

GT-SP user guide Part 2 (How to Use Design Tools)

Ver.e00

1 Introduction

- ◆ **This introductory guide is for first-time developers** of our **GT-SP** touch display (LCD Touch Screen Modules GUI-controlled type).
- ◆ This section will explain the primary usage of our design tool **GT Design Studio** by creating an operating screen example using a GT-SP.

*Screen contents may differ slightly depending on the PC operating system or settings and the version of this tool.

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1.1 What to prepare

- GT-SP (This document assumes that the 7-inch size standard product **GTWV070S3A00P** is used)
- PC (OS: Windows 10 / 11 recommended)
- USB cable
- DC power supply (5V), power cables
- GT Design Studio *Please [download the latest version from our website](#) (free of charge).
[North America / EU] <https://www.noritake-elec.com/support/>
[Asia / Other] <https://www.noritake-itron.jp/eng/cs/soft/42>

◆When using other GT-SP series products, please check the connector configuration, power supply voltage, etc. of each hardware specification and read it accordingly.

1.2 GT-SP operation screen development flow

- (1) Place "objects" such as buttons, text, and images on each "page."
- (2) Set the touch action operation as an "event" for each object
- (3) Register the completed "project" in the GT-SP FROM.

*For more information on connecting with the host controller or control by commands, please refer to **GT-SP user guide Part 3** (Host Control Edition).

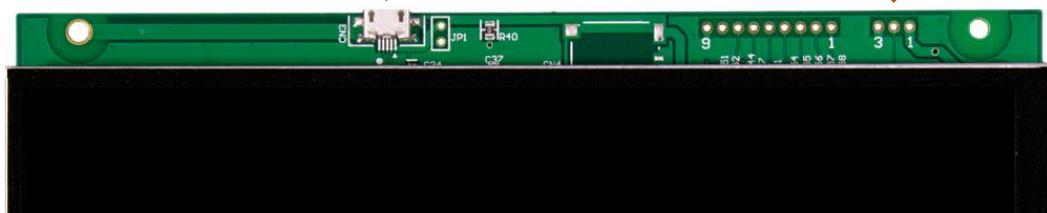
2 Connecting the GT-SP to a PC

- ◆ First, connect the GT-SP to the PC using a USB cable and a **5V DC power supply**.

CN3: Connect to the PC with a USB cable.

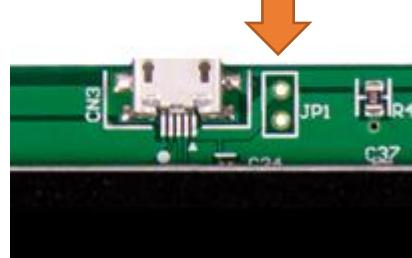
CN8: 5V DC power supply

1: 5V 2: NC 3: GND



- ◆ If the PC is USB 3.0 compatible and the GT-SP rating is 900mA or less, it is possible to supply power directly from the USB during evaluation. If necessary, bridge **JP1** with a short pin or the like.

JP1: Short (When 5V DC is supplied from USB)



- ◆ If the GT-SP is not GTWV070S3A00P, check the connector configuration and power supply voltage in the hardware specifications before connecting.

[Attention]

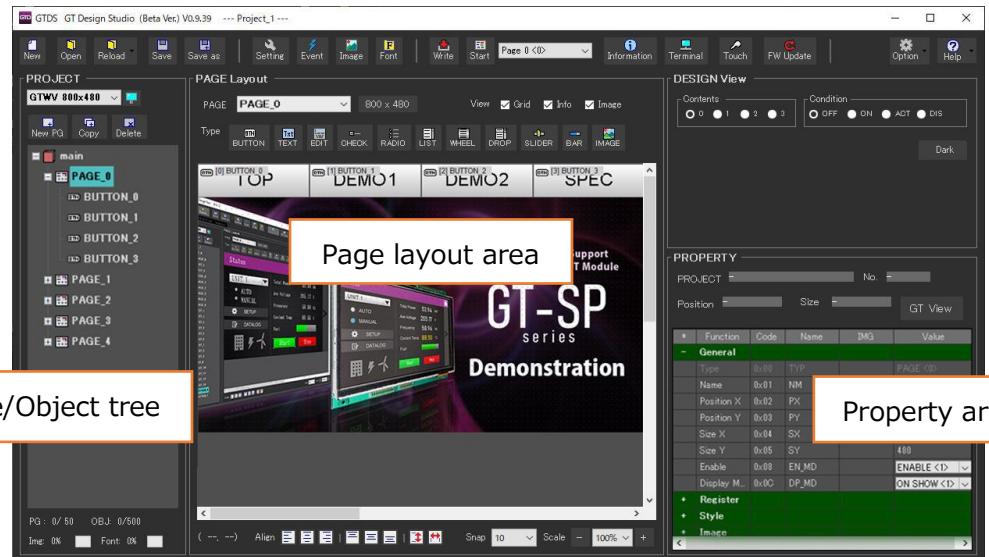
- ◆ Hot swapping connections may cause damage to the GT-SP. Please make sure the power is off before connecting or disconnecting cables.

3 Tool startup and initial settings

- ◆ After downloading the latest version of **GT Design Studio** from the website, open the ZIP file and save it on your hard drive. Then install the tool on your PC.

3.1 Description of the main screen

- ◆ After launching the tool, you will see the following **main screen**. Here you can place objects and set their properties.



3.2 Initial settings (screen resolution and orientation)

- ◆ Select the screen size of the project in the **page/object tree** according to the resolution of the GT-SP you are using. Next, use the screen rotation button to determine the orientation of the TFT screen.

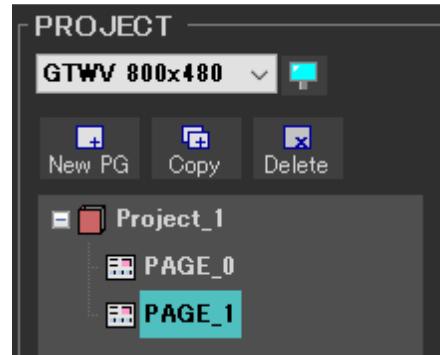


[Example 1]

- ◆ Select "GTWV 800x480" for the screen size and "0 deg (default)" for the screen orientation.

4 Page creation

- ◆ In the page/object tree, you can "create new pages," "select pages to edit," "duplicate/delete/rename pages and objects," "change the object display order," etc.

