



SKY15-P20A

15" RUGGED SMART DISPLAY WITH 20 PROGRAMMABLE FUNCTION KEYS



USER MANUAL

Safety Information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area.
- If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your local distributor.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter any technical problems with the product, contact your local distributor

Statement

- All rights reserved. No part of this publication may be reproduced in any form or by any means, without prior written permission from the publisher.
- All trademarks are the properties of the respective owners.
- All product specifications are subject to change without prior notice

Revision History

| Revision | Date(YYYY/mm/dd) | Changes |
|----------|------------------|-----------------|
| V1.0 | 2025/03/27 | Initial Release |
| | | |

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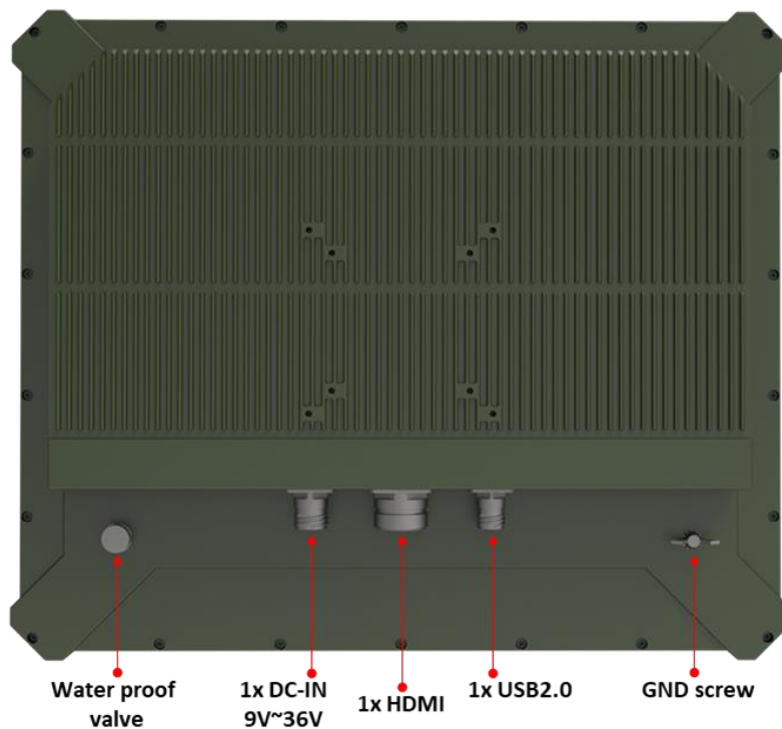
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Chapter 1: Product Introduction

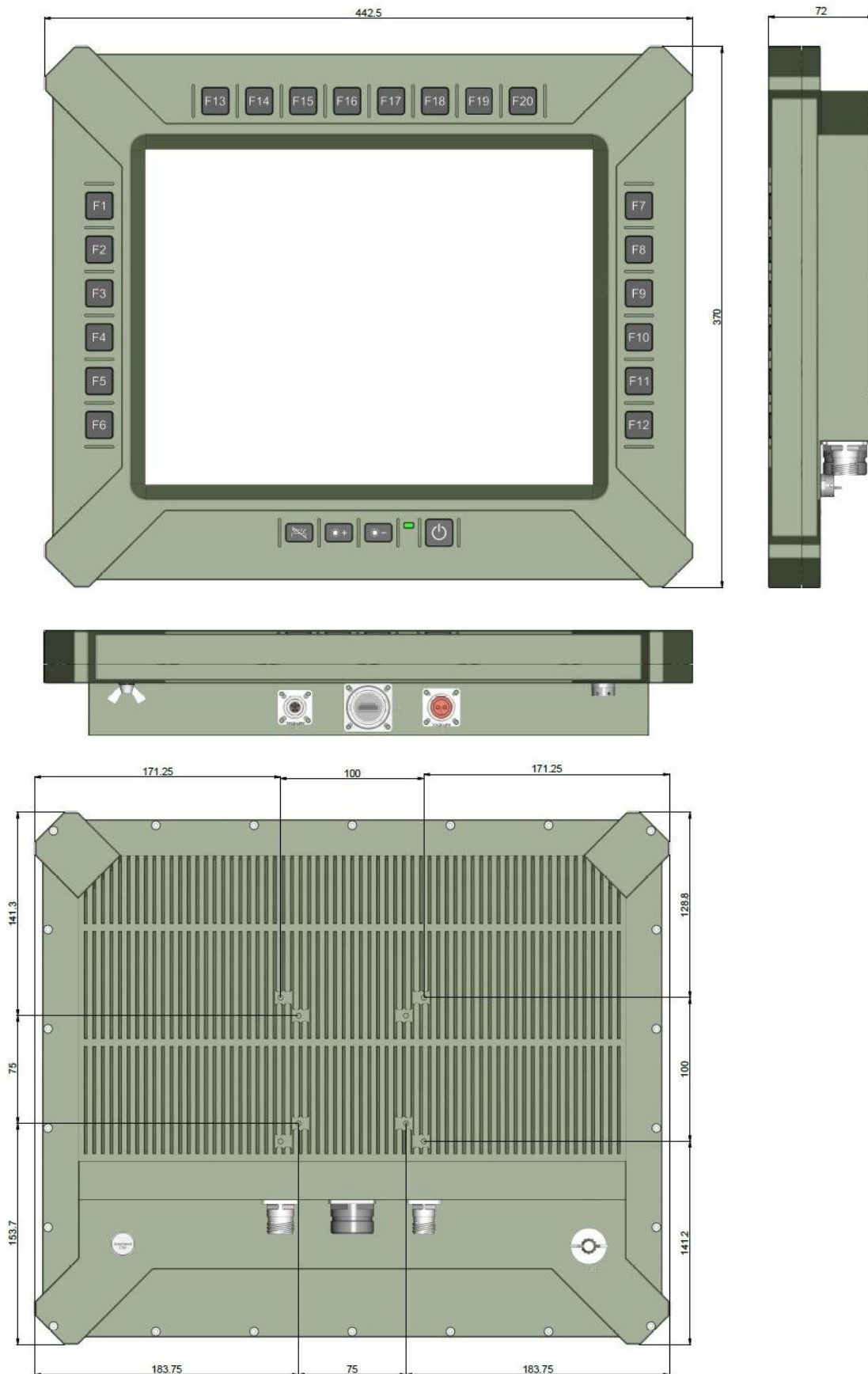
1.1 FRONT VIEW



1.2 REAR VIEW



1.3 ME DIMENSION



Chapter 2: Components

2.1 LOCATION

A clean and moisture free environment is preferred. Make room for air circulation. Avoid areas with:

- Sudden or extreme changes in temperature.
- Extreme heat.
- Strong electromagnetic fields.
- Dust or high humidity.

If it is necessary to work in a hostile environment, please regularly maintain your display by cleaning dust, water, etc. to keep it in optimal condition.

2.2 RUGGEDNESS

The display is designed with rugged features such as vibration, shock, dust and rain/water protection. However, it is still necessary to provide appropriate protection while operating in harsh environments. NEVER immerse the unit in water. Doing so may cause permanent damage. All connectors will corrode if exposed to water or moisture. Corrosion is accelerated if the system's power is ON. Please take proper water-resistant measures for cable connections.

The DC jack and cables are sealed and may be operated with water splashing while attached. All port covers should be in place when no cable is attached.

