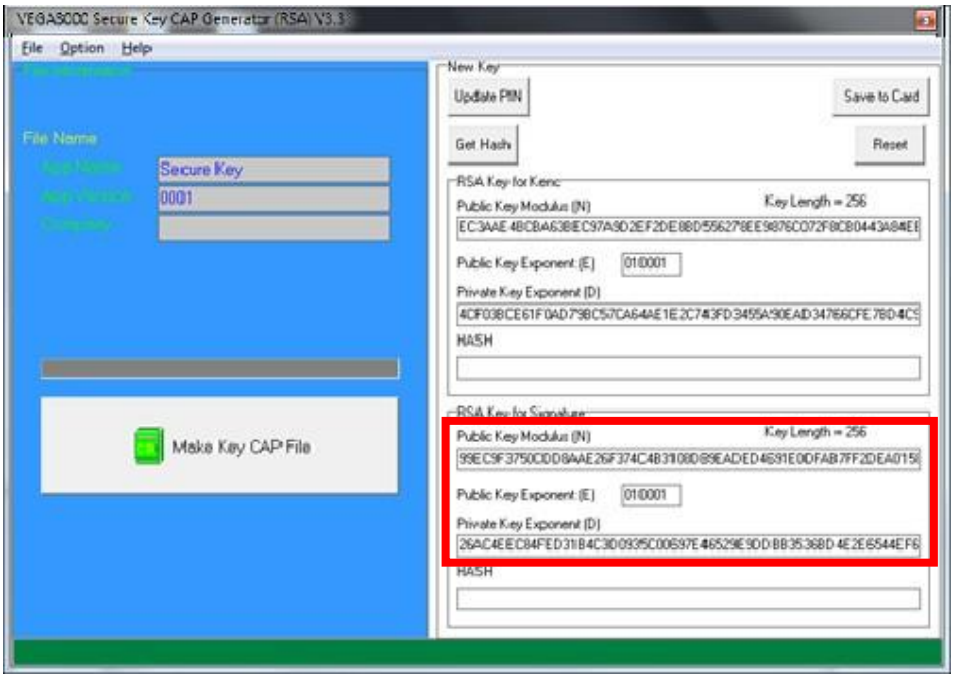




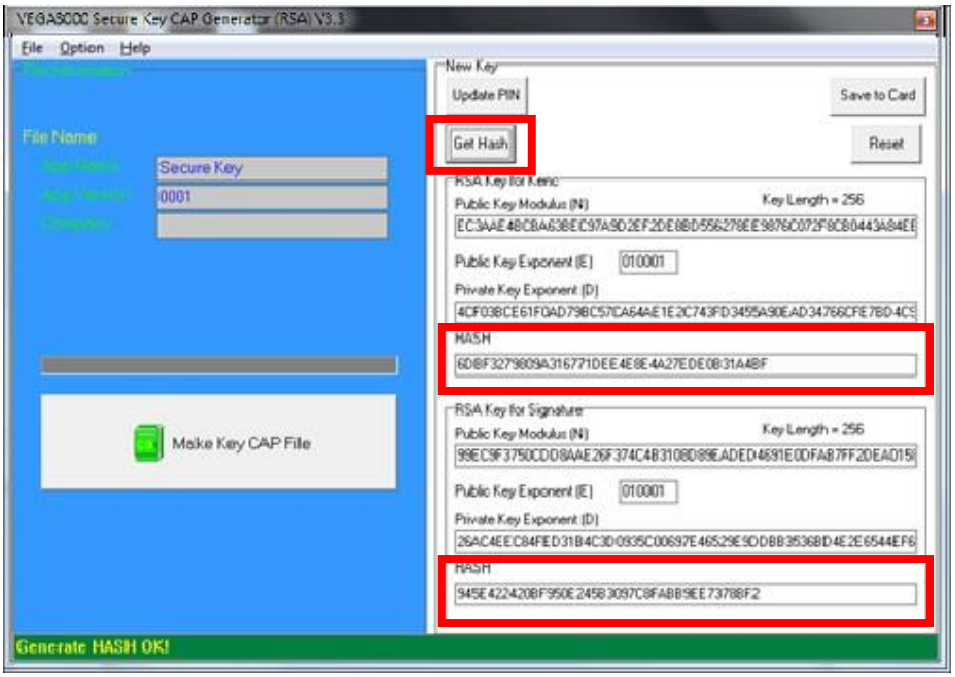
- To generate new user key set
  - Please generate the RSA key by yourself, the length of the RSA key set should be 2048 (bits).
  - Copy RSA key components to RSA Key for Kenc in Secure Key Generator.



- Generate second RSA key set for Signature.

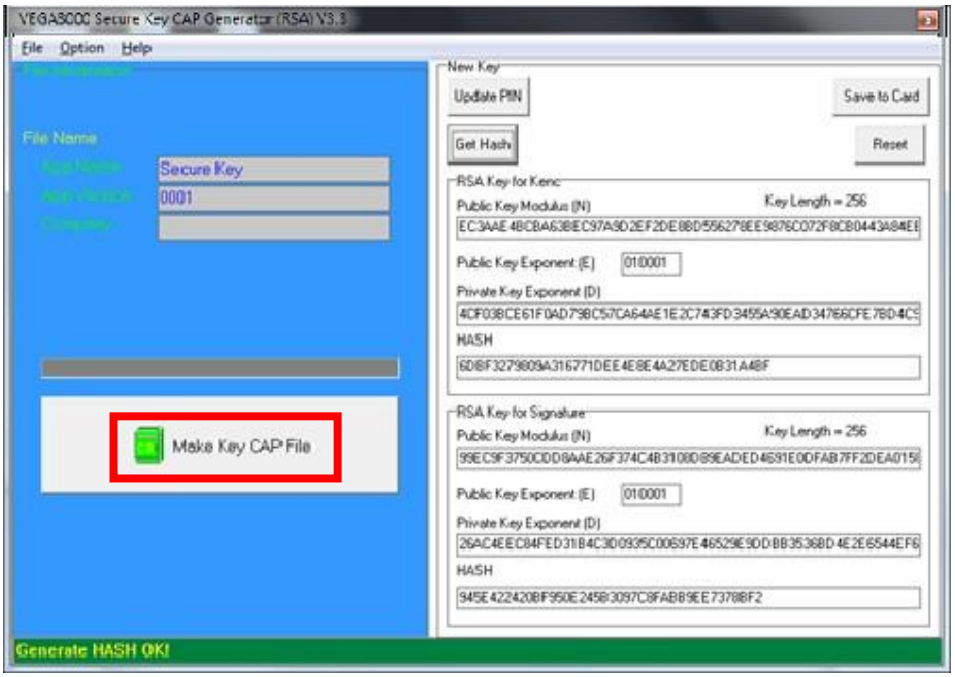


- Click [Get Hash] button to calculate the hash value for key sets.