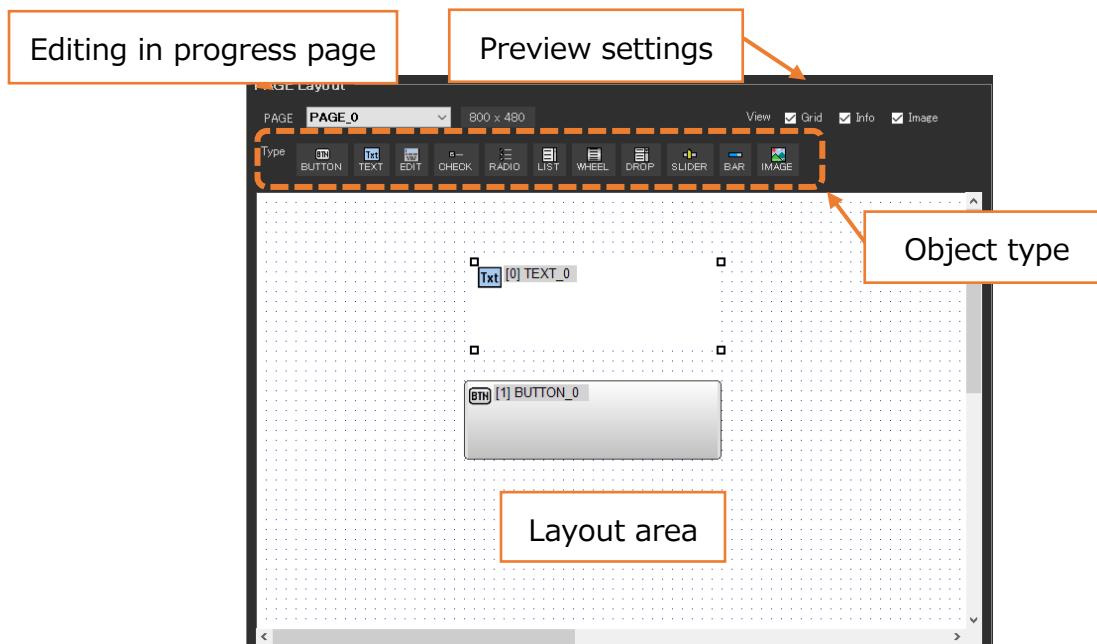


[Example 2]

- ◆ To create a new page, press the "New PG" button (PAGE_0).

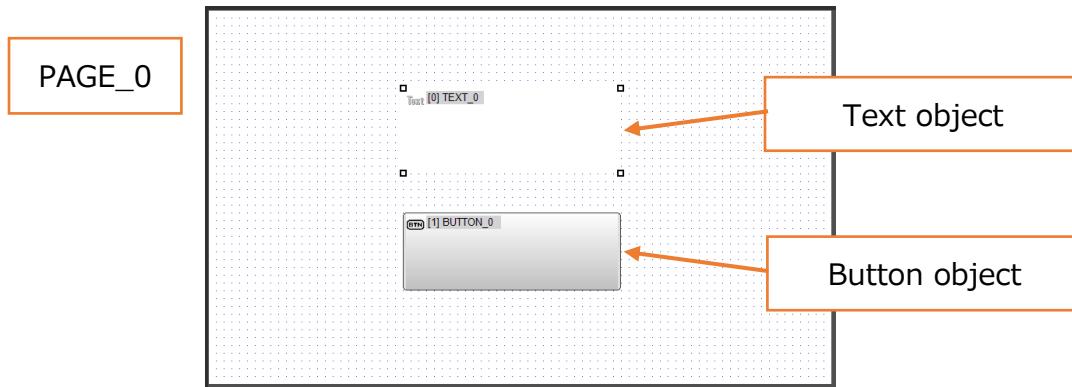
5 Object placement

- ◆ Objects can be arranged in **the page layout area**. Select the object type you want to reposition and then click on the layout area to place it.
- ◆ Users can adjust the size and position of the placed object by dragging the object handles.
- ◆ Users can change the preview display format in the layout area in the preview setting.



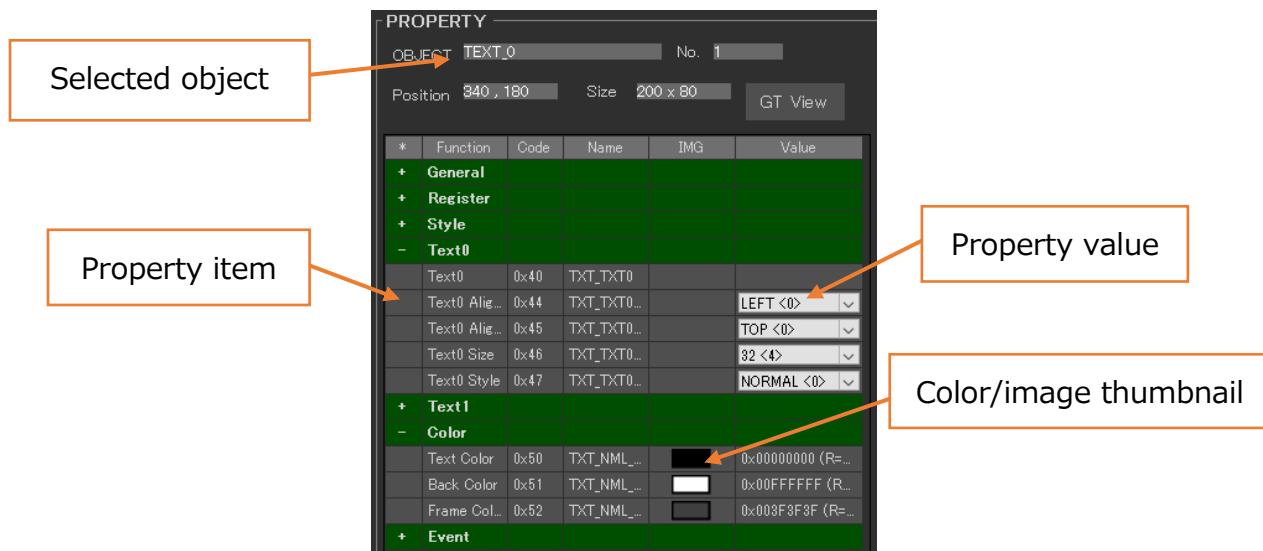
[Example 3]

◆ Place text  and button  objects in PAGE_0 as follows.