2.3 POWER SUPPLY

The display can be powered via DC-IN (18~36V). Optional: MIL-STD-461, MIL-STD-1275

2.4 DISPLAY PANEL

The panel of the CLOUD15 series is a 4:3, 1024 x 768 XGA panel with typical 1000 cd/m² brightness, a contrast of 2000:1 and a LED backlight.

2.4.1 BRIGHTNESS

The brightness of the display can be changed by simple pressing the brightness up/down keys in normal operational mode.

2.5 G.F.G SCREEN

CLOUD15 series is equipped with a 15" G.F.G screen. The screen can be connected and used with an external LCD panel via the HDMI (by cable kit) interface. It is designed to meet requirement and environmental specifications dictated by the nature of military systems.

15" TFT LCD Display screen

| | | | |
|---------------------|------------------------|-----------------------|-----------|
| Resolution | 1024x768 XGA | Brightness | 1000 Nits |
| Aspect Ratio | 4:3 | Contrast Ratio | 4000 |
| Touch Panel | Glass-Film-Glass panel | | |

Chapter 3: Specification

3.1 15" TFT LCD DISPLAY

| | | | |
|--------------|---|-----------------------|-----------------|
| Resolution | 1024x768 | Brightness | Up to 1000 Nits |
| Aspect Ratio | 4:3 | Contrast Ratio | 4000:1 |
| Touch Panel | Glass-Film-Glass panel (Options: 5-Wire resistor touch) | | |

SYSTEM SPEC

| | |
|--------------|---|
| Function key | Programmable Function Keys (F1~F20) |
| DC-IN | 9V ~ 36V DC-IN, 28Vdc Optional:12V~40V DC-IN (150W max) MIL-STD-461, MIL-STD-1275, |

CONNECTORS

| | |
|---------------|-------------------------------|
| Rear I/O Port | 1x Water Proof valve |
| | [X1] 1x DC-IN MIL-38999 |
| | [X2] 1x HDMI with MIL-38999 |
| | [X3] 1x USB2.0 with MIL-38999 |
| | 1x GND screw |

APPLICATIONS

Applications

PHYSICAL

| | | | |
|-----------|--|---------------------------|------------------------|
| Dimension | 442.5 x 72 x 370mm (17.42" x 2.84" x 14.57") | | |
| Weight | 12.0kg(26.43lbs) | Finish | Anodic aluminum oxide |
| Chassis | Aluminum Alloy, Corrosion Resistant. | Ingress Protection | IP65 Dust /water Proof |

MIL COMPLIANCE

MIL-STD-810 (OPERATION TEST)

| | | |
|------------|--------------------------|--|
| Low Temp. | Method 502.5 Procedure 2 | Exposure(24h x 3 cycle) at -10°C min. |
| High Temp. | Method 501.5 Procedure 2 | 60°C for 2 hrs after temperature stabilization. |
| Humidity | Method 507.5 Procedure 2 | RH -95%. Test cycles: ten 24-hrs , functional test after 5th and 10th cycles |
| Vibration | Method 514.6 Category 20 | 10 - 500Hz 1.04Grms Test duration: 1 hr x 3 axis (total 3 hrs) |
| Shock | Method 516.6 Procedure 1 | 10G, 11mSec, 3 per axis |

MIL-STD-810 (NON-OPERATING TESTS)

| | | |
|------------|--------------------------|--|
| Low Temp. | Method 502.5 | Exposure(24h x 7 cycle) at -20°C min. |
| High Temp. | Method 501.5 Procedure 1 | 71°C for 2 hrs after temperature stabilization. |
| Vibration | Method 514.6 Category 24 | 200 to 2000Hz Test duration: 1hr per axis; rms = 2.24 gs |

| | | |
|-------|--------------------------|-------------------------|
| Shock | Method 516.6 Procedure 1 | 20G, 11mSec, 3 per axis |
|-------|--------------------------|-------------------------|

MIL-STD-461

CE102

RE102-4 (1.5 MHz) -30 MHz - 5 GHz

RS103 1.5MHz -5GHz, 50V/m equal for all frequencies
EN 61000-4-2: Air discharge: 8 kV,

ENVIRONMENTAL QUALIFICATIONS

Regulatory CE, FCC, Compliance

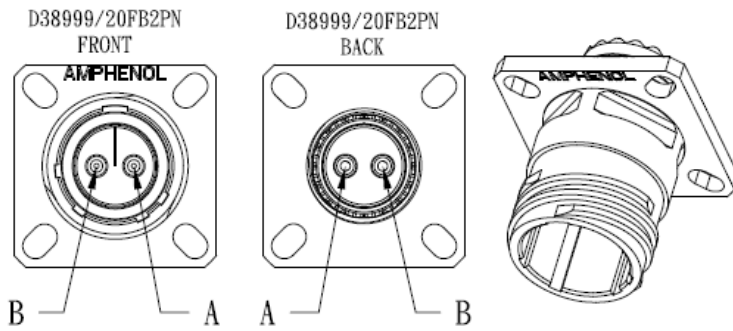
Operation Temp. -20~+60 °C

Storage Temp. -40~+85 °C

Green Product RoHS, WEEE compliance

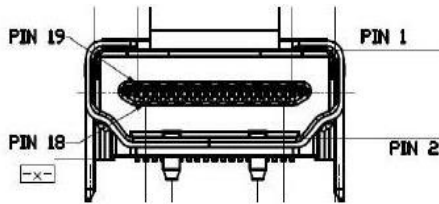
3.2 I/O INTERFACE

3.2.1 (X1) 1x DC-IN



| D38999/20FB2PN DC-IN | |
|-------------------------|------|
| A | Vin+ |
| B | Vin- |

3.2.2 (X2) 1x HDMI 2.0



| Pin # | Signal | Pin # | Signal |
|-------|-----------------|-------|------------|
| 1 | HDMI_TX2_P | 2 | GND |
| 3 | HDMI_TX2_N | 4 | HDMI_TX1_P |
| 5 | GND | 6 | HDMI_TX1_N |
| 7 | HDMI_TX0_P | 8 | GND |
| 9 | HDMI_TX0_N | 10 | HDMI_CLK_P |
| 11 | GND | 12 | HDMI_CLK_N |
| 13 | CEC | 14 | NC |
| 15 | HDMI_SCL | 16 | HDMI_SDA |
| 17 | GND | 18 | +5 V Power |
| 19 | Hot Plug Detect | 20 | GND |
| 21 | GND | 22 | GND |
| 23 | GND | | |

3.2.3 (X3) 1x USB2.0 CONNECTOR



| D38999/20FA35SN USB2.0 | |
|---------------------------|-------|
| 1 | VCC |
| 2 | D- |
| 3 | D+ |
| 4 | GND |
| 5 | N. C. |
| 6 | N. C. |

Chapter 4: Operation Introduction



4.1 F1~F20 FUNCTION KEYS

Programming function keys could be customized depend on customer's requirement.

4.2 POWER BUTTON

Turn the LCD Panel power on by pressing the power button. Turn the display Off by pressing the power button again.

4.3 LED INDICATORS

Green: When Power is "ON".