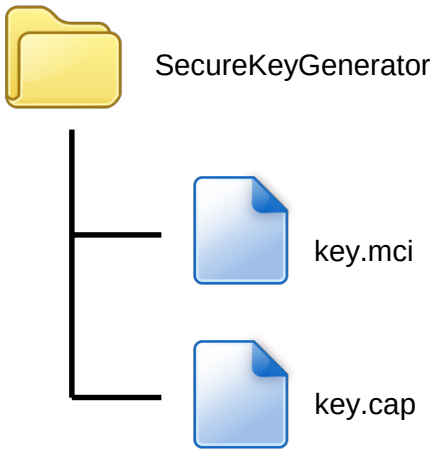


- Please copy down all the values into a text file and keep in a safe place. You will need this if you need to create duplicate Key Card.

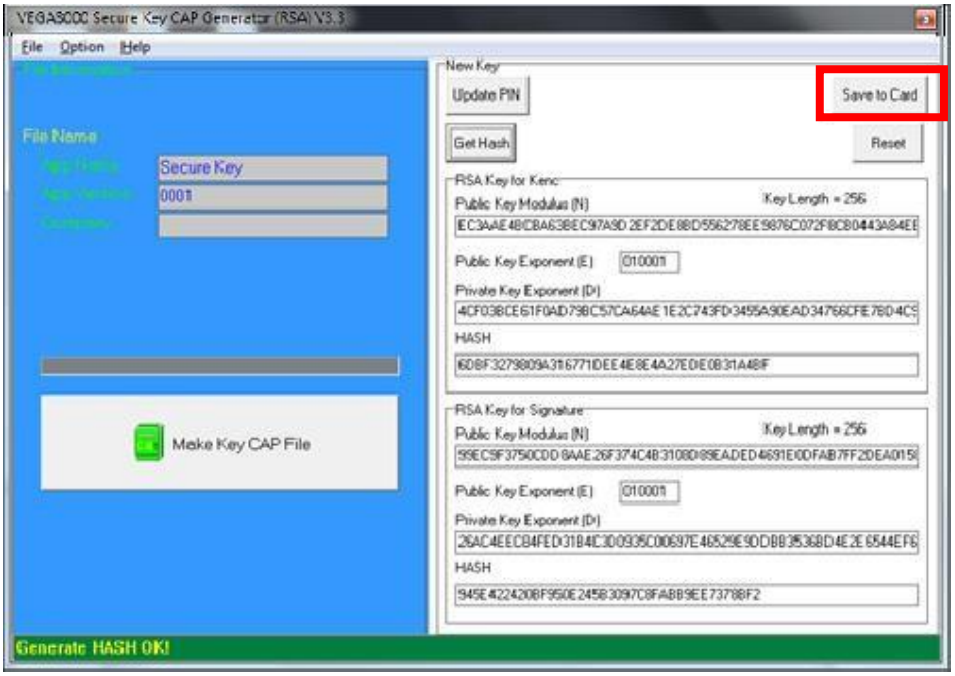
- To generate the key CAP for the newly generated user key set, press [Make Key CAP File] button.



- The output file will be located in the Secure Key Generator folder.



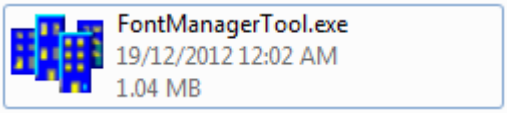
- To update the newly generated key set to Key Card, press [Save to Card] button to write the key set to Key Card.