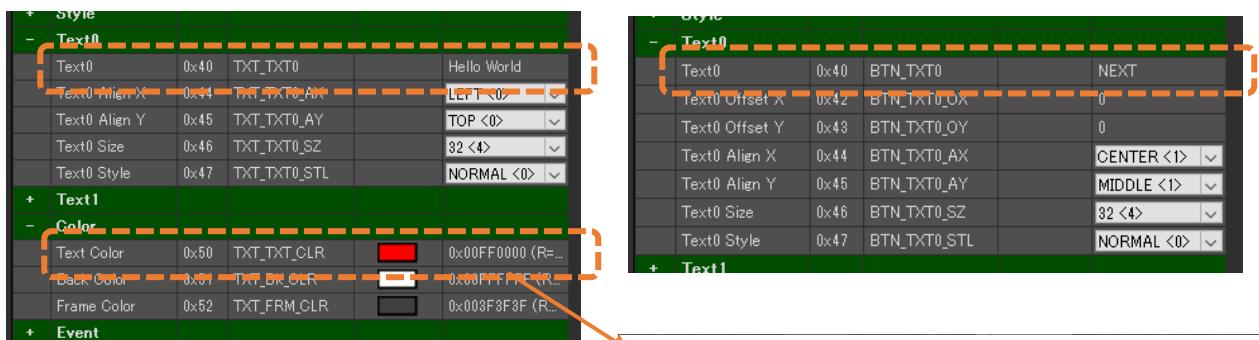
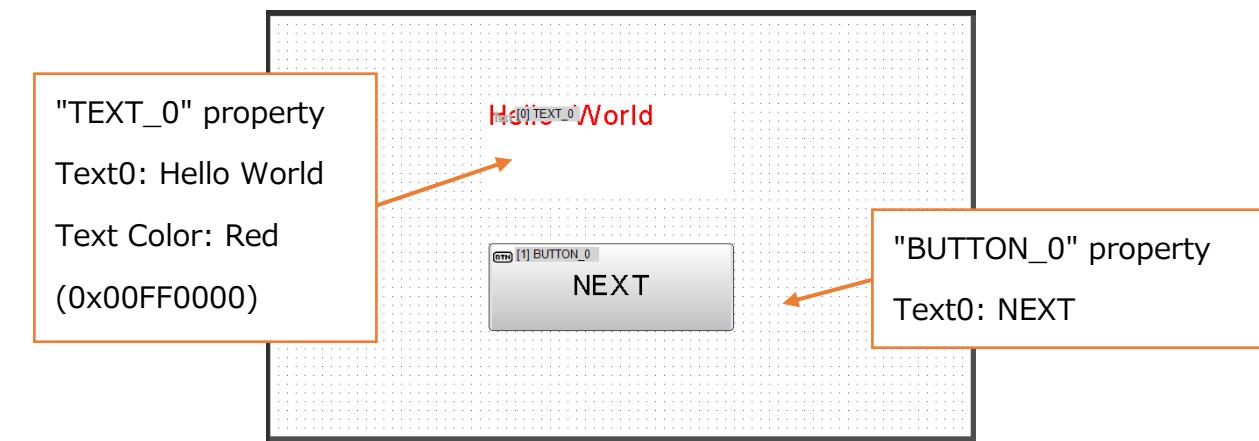
6 Property settings

◆ By adjusting object **properties**, the position, size, text, and color can be set in detail. In **the property area**, click on the property you want to change to enter or select the desired value.



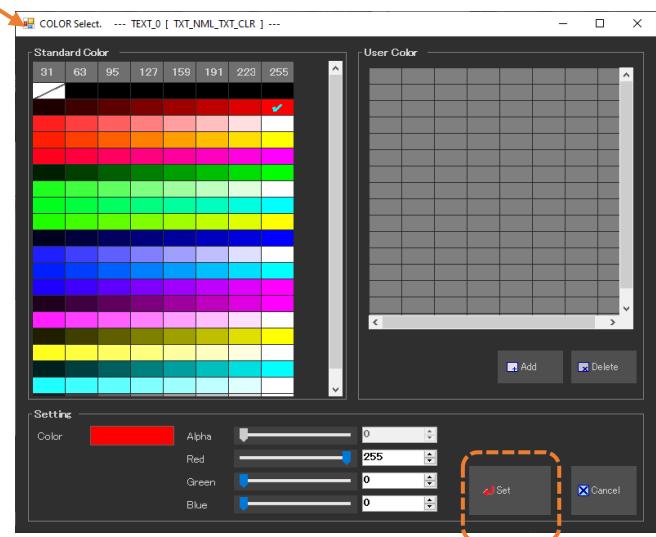
[Example4]

- ◆ Set the following properties for the text and button objects. "Text 0" defines the displayed text, and "Text color" represents the text color.
- ◆ To change the text color, select RED from the color palette and press the Set button to confirm.



[User tip]

- ◆ Some properties can be directly set by right-clicking the object.



7 Registering and executing a project file (to display on the GT-SP)

- ◆ **The operation screen can be displayed** after registering a created project file in the GT-SP.

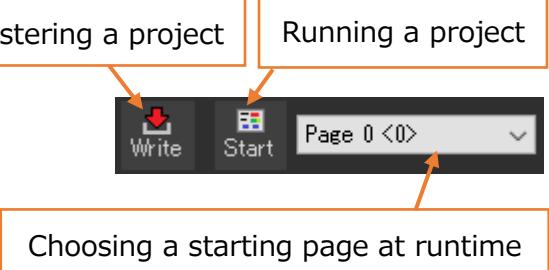
7.1 Registration and execution

- ◆ After the GT-SP is connected to a PC, press the Write button  on the menu bar to write the project file to the GT-SP. Press the Start button  to execute.

- ◆ If a page is selected in **Start Page** (MSW32) in Settings, the page is automatically displayed after writing is complete.

[Example 5]

- ◆ Register the created project in GT-SP and run **Page 0**. A screen as seen to the right will appear on the GT-SP display.



7.2 Registration limit

- ◆ There is **a limit to the number** of pages/objects and the image/font capacity users can register in the GT-SP. The maximum number and current usage numbers can be checked **under the page/object tree**. We advise designing screens that do not exceed limitations.