4.4 BRIGHTNESS UP OR DOWN

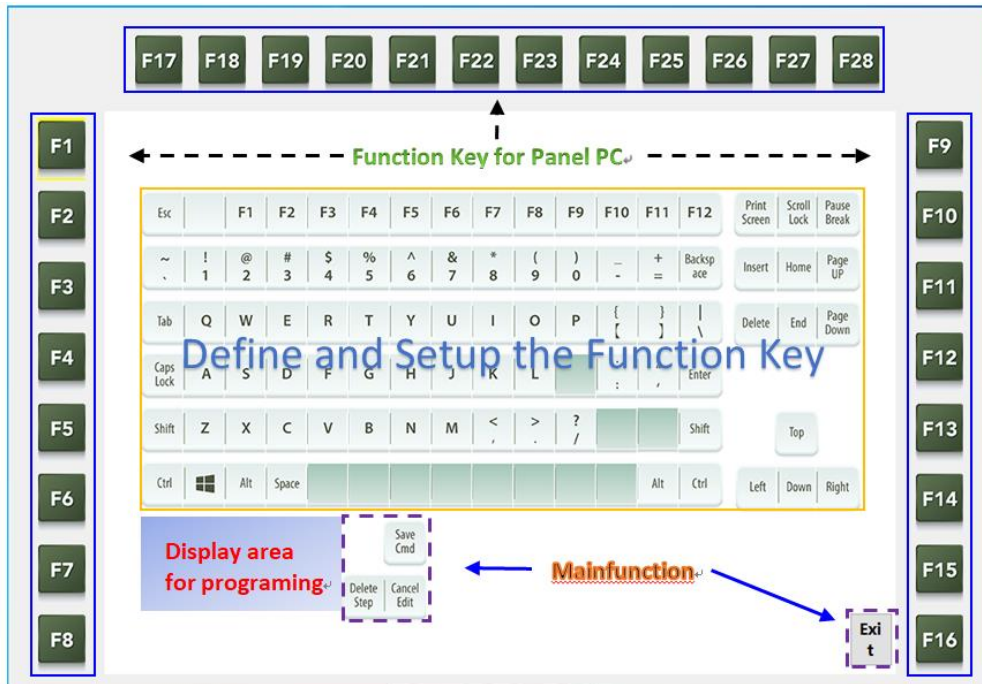
Dim+:LCD backlight increase

Dim-:LCD backlight decrease

4.5 FN-KEY BACKLIGHT ON OFF

Non function Key.

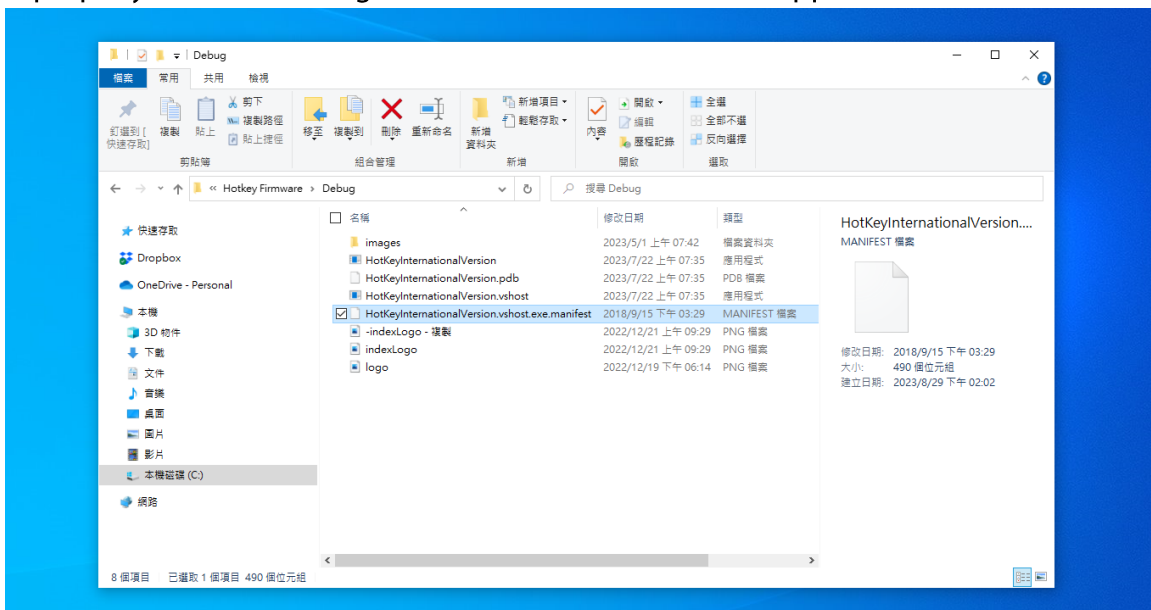
Chapter 5: Programmable Function Key Setup - PreFace Under Window OS



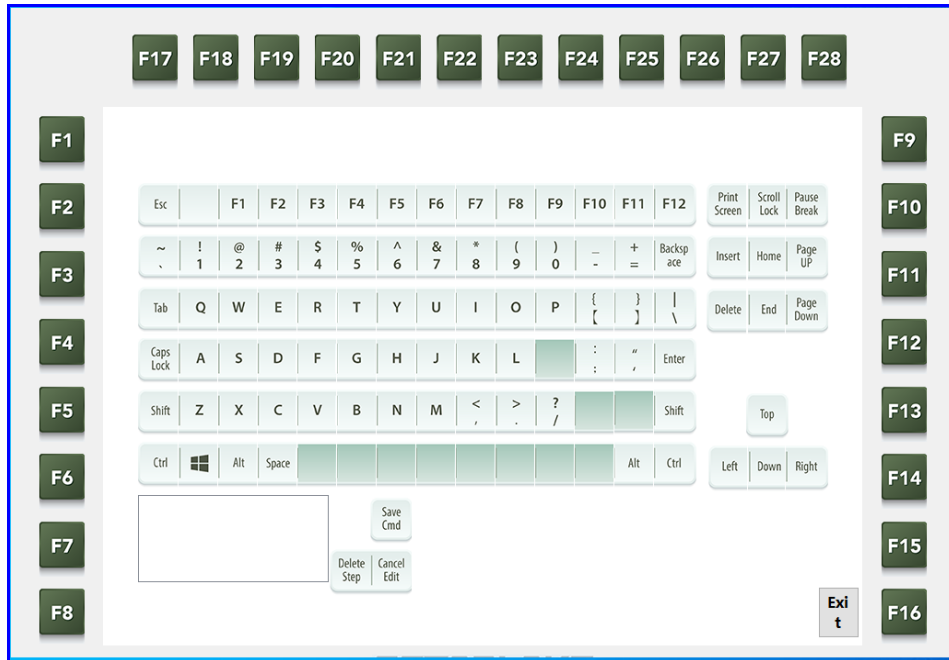
All operations within this document must be performed with the HotKey hardware connected in order to function properly.

5.1 START HOT KEY INTERNATIONAL VERSION

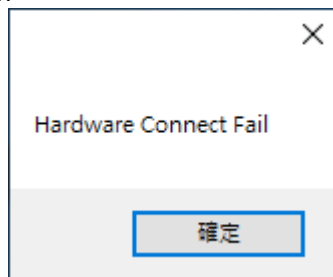
Click the Hot Key International Version.exe program and wait for it to finish initializing. Once the program interface appears, it means that the initialization is complete and you can proceed with the operations. If the hardware is not connected or cannot be connected properly, an error message "Hardware Connect Fail" will appear.



Click the Hot Key International Version.exe program and wait for it to finish initializing.



Once the program interface appears, it means that the initialization is complete and you can proceed with the operations.