5. Font Management

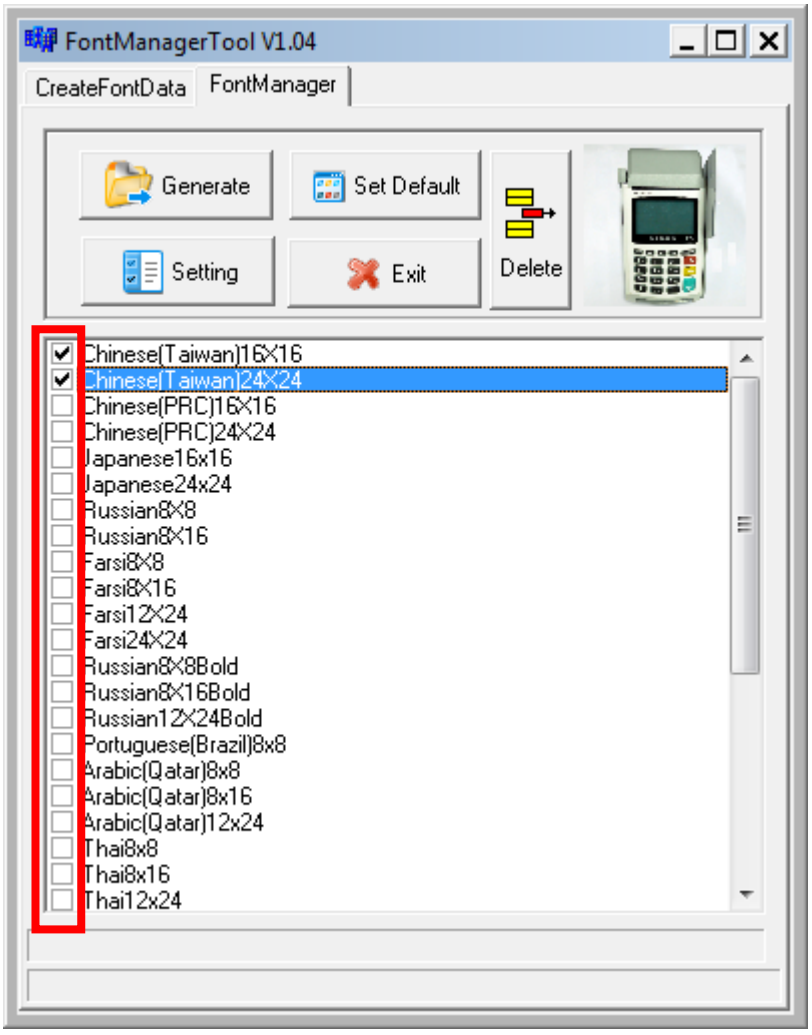
5.1. Loading New Font

- Run FontManager.exe

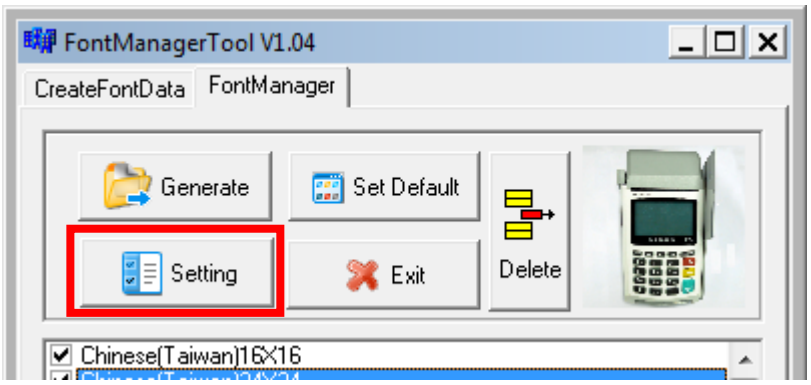


Located at C:\Program Files\Castles\Font Manager

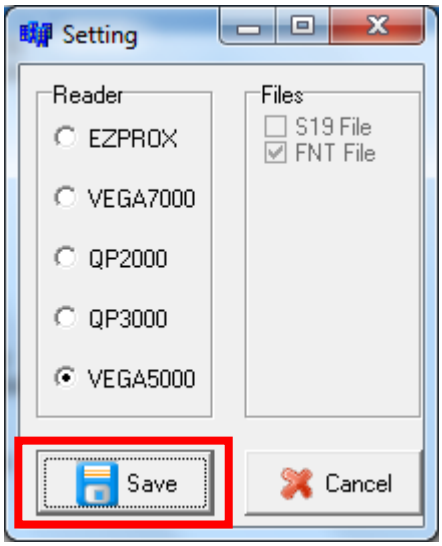
- Select font to download



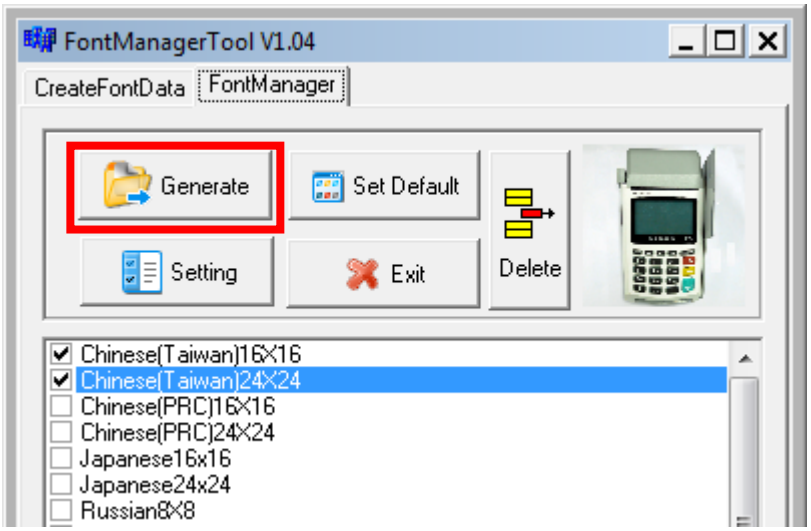
- Press [Setting] button to configure terminal type.



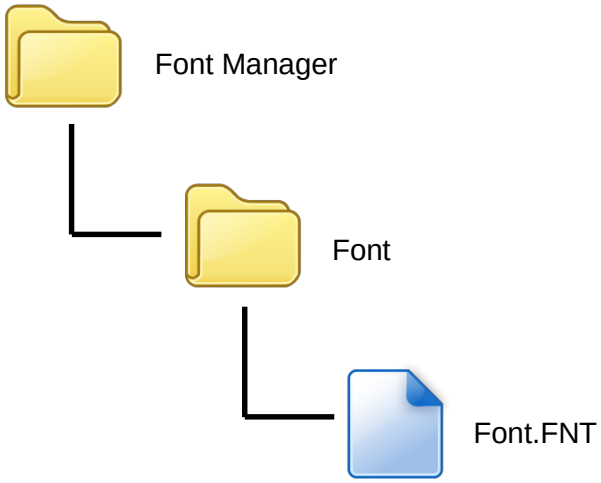
- Select **VEGA5000**, press [Save] button to save and return font manager.



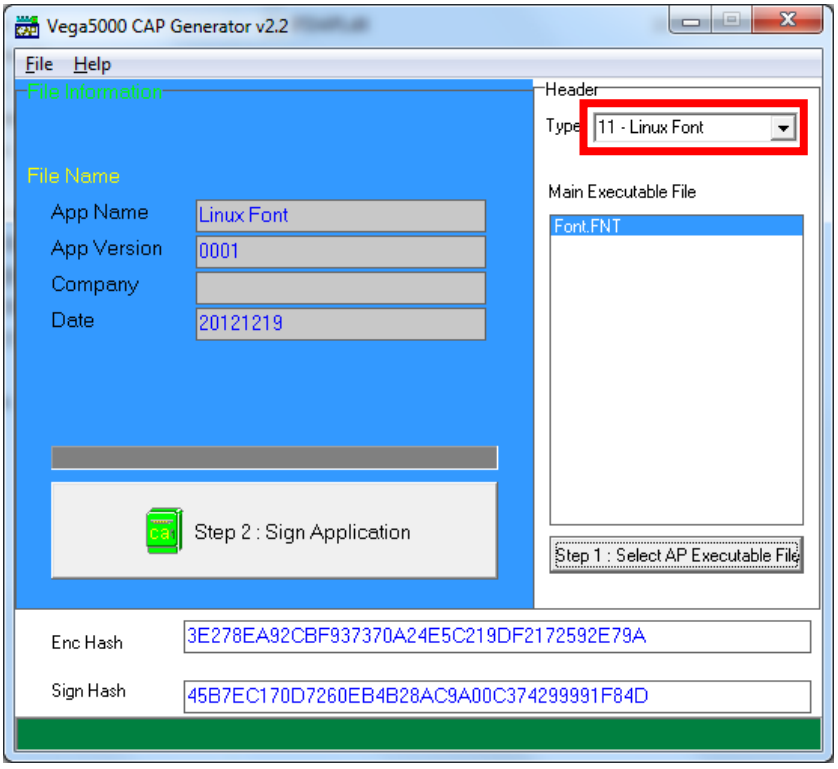
- Press [Generate] to create the font file.