PG : 5/ 50 OBJ: 45/500
Img: 1%  Font: 0% 

[User tip]

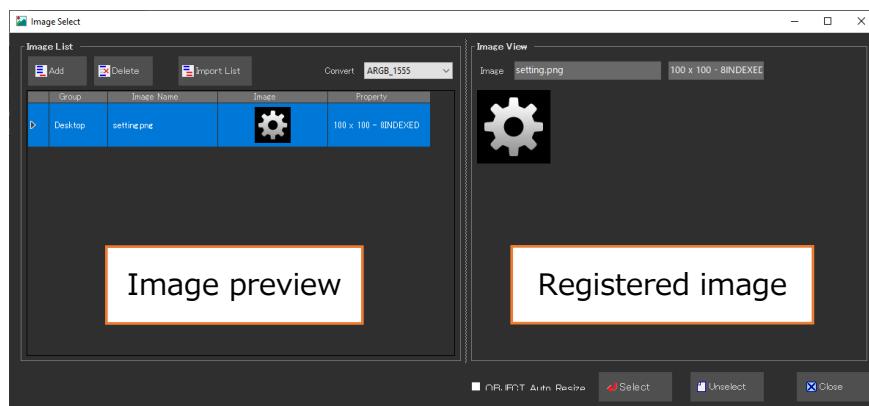
- ◆ Repeat objects can be **reused and displayed on other pages** while retaining their property and event information. Save time and space by reusing objects like the Return to Home button instead of recreating them. To do so, right-click the object you want to duplicate and select the page you want to place it from the "**OBJ LIST Add.**"
- ◆ If the number of pages is insufficient for an extensive UI layout, design the pages as templates and control the display text from the **host controller**.

8 Registering and displaying images

- ◆ To display **an image**, it must first be registered in the tool. Next, users must assign the registered image to the image object properties area.

8.1 Registering images to be displayed

- ◆ First, register the image. Press the Image button  on the menu bar to display the image selection screen.



- ◆ Select the image file you want to register using the Add button .

[Example 6]

- ◆ Prepare and register a 100 X 100 pixel image.

8.2 Assigning images to be displayed

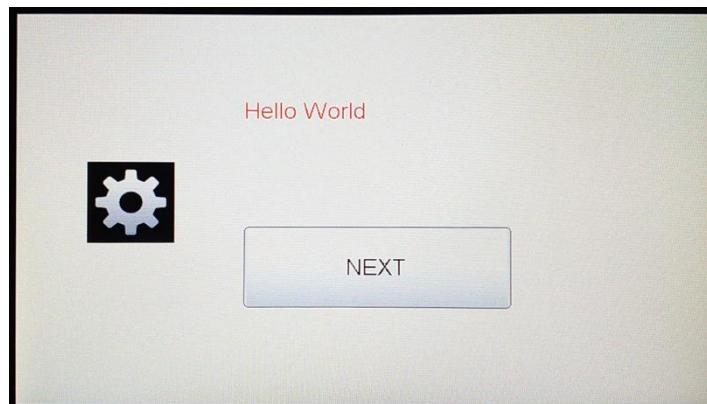
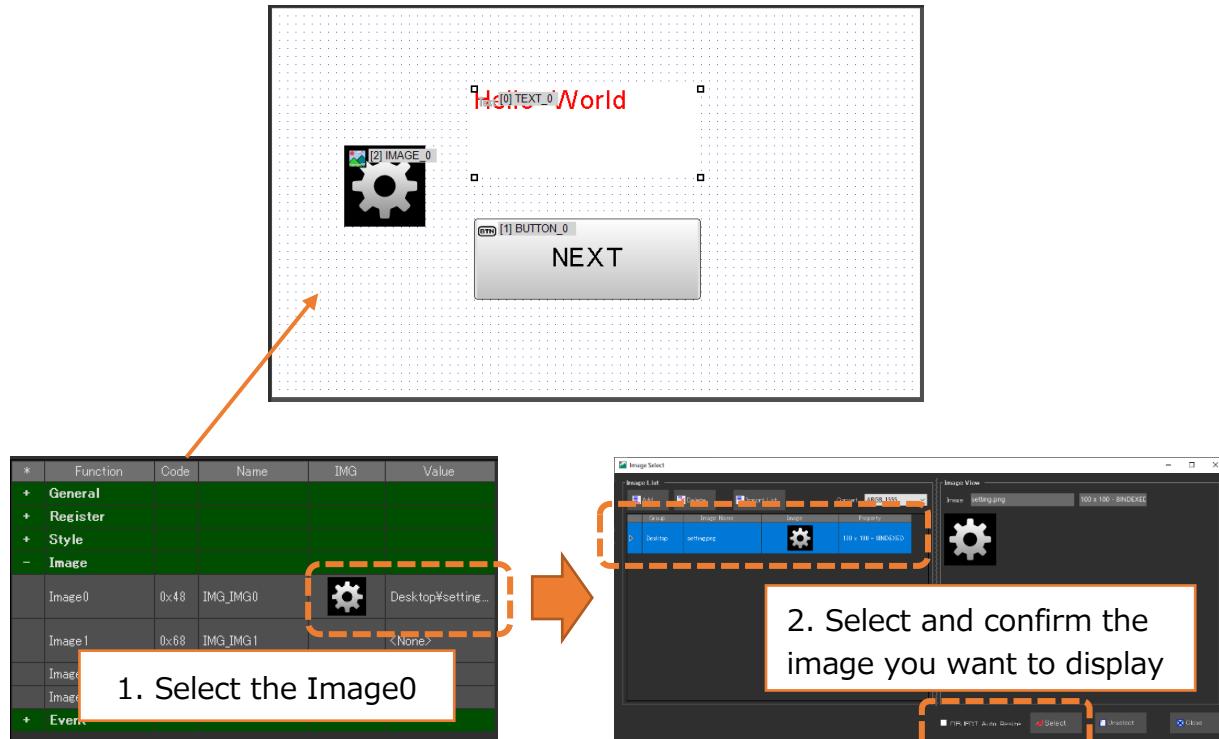
- ◆ **Place an image object** to display an image. Select the placed image object and click on the "**Image0**" value box in the properties to display the image registration screen. Choose the image you want to display from the list of registered images and press the  Select button.

[User tip]

- ◆ If **OBJECT Auto Resize** box is checked, object sizes are automatically adjusted to match the image size.

[Example 7]

- ◆ Place the image object as follows and assign the image registered earlier. After registering and entering the image in the GT-SP, it will be displayed on screen 1.