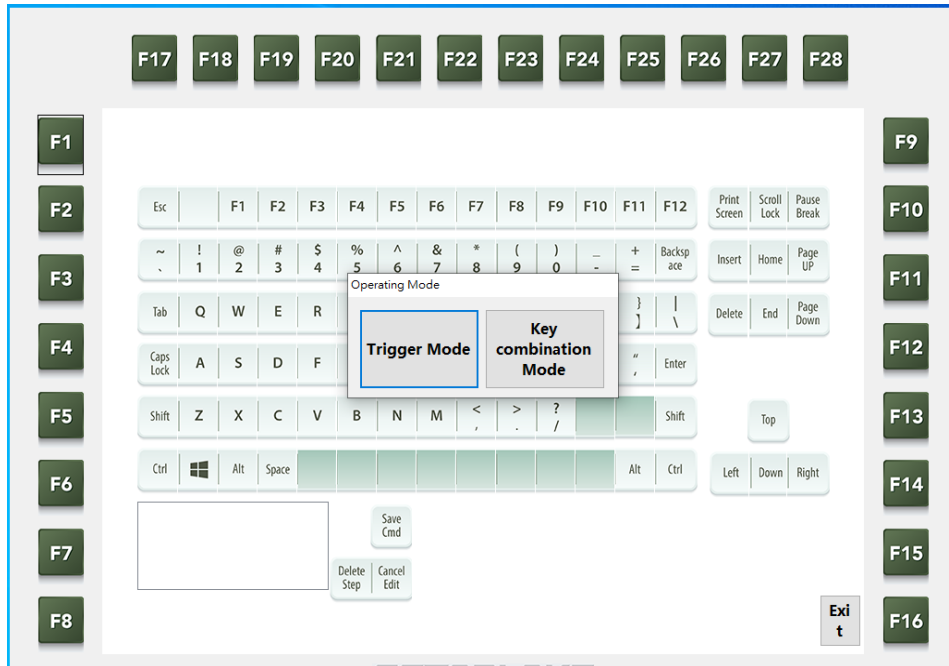
If the hardware is not connected or cannot be connected properly, an error message "Hardware Connect Fail" will appear.

5.2 INTRODUCTION TO HOTKEY TRIGGER MODE OPERATION

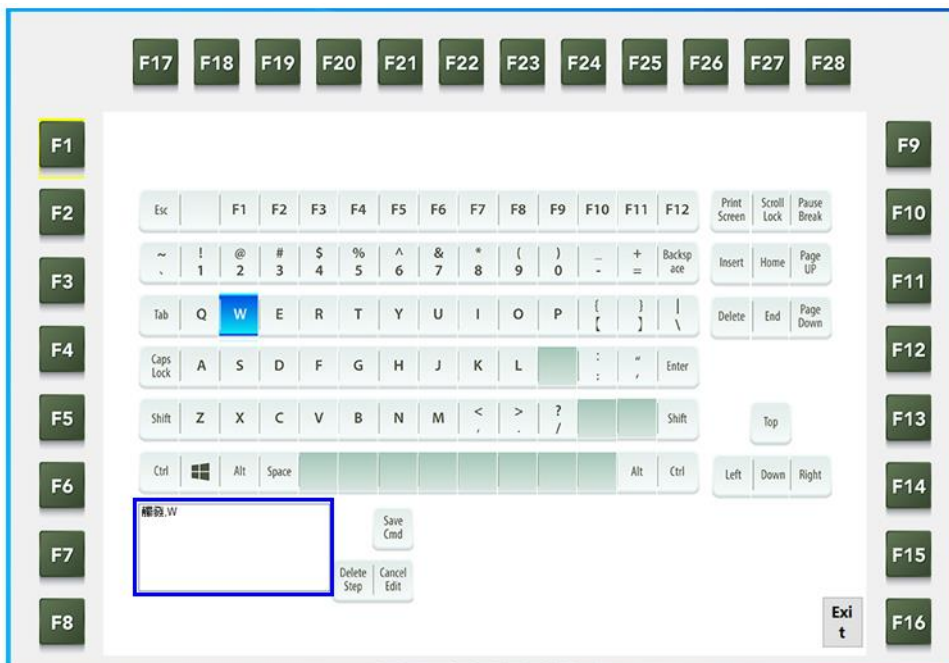
This chapter demonstrates the steps for setting up Trigger mode, including Save Cmd/Delete Step/Cancel Edit.

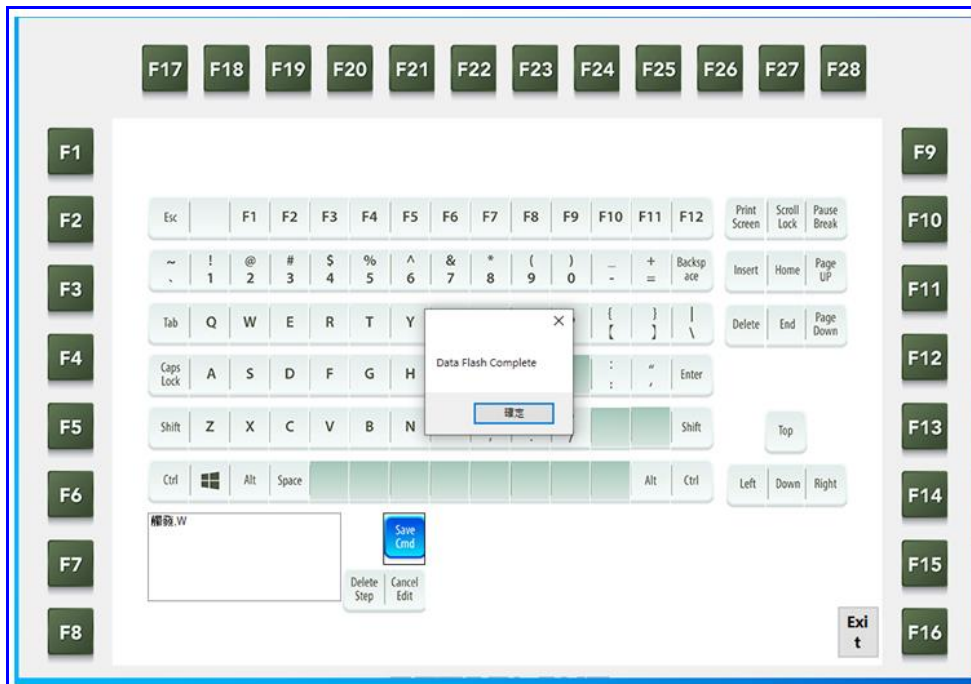
5.2.1 HOTKEY TRIGGER MODE - SAVE CMD

Clicking on the first command "F1" will bring up a window to select Trigger Mode and Key Combination Mode. Select Trigger Mode and then choose "W" after entering Trigger Mode. Press "Save Cmd" to write the command to the hardware.