- Output file “Font.FNT” will be located at sub-directory named “Font” in “Font Manager” folder.



- Sign the file using CAP Generator, the type must set to “11 – Linux Font”.



- Lastly, download the signed file (CAP file) to terminal using Loader.

5.2. Custom Font

User may create font they preferred for displaying or printing on terminal.

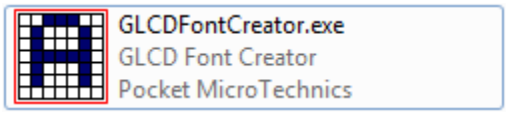
There are two zone defined:

Zone 0x00 ~ 0x7F – ASCII characters, you may replace with the font type preferred or your own language character set.

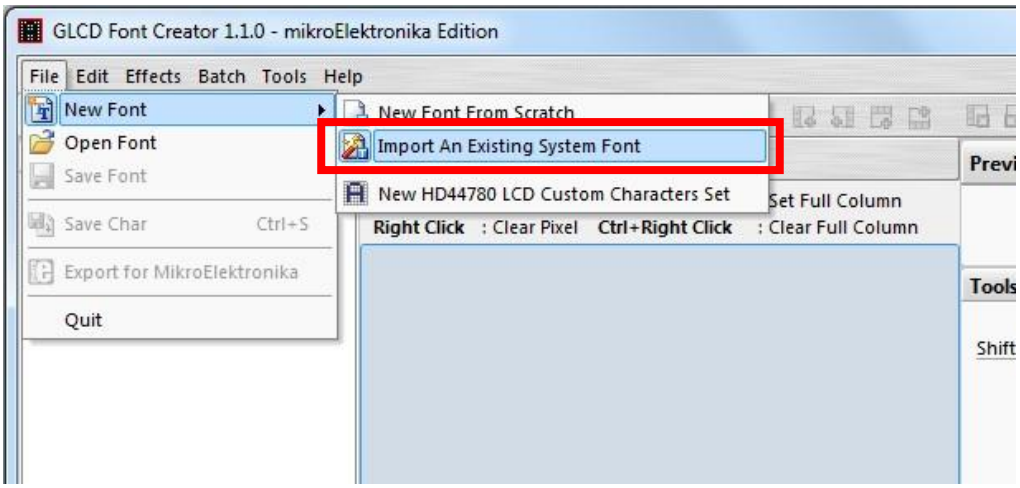
Zone 0x80 ~ 0xFF – Free to use, you may use for symbols.

Following steps demonstrate how to create a 12x24 font.