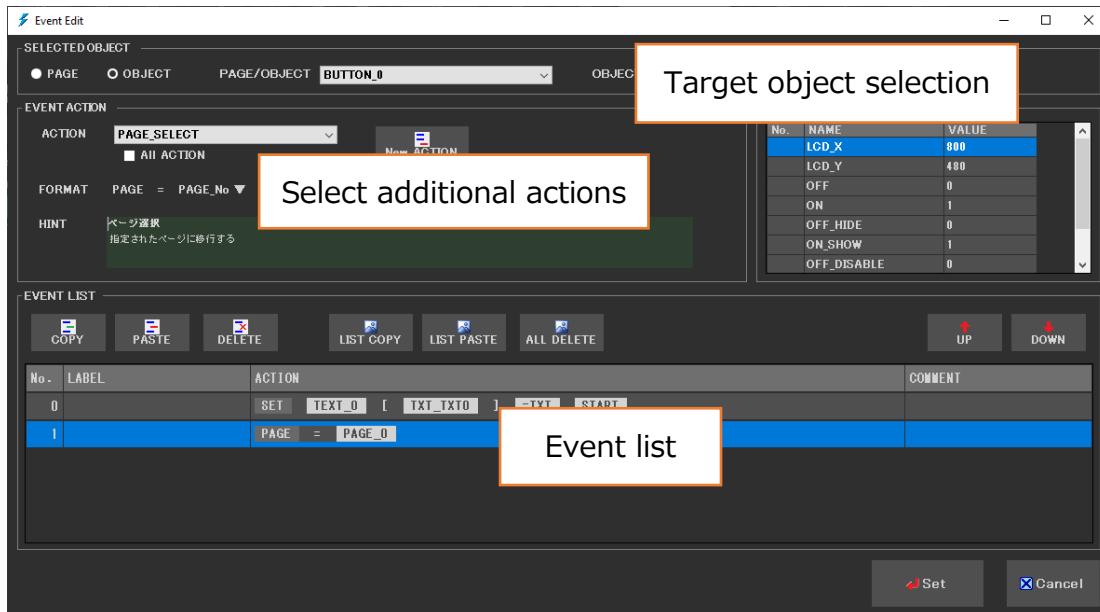


9 Setting events

- ◆ **Events are set** when a object is touched. Events occur automatically when a button is pressed or when the content of a drop box is changed.



- ◆ Press the Event button or select and double-click the object in the page layout area to set an event and display **the event setting screen**.



- ◆ Select the action you want to add from **the pull-down menu** and click the **New ACTION** button to add it to the event list.

- ◆ Click on the added action ▼ and specify or enter the target item (object, variable, property, operation, etc.) by selecting it from the pull-down menu. Multiple actions can

be added to a single event. Then press **SET** to confirm the event. (Actions are executed in order from top to bottom).

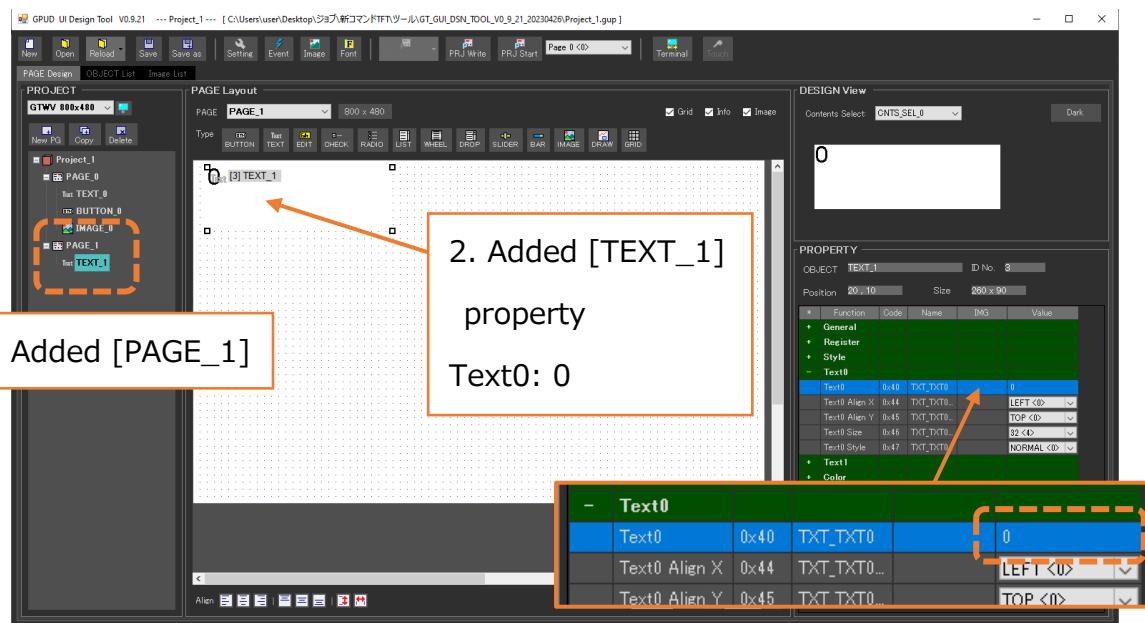
- ◆ The main actions are described below. For details on all actions, please refer to **the GT-SP software specifications**.

9.1 Moving pages

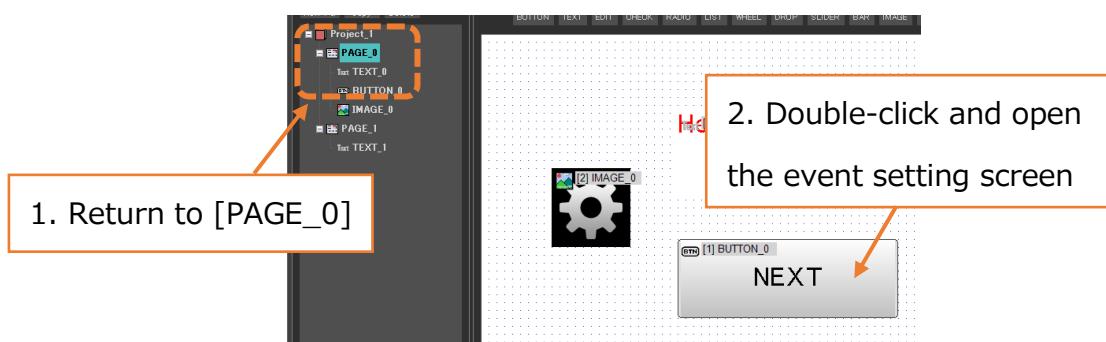
- ◆ Moving from one page to another on the GT-SP screen is performed with the "**PAGE SELECT**" action. When this action is used, specified pages are automatically displayed.