Clicking on the first command "F1" will bring up a window to select Trigger Mode and Key Combination Mode. Select Trigger Mode

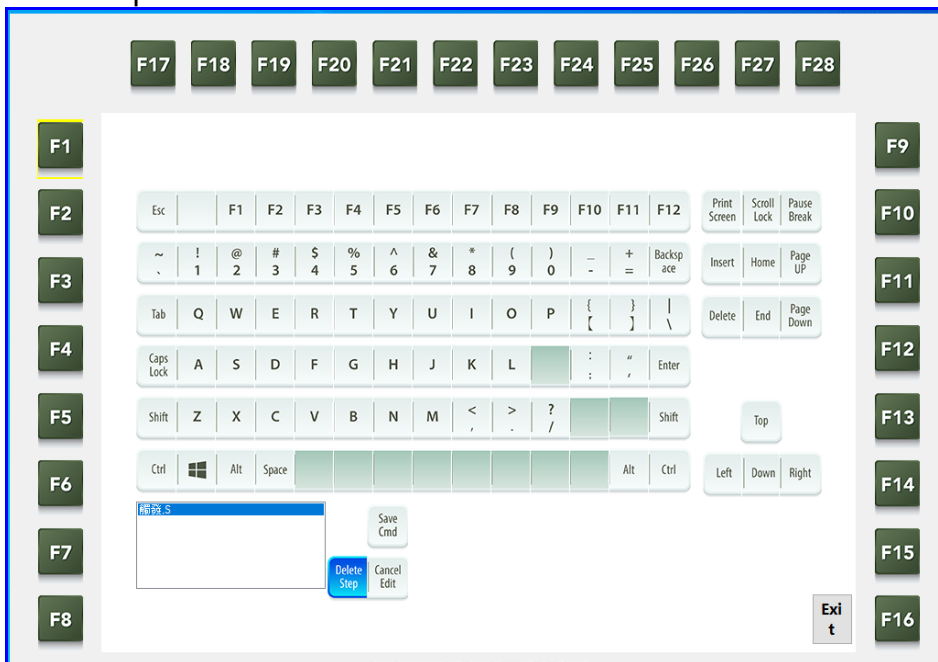




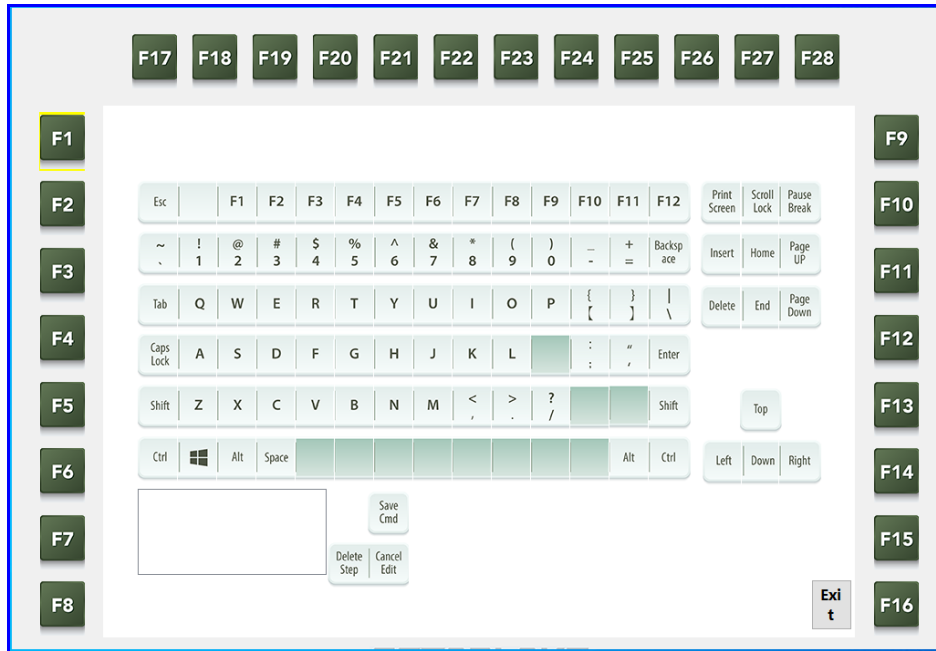
Select Trigger Mode and then choose "W" after entering Trigger Mode. Press "Save Cmd" to write the command to the hardware.

5.2.2 HOTKEY TRIGGER MODE - DELETE STEP

Select the instruction to be deleted in the instruction display window, and then press "Delete Step". Confirm that the instruction in the instruction display window has been deleted to complete the deletion action.



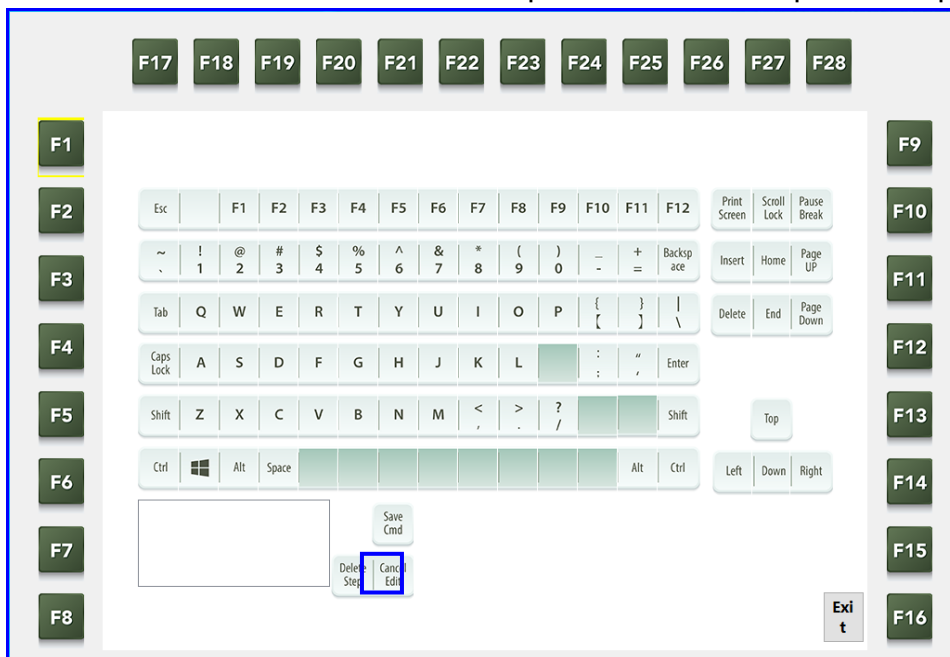
Select the instruction to be deleted in the instruction display window, and then press "Delete Step"



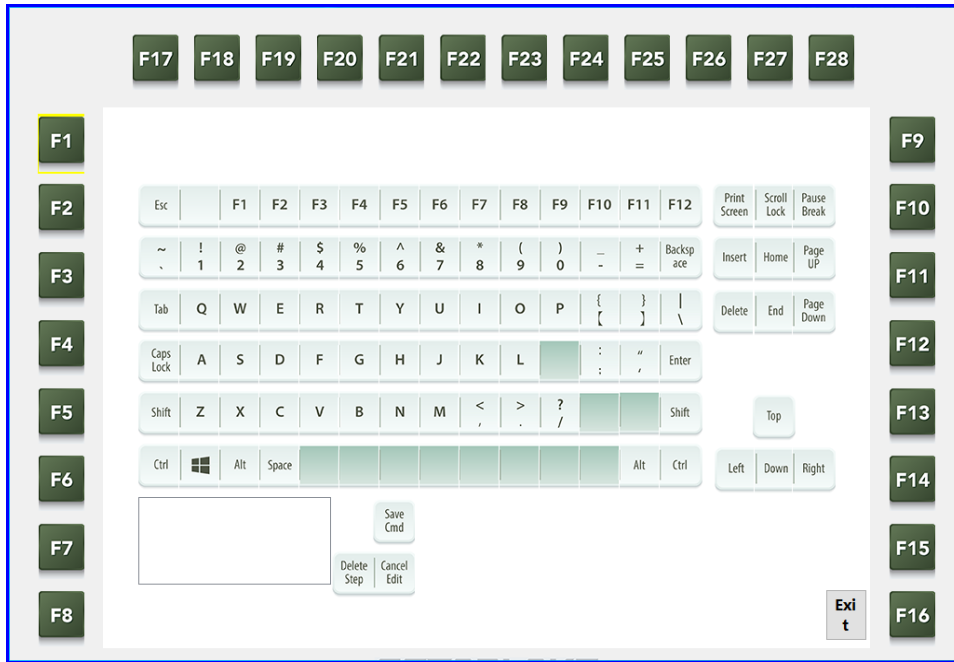
Confirm that the instruction in the instruction display window has been deleted to complete the deletion action.