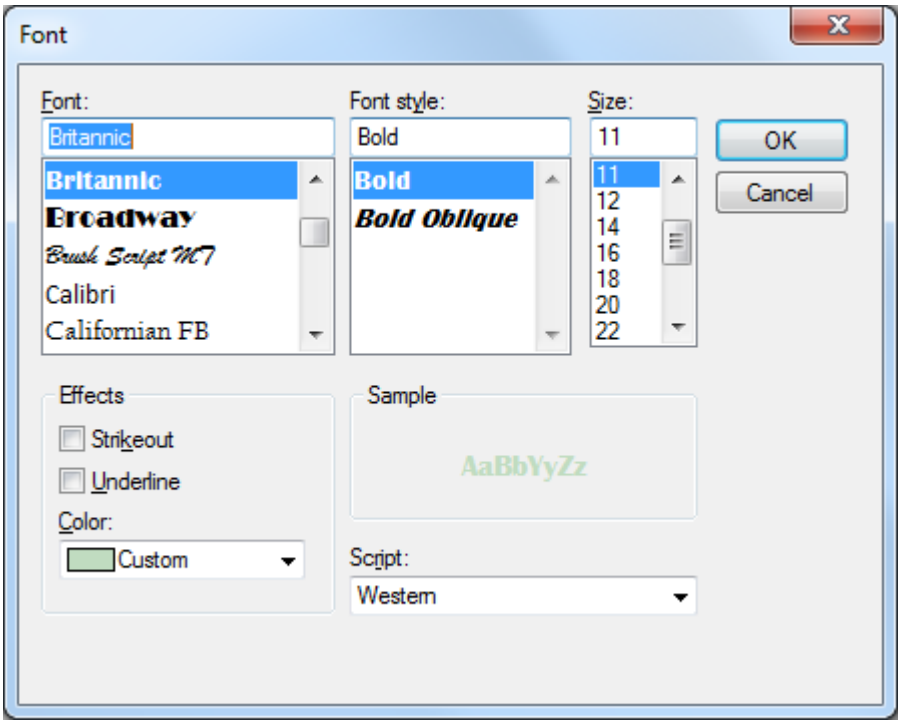
- Run GLCD Font Creator



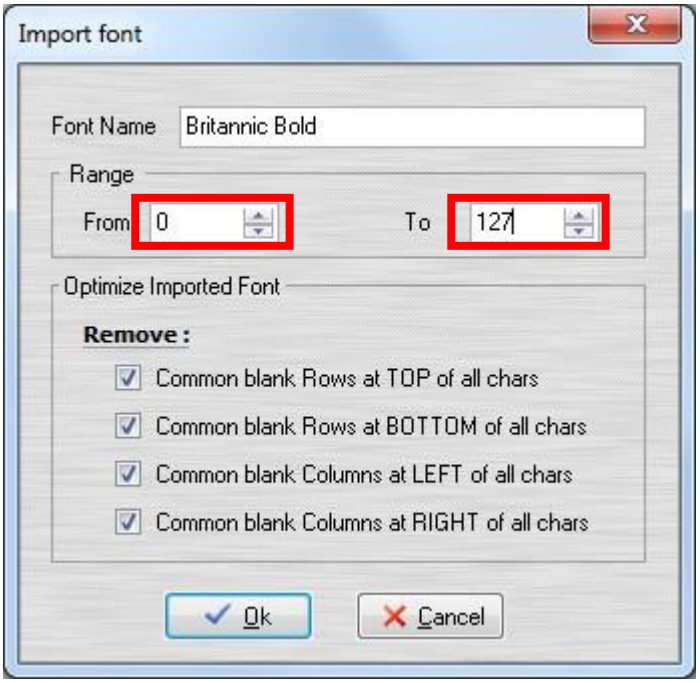
- Select [File] ⇨ [New Font] ⇨ [Import An Existing System Font]



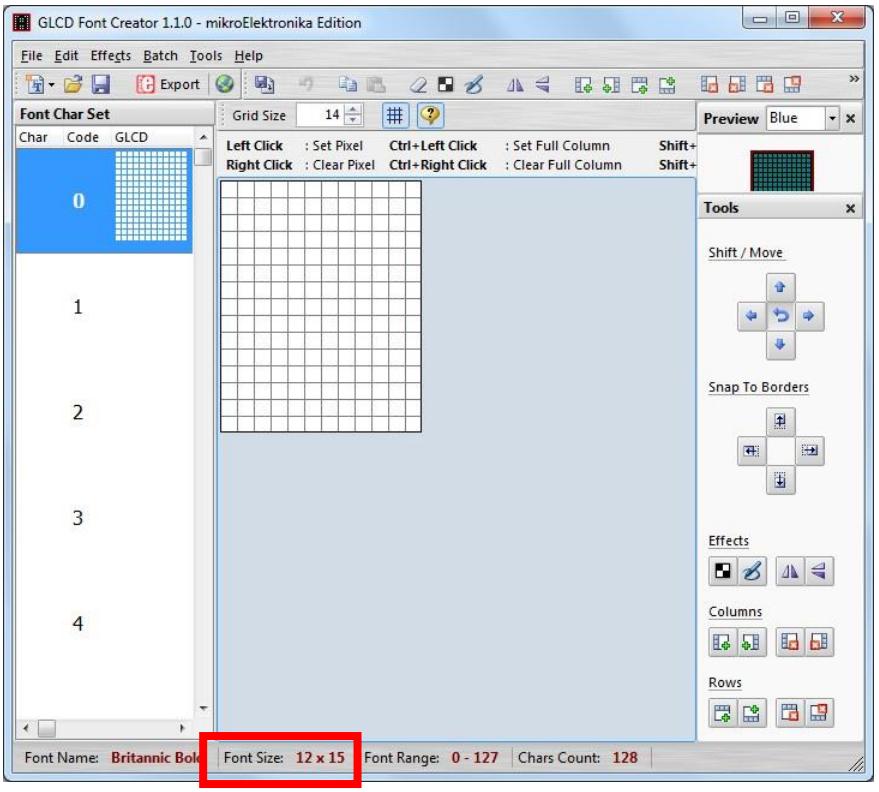
- Select the font needed, simply choose a font size. The final value of font size should be determine by the minimum pixel width. You may need to repeat this steps few times to find the best fit font size.



- Set the import range from 0 to 127.

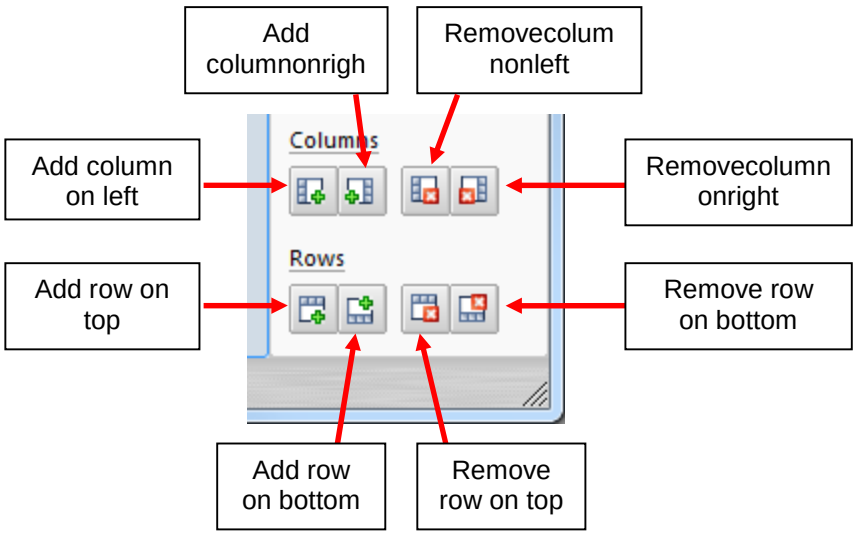


- Check the minimum pixel width and height.