[Example 8]

- ◆ In this section, users can create **an action button that jumps to the next page** when pressed. For preparation, add a new page (PAGE_1) based on the project created in the example. Place a text object (TEXT_1) and set the character to be displayed as "0."

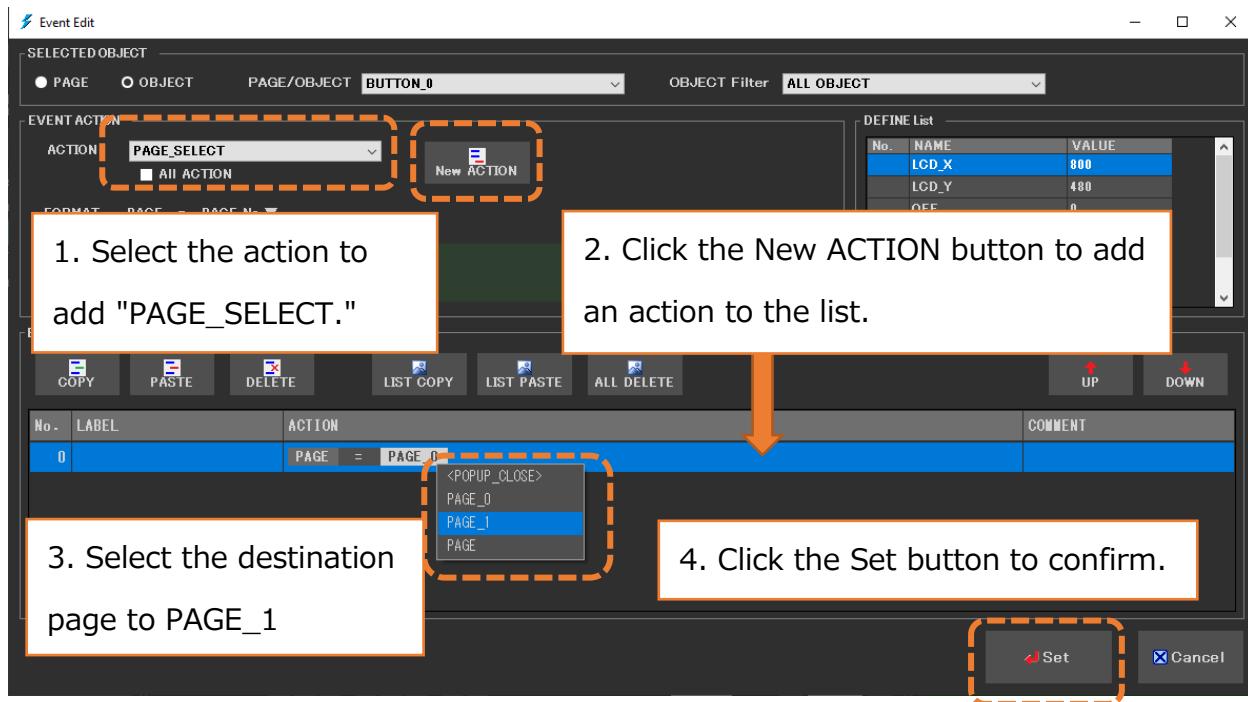


- ◆ Next, return to PAGE_0 from the page/object tree and double-click the button (BUTTON_0) to open the event setting screen.

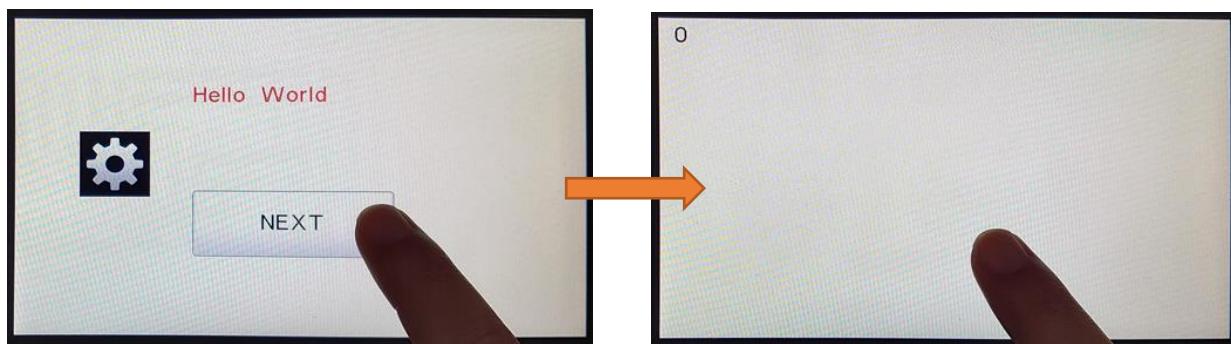


◆Select the PAGE_SELECT action from the action pull-down menu and add it to the list.

Click "PAGE_No ▼" and select the destination page (PAGE_1). Press the SET button to confirm the event.



◆Register the action in the GT-SP and execute it. Pressing the button generates an event to move to PAGE_1.