5.2.3 HOTKEY TRIGGER MODE – CANCEL EDIT

Click "Cancel Edit" and wait to return to the splash screen to complete the operation.



Click "Cancel Edit" and wait to return to the splash screen



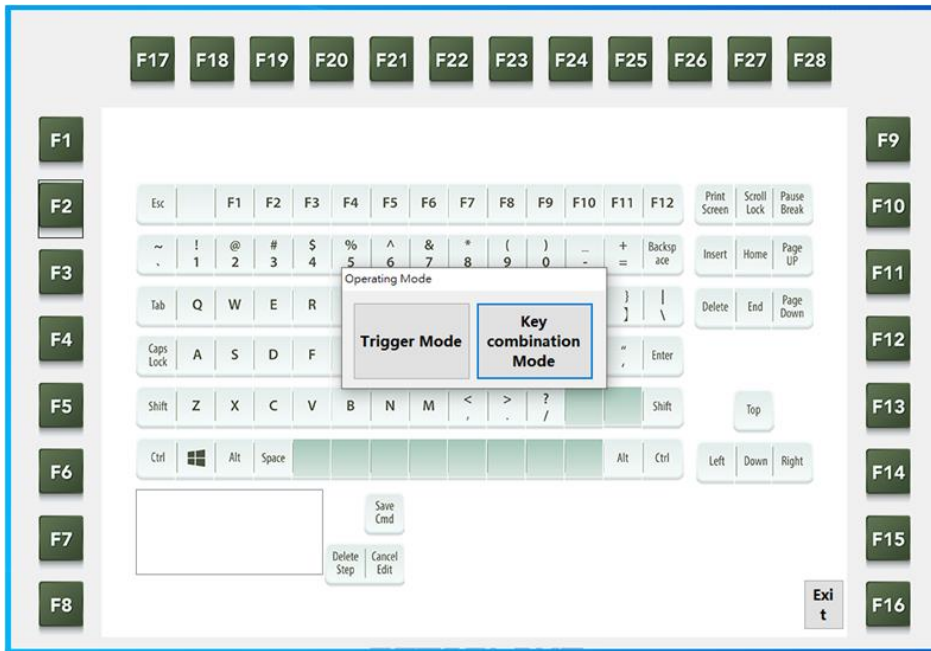
Returning to the splash screen signifies the completion of the operation.

5.3 KEY COMBINATION MODE INTRODUCTION

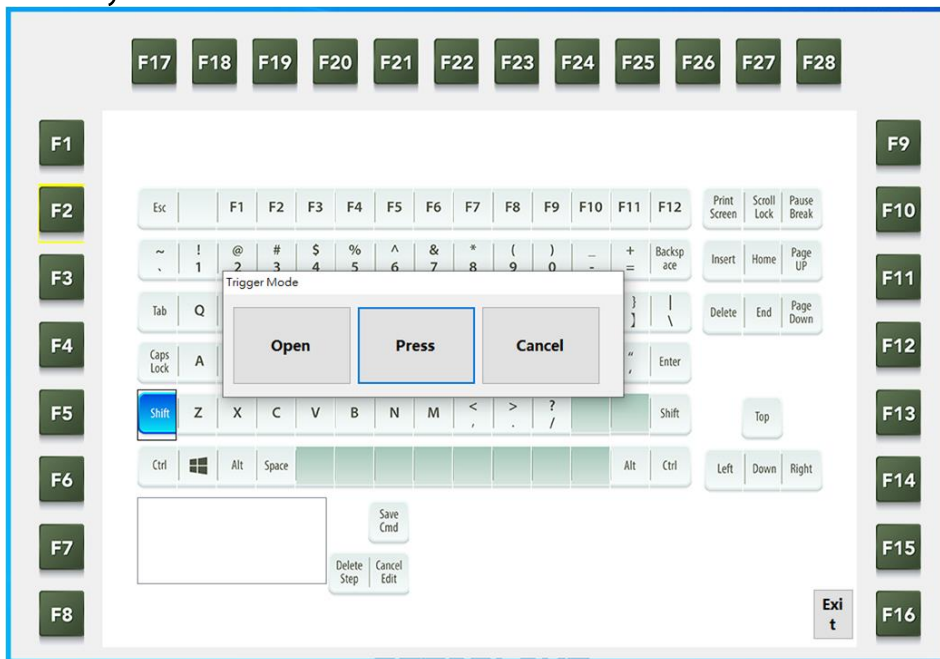
This chapter demonstrates the operation steps for setting up the Key Combination Mode, including Save Cmd/Delete Step/Cancel Edit.

5.3.1 HOTKEY KEY COMBINATION MOD - SAVE CMD

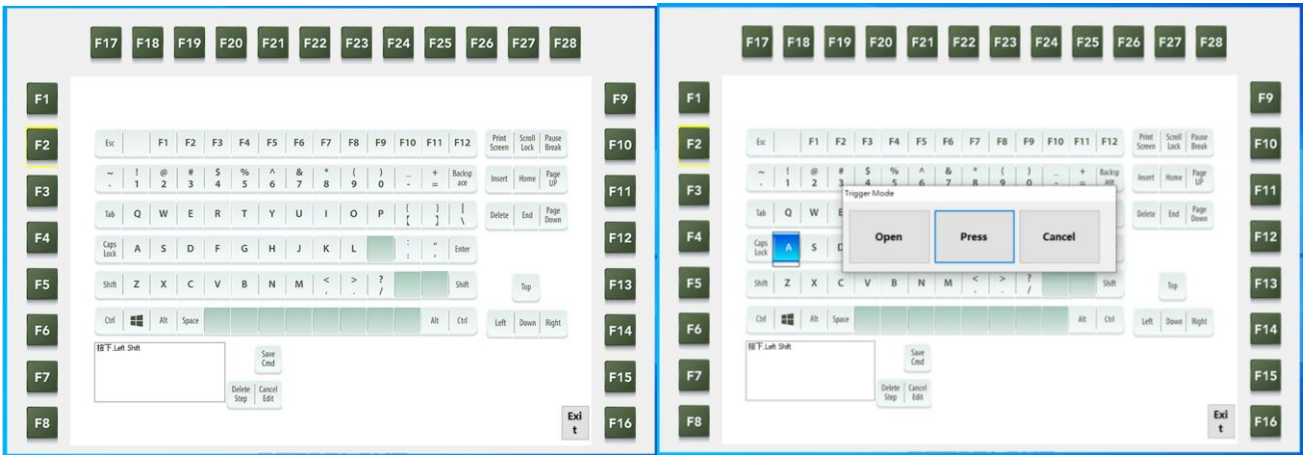
Clicking on the first command "F2" will bring up a window to choose between Trigger Mode and Key Combination Mode. Selecting Key Combination Mode will take you to a window where you can choose "Ctrl" on the left, which will bring up a window with three options: Open, Press, and Cancel. Select "Press" here, where Open indicates releasing the key, Press indicates pressing the key, and Cancel indicates cancelling the action. Once the configuration is complete, the instruction display window will show the configured command. Since the Key Combination Mode is designed to provide combination function, the action to be performed here is to simulate the "Select All" action. Therefore, you need to sequentially configure the "Ctrl" and "A" on the left to be in the "Press" state, followed by configuring the "Ctrl" and "A" on the left to be in the "Open" state, and then click on "Save Cmd" to write the command into the hardware.