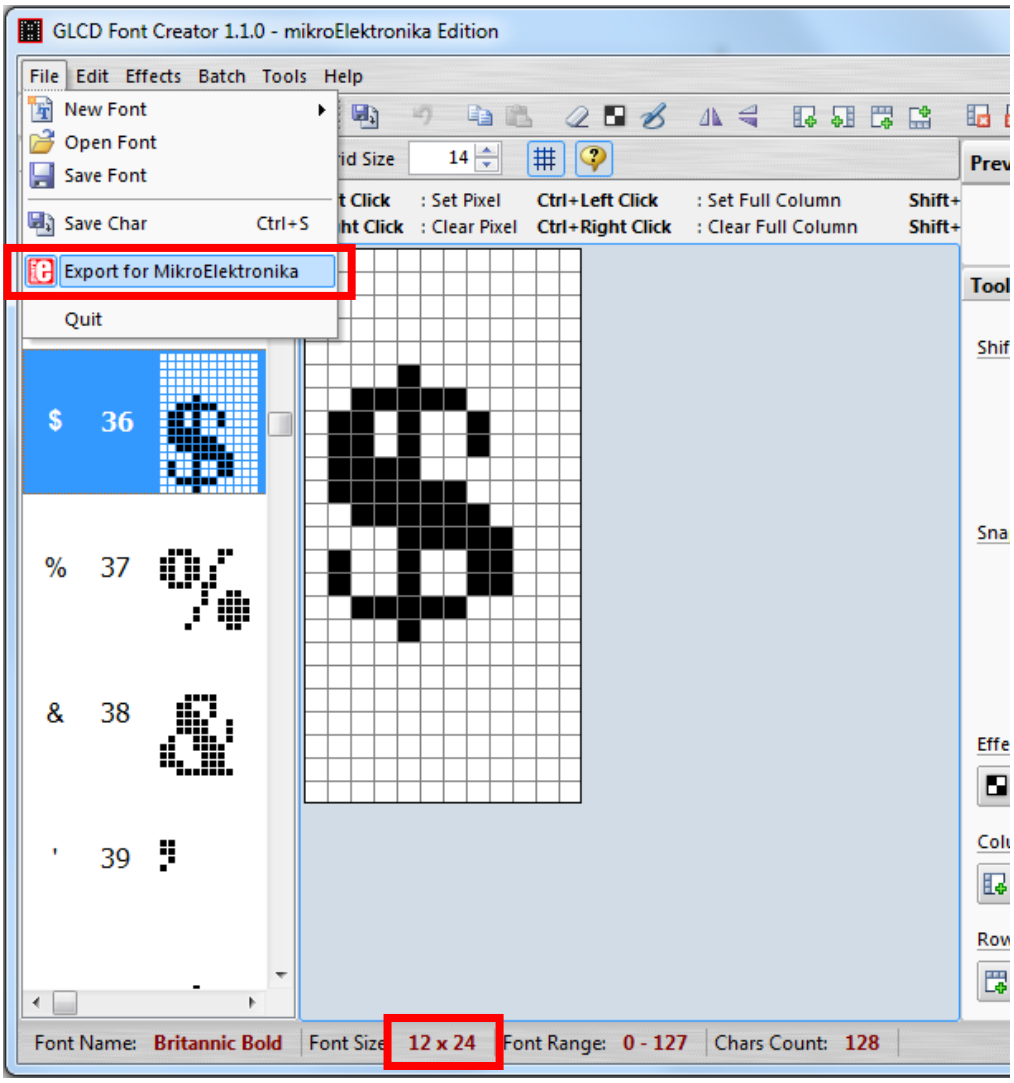


- If the pixel width of the font size is larger than expected, then you have to repeat the previous steps to import font with smaller size.

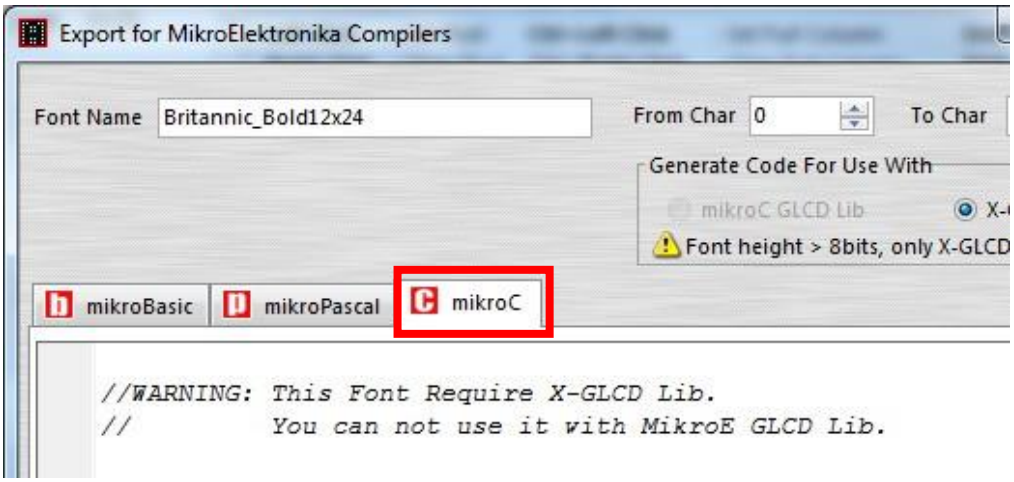
- Use the following buttons to adjust the font size to match with expected font size.



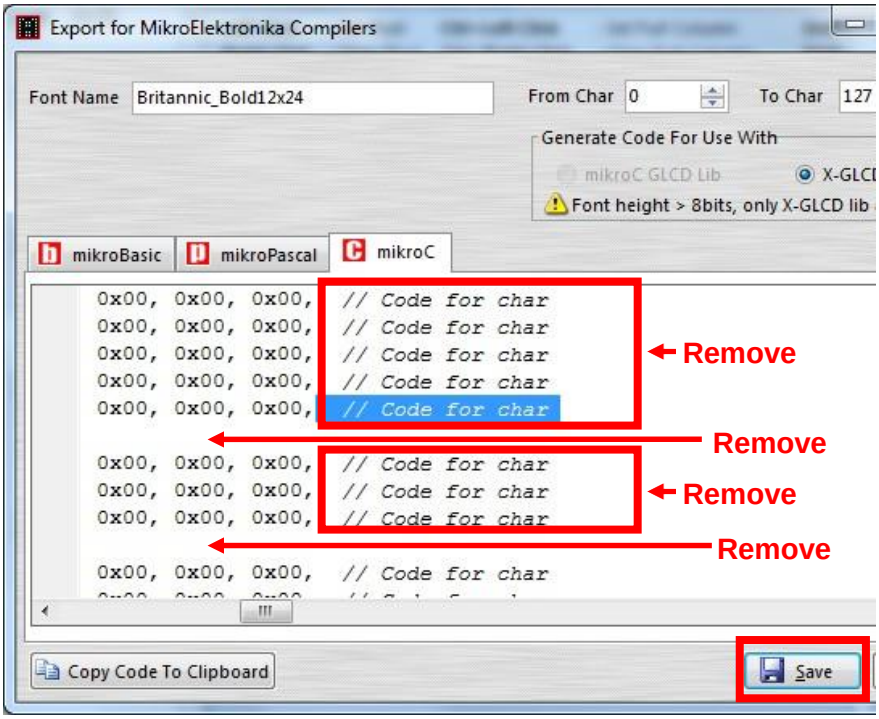
- After adjust font size, select [File] ⇨ [Export for MicroElektronika].