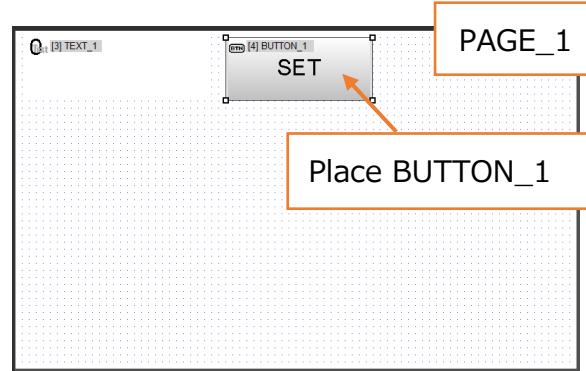


9.2 Changing object property values

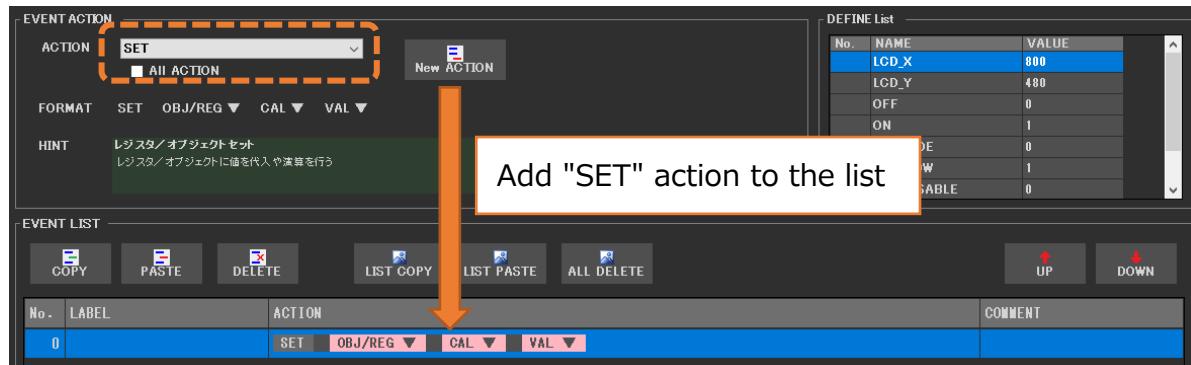
- ◆ Changing or assigning property values of an object is done with the "SET" action. Enter the target object and property specification, the assignment operator specification, and the value to be assigned. The value can be a string, a property value of another object, or the value of a generic variable.

[Example 9]

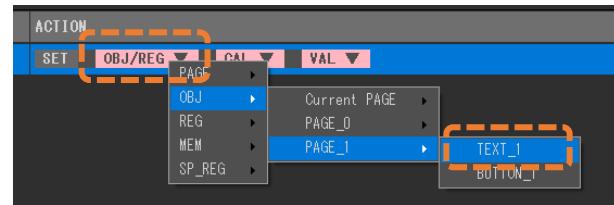
- ◆ In this example, we will create an event that changes the text displayed on a text object (TEXT_1) when a button is pressed.
- ◆ Place a new button object (BUTTON_1) on PAGE_1 as follows: Set the characters to be displayed as "SET."



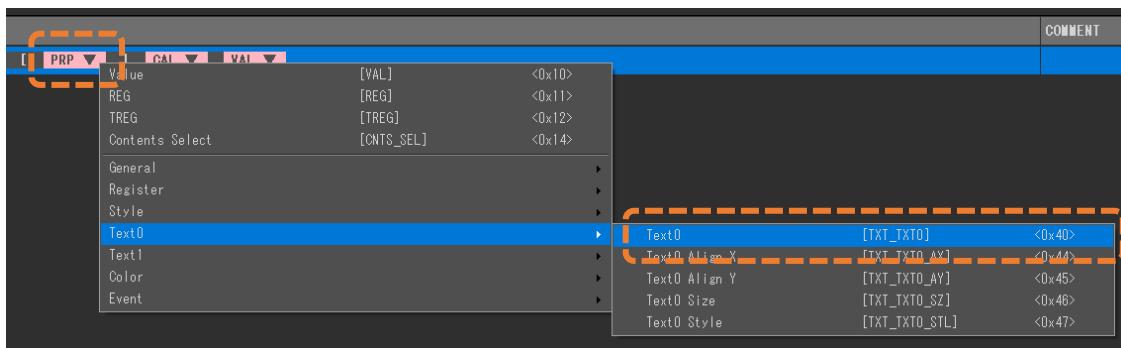
- ◆ Double-click BUTTON_1 to open the event setting screen. Then select the "SET" action and add it to the list.



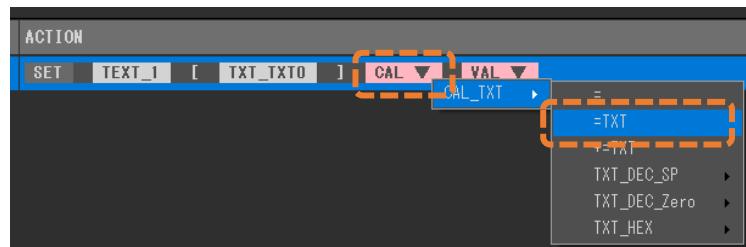
- ◆ Set up the items for the "SET" action. First, click "OBJ/REG ▼" and select the target object. Then select "OBJ > PAGE_1 > EXT_1."



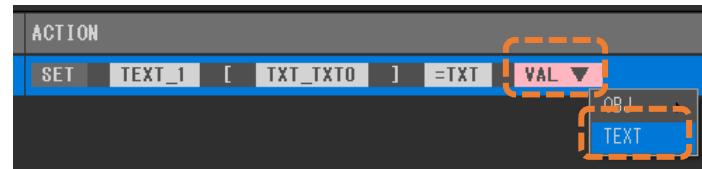
- ◆ Next, click "PRP ▼" and select the target property. Then, select "Text0 > Text0" to change the properties of the display text.



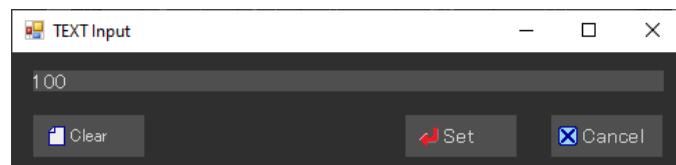
- ◆ Click "CAL ▼" to specify the assignment operator. Since text will be directly entered here, select "CAL > =TXT."



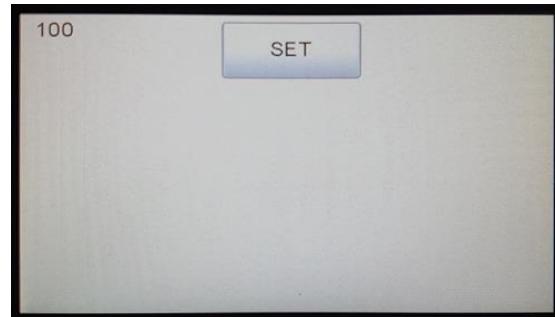
- ◆ Finally, click "VAL ▼" to specify the value to be assigned. Select "TEXT" for direct text input.



- ◆ After the input dialogue box is displayed, enter "100" and confirm with the SET button.



- ◆ After that, press the SET button to confirm the event and register it in the GT-SP.



- ◆ Pressing the button creates an event where the text value changes from 0 to 100.

9.3 Serial output

- ◆ Output from the GT-SP to an external host controller via a serial connection.