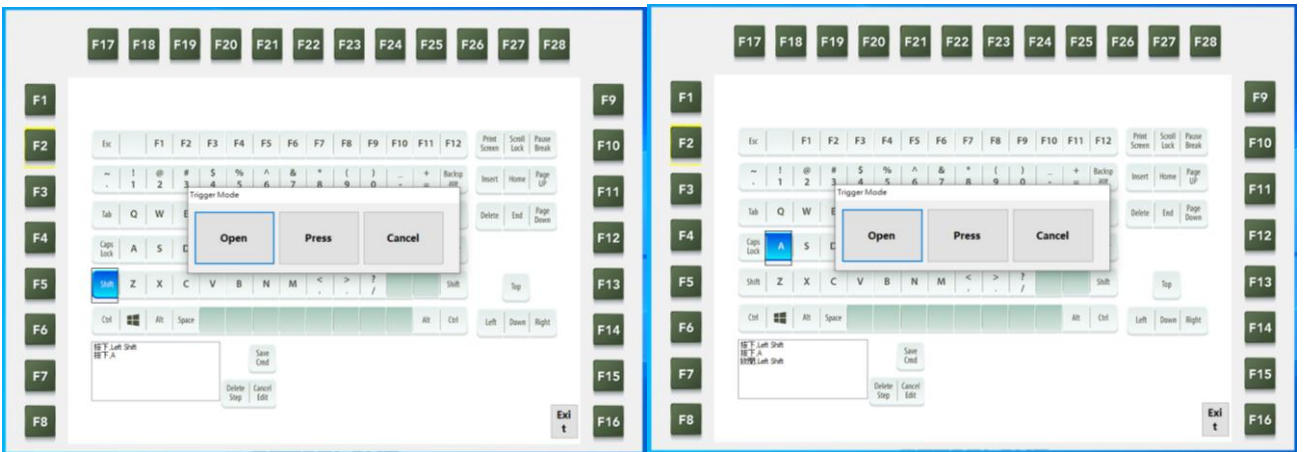
Clicking on the first command "F2" will bring up a window to choose between Trigger Mode and Key Combination Mode.



Choose "Shift" on the left, which will bring up a window with three options: Open, Press, and Cancel. Select "Press".



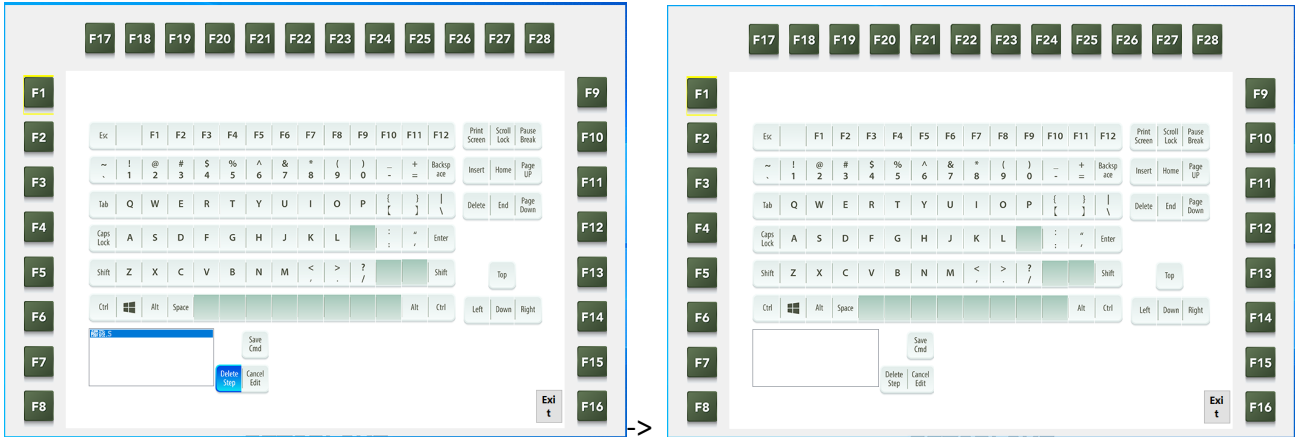
Once the configuration is complete, the instruction display window will show the configured command.



Sequentially configure the "Shift" and "A" on the left to be in the "Press" state, followed by configuring the "Shift" and "A" on the left to be in the "Open" state, and then click on "Save Cmd" to write the command into the hardware.

5.3.2 HOTKEY KEY COMBINATION MOD - DELETE STEP

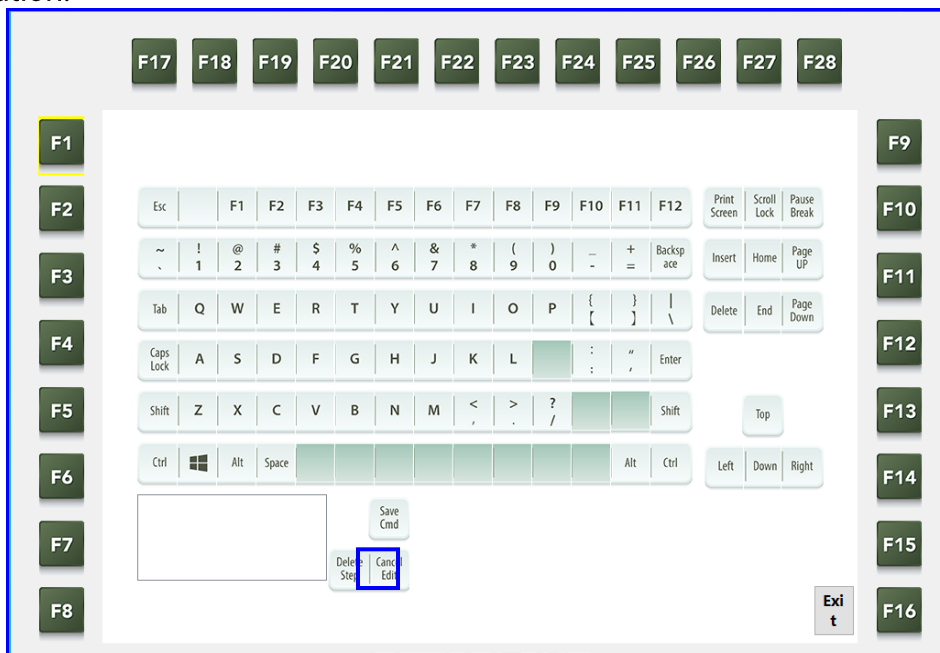
In the instruction display window, select the command to be deleted, and then click on "Delete Step". Confirm that the command has been deleted in the instruction display window to complete the deletion action.