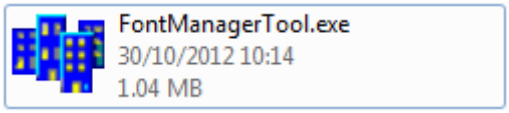
- Select output format as [mikroC].



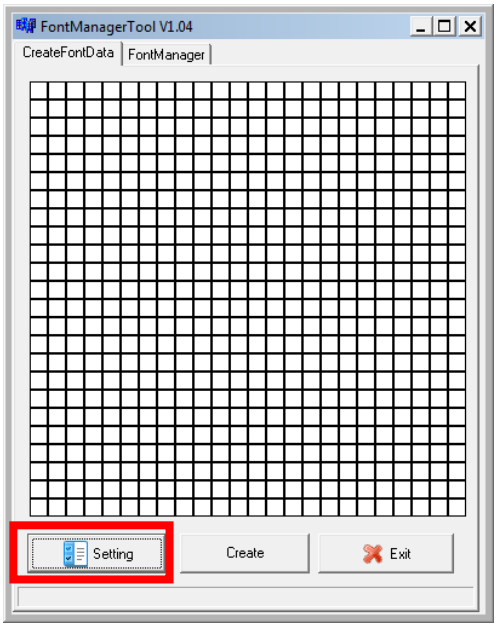
- Remove comment “// Code for char “from offset 0x00 to 0x1F. Remove empty line if found. Then click [Save] button to save to file.



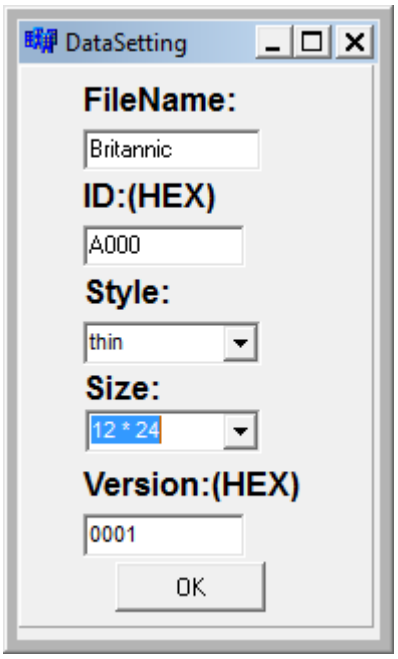
- Run Font Manager Tool.



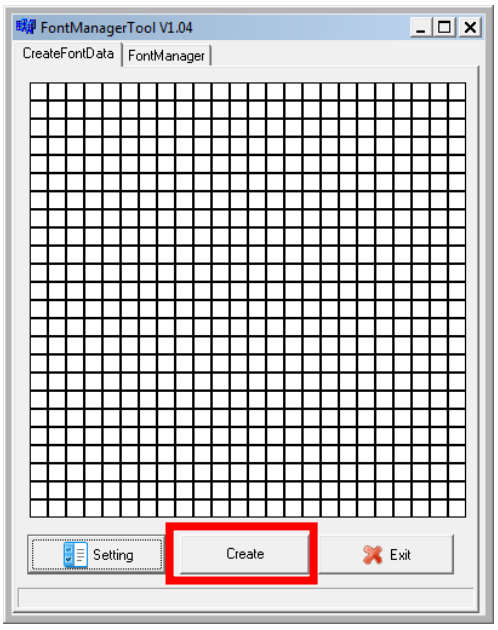
- Click [Setting] button



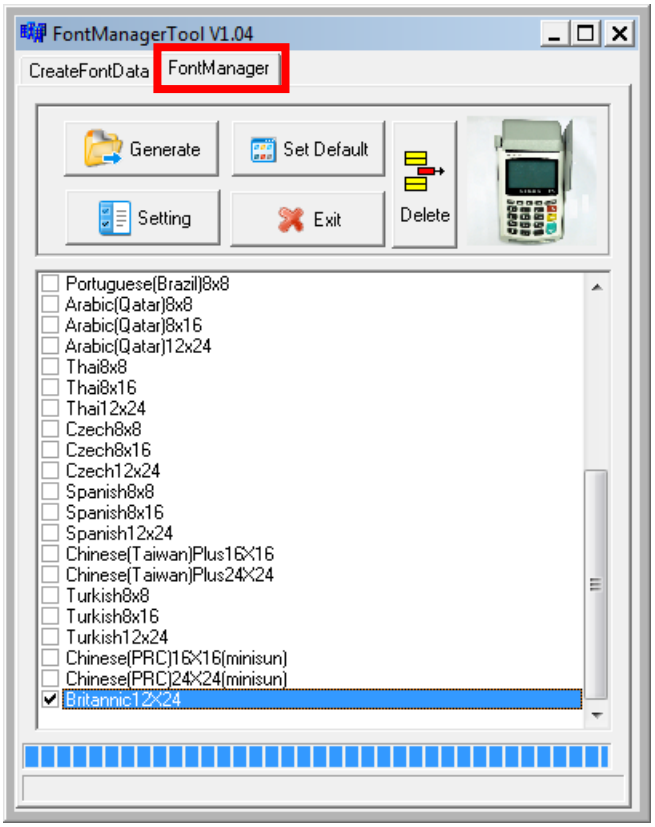
- Enter the file name, font id, and select the size.



- Click [Create] button, and select the C file previously created using GLCD Font Generator.

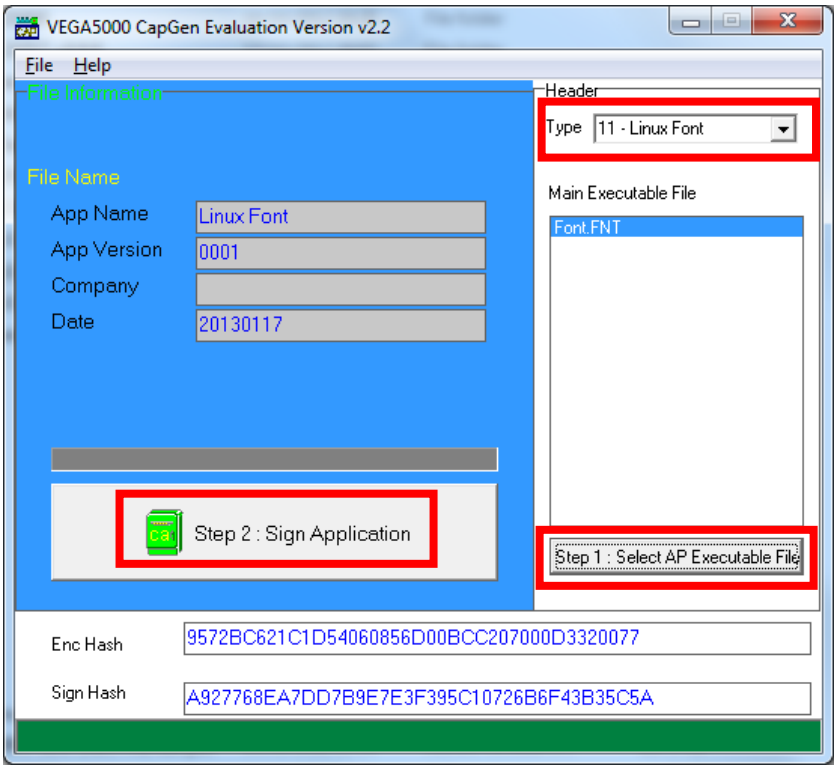


- Select [Font Manager] tab and tick the newly created font, and press [Generate] button to export to FNT file.



- Use CAP Generator to convert the FNT file to CAP.

  Set type to [11 – Linux Font], press [Step 1] button select the FNT file. Then press [Step 2] to generate CAP file.



- Download the font CAP file to terminal.
- In terminal application, add following code to display message using the newly created font.

```
CTOS_LanguageConfig(0xA000,d_FONT_12x24,0,d_FALSE);
CTOS_LanguageLCDSelectASCII(0xA000);
CTOS_LCDTPrintXY(1, 1, "ABCDEFGH");
```

  Or print message using the newly created font.

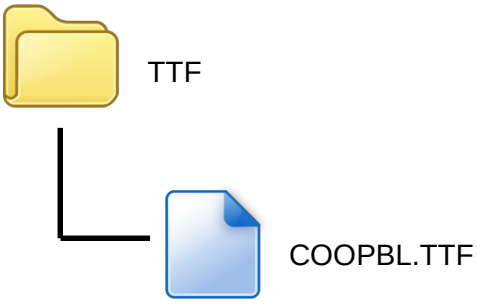
```
CTOS_LanguagePrinterSelectASCII(0xA000);
CTOS_PrinterPutString("ABCDEFGH");
```

5.3. Using TrueType Font (TTF)

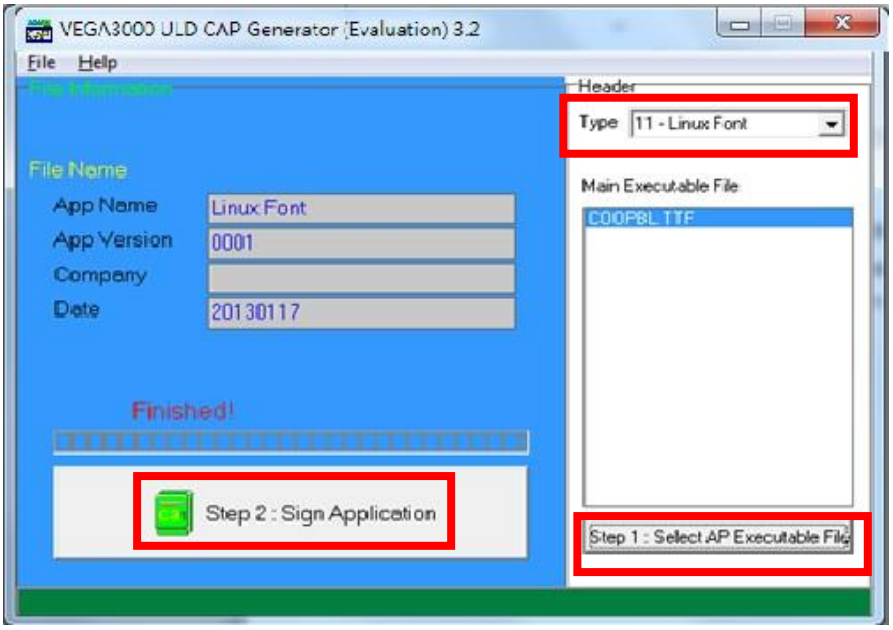
TrueType Font (TTF) is supported in VEGA3000 terminal. You can download the TrueType font to terminal for displaying or printing.

Following steps demonstrate how to use "Cooper Black" TrueType font.

- Copy the TTF file needed to an empty folder.



- Use CAP Generator to convert the TTF file to CAP.
  Set type to [11 – Linux Font], press [Step 1] button select the TTF file.
  Then press [Step 2] to generate CAP file.



- Download the font CAP file to terminal.

- In terminal application, add following code to display message using the newly added font.

```
CTOS_LCDTTFSelect("COOPBL.TTF", 0);
CTOS_LCDFontSelectMode(d_FONT_TTF_MODE);
CTOS_LCDTSelectFontSize(0x203C); // 32x60
CTOS_LCDTClearDisplay();
CTOS_LCDTPrintXY(1, 1, "Hello World");
```

Or print message using the newly added font.

```
CTOS_PrinterTTFSelect("COOPBL.TTF", 0);
CTOS_PrinterFontSelectMode(d_FONT_TTF_MODE);
CTOS_LanguagePrinterFontSize(0x203C, 0, 0); // 32x60
CTOS_PrinterPutString("Hello World");
```

6. Appendix

6.1. FCC Warning

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

This device meets the government's requirements for exposure to radio waves.
This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government.
The exposure standard for wireless device employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit set by the FCC is 1.6W/kg. *Tests for SAR are conducted using standard operating positions accepted by the FCC with the device transmitting at its highest certified power level in all tested frequency bands.

6.2. Safety Warning for External Power Source

To reduce potential safety issues, only the AC adapter provided with the product, a replacement AC adapter provided by agency, or an AC adapter purchased as an accessory from agency should be used with the product.

~ END ~