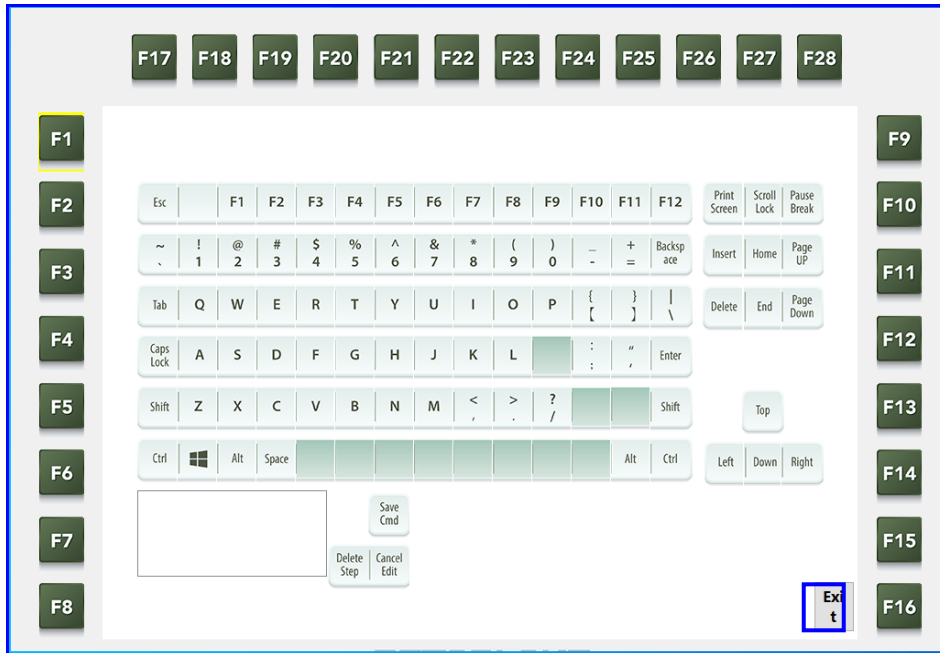
In the instruction display window, select the command to be deleted, and then click on "Delete Step". Confirm that the command has been deleted in the instruction display window to complete the deletion action.

5.3.3 HOTKEY TRIGGER MODE - CANCEL EDIT

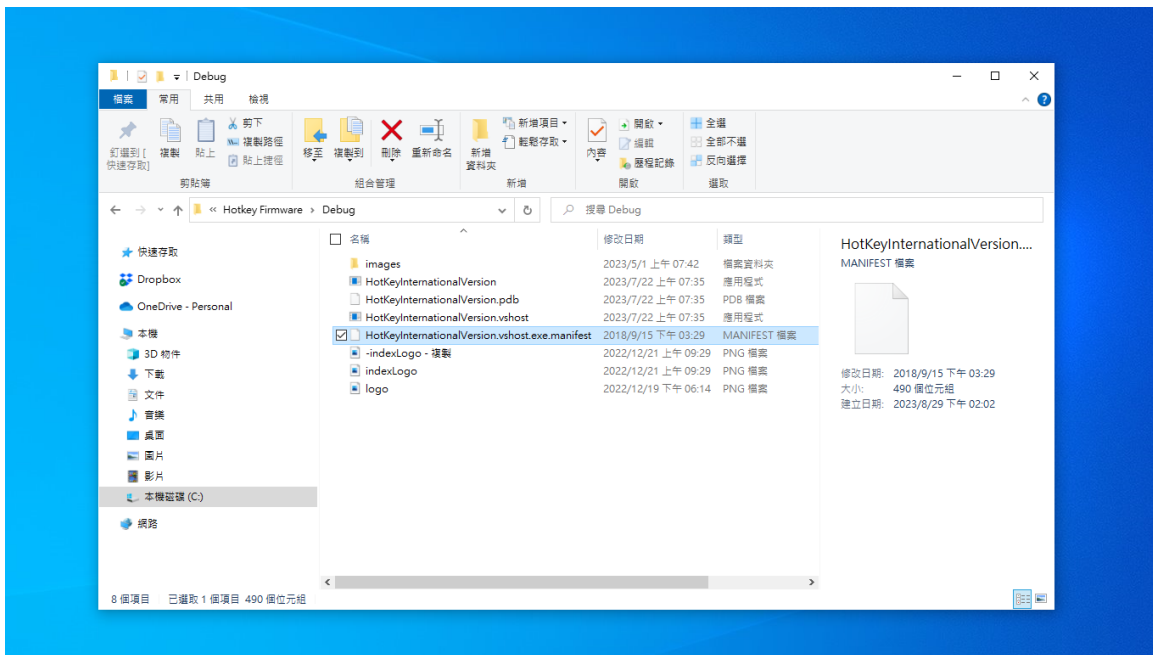
Click on "Cancel Edit" and wait until you return to the splash screen to complete the operation.



Click on "Cancel Edit" and wait until you return to the splash screen.



Returning to the splash screen signifies the completion of the operation.
Click "Exit" and wait to return to the Windows screen



Note 1: This control program is only applicable to display settings with resolutions between 1024 x 768 and 1920 x 1080.

Note 2: This control program is only applicable under OS of Windows 10 and is not guaranteed to be used on other platforms..

Chapter 6: Programable Function Key Setup - PreFace Under Linux OS

6.1 SOFTWARE INSTALLATION

The overall installation could refer to following link
https://www.pjrc.com/teensy/td_download.html

6.1.1 INSTALL ARDUINO IDE 1.8.19 (ARM 64 BIT)

Download path <https://www.arduino.cc/en/software>

Go to "Arduino IDE 1.8.19", download Linux ARM 64 bit version (filename shall be arduino-1.8.19-linuxaarch64.tar.xz)

```
tar xvf arduino-1.8.19-linuxaarch64.tar.xz
```

```
cd arduino-1.8.19
```

```
sudo ./install.sh
```

6.1.2 DOWNLOAD LINUX UDEV RULES

Download path <https://www.pjrc.com/teensy/00-teensy.rules>

Right click on the download path, select "Save Link As..."

```
sudo cp 00-teensy.rules /etc/udev/rules.d/
```

6.1.3 INSTALL TEENSYDUINO 1.59 ADD-ON INTO ARDUINO-1.8.19 FOLDER

Download path https://www.pjrc.com/teensy/td_159/TeensyduinoInstall.linuxaarch64

```
chmod 755 TeensyduinoInstall.linuxaarch64
```

```
./TeensyduinoInstall.linuxaarch64
```

By clicking "Next" to finish installation. The installation folder shall be under "arduino-1.8.19" folder where you just extracted the Arduino IDE file earlier

6.1.4 INSTALL TEENSY LOADER APPLICATION

Download path https://www.pjrc.com/teensy/loader_linux.html

select "Download Teensy Program (Jetson, R-Pi 64 bit)"

```
tar -xvf teensy_linuxarm64.tar.gz
```

```
./teensy & // Let the Teensy Loader run in the background
```



6.2 SET UP CONNECTION PARAMETERS

open arduino IDE  application

The Tools -> Board -> Teensyduino menu, select "Teensy 4.1"

The Tools -> USB Type menu, select "Serial + Keyboard + Mouse + Joystick"

6.3 ADJUST FUNCTIONAL KEY VALUE

You can open the example file by using menu File -> Open.. , and select example "NV300_Teensy_4.1_Buttons.ino"



There are already 20 predefined function keys F1 to F20 in the file , you can program these keys as your need

Use `Keyboard.press(key)` and `Keyboard.release(key)` to send individual key press and release events. The "key" is a key code represents the character on the keyboard. Please refer to following link for the definition of Key Code

https://www.pjrc.com/teensy/td_keyboard.html

- `Keyboard.press(KEY_A);` represents key "A" has been press down
- `Keyboard.release(KEY_A);` represents key "A" has been release off
- `Keyboard.println("F1 press")` will print string "F1 press" for debugging usage. Normally you shall not use it
- words after "///" can be represented as inline comments

6.4 SAVE, CHECK AND UPLOAD

- click File -> Save menu to save the configuration
- click  will verify if there is any wrong configuration
- click  will upload your latest configuration to the CLOUD15-P20-F2A2. During uploading, you should see a progress bar on the Teensy Loader window

Now you can test new settings as you definded earlier