[Attention]

- ◆ When the GT-SP outputs data through a serial connection, but the output data cannot be received, the data accumulates and is stored in the transmission buffer inside the GT-SP. When the buffer overflows, the GT-SP stops event operations. It will restart when the buffer has enough free space.

When checking the operation, including the serial output of the GT-SP, be sure to review while executing the "Terminal function" described later to prevent overflow data stoppage. Alternatively, ensure the host controller is ready to receive output data.

9.3.1 Serial output of strings

- ◆ Through the "DATA_TX_FIX" action, any string can be serially output to an external host controller.

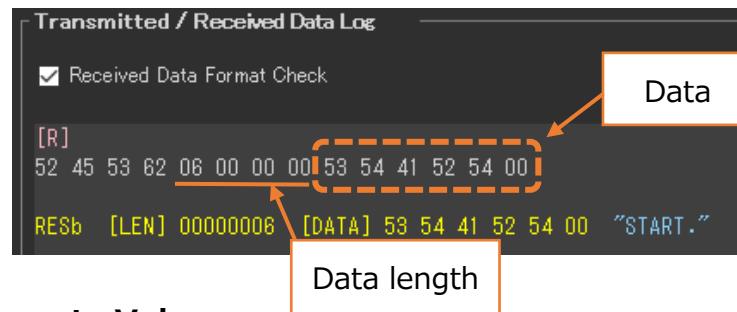
[Example 10]

- ◆ In this example, an event is added to output the string "START" when the button (BUTTON_1) is pressed.
- ◆ Double-click the button (BUTTON_1) and select the "DATA_TX_FIX" action from the Event Settings screen to add it to the list. Click VAL ▼ and select TEXT. The input dialogue box will then be displayed. When finished, press SET to confirm the event.



- ◆ When the button (BUTTON_1) on the GT-SP screen is touched, the serial port outputs header a 4-byte data length (0x00000006) and a hexadecimal character code of "START" and the NULL character (0x00) as data according to the response format.

- ◆ For information on how to check on the tool, please see the **terminal function** below.



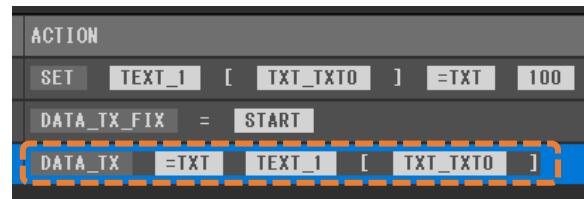
9.3.2 Serial Output of Object Property Values

- ◆ Using the "DATA_TX" action, you can serially output the property value of any object to an external host controller.

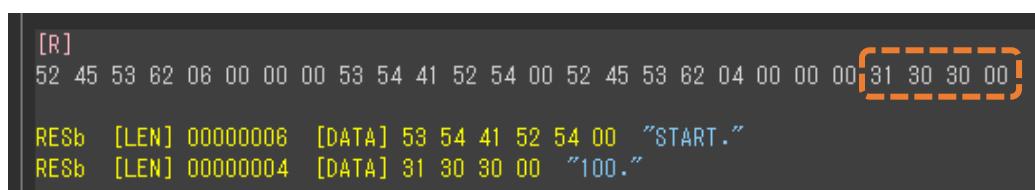
[Example 11]

- ◆ Here, an event is added that serially outputs the character string (Property value of Text0) displayed in the text (TEXT_1) when the button (BUTTON_1) is pressed.

- ◆ Add "DATA_TX" to the event list of the button (BUTTON_1). For "TX_TYPE ▼" select "=TXT.". Select the text object TEXT_1 for VAL ▼ and Text0 (TXT_TXT0) for VAL_PRP ▼. When complete, confirm the event by pressing the SET button.



- ◆ Register the selections with the GT-SP and execute. When you touch the button (BUTTON_1) on the GT-SP screen, the character string "100" is output from the serial port in hexadecimal character code. For information on how to check this with the tool, see Terminal functions below.



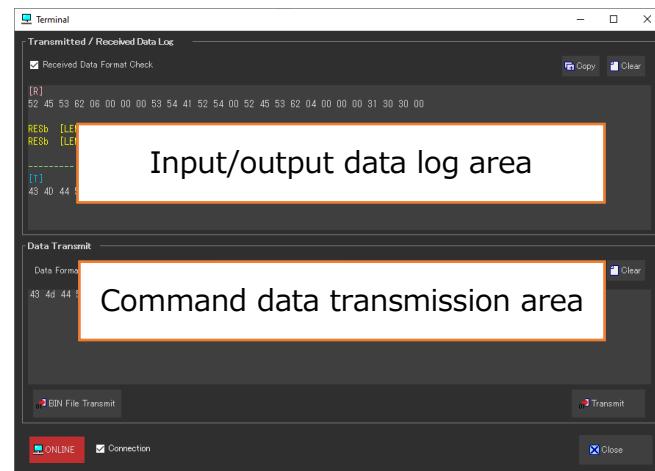
10 Check the serial input/output signal using the terminal function

- ◆ The terminal function can be used to check the contents of the signal serially output from the GT-SP. Users can also input any signal (command) from the tool to verify the operation of the GT-SP.

10.1 Using the Terminal function

- ◆ With the GT-SP operational, the Terminal

button  on the main screen's toolbar opens the terminal screen. Press the ONLINE status  if the GT-SP connection successfully initiates.



10.2 Checking the input/output signals

- ◆ When a signal is input to or output from the GT-SP while ONLINE, the input/output signal log is displayed in the "input/output data log area."

[Example 12]

- ◆ To run the created sample, press the button (BUTTON_1) while ONLINE, and confirm the signal is output correctly.

```
[R]
52 45 53 62 06 00 00 00 53 54 41 52 54 00 52 45 53 62 04 00 00 00 31 30 30 00

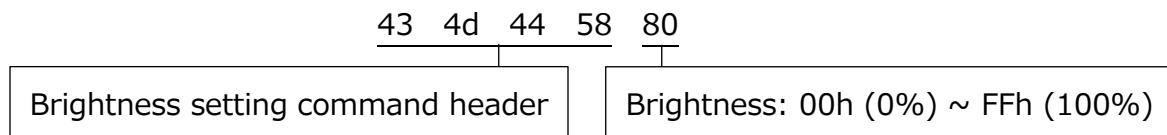
RESb [LEN] 00000006 [DATA] 53 54 41 52 54 00 "START."
RESb [LEN] 00000004 [DATA] 31 30 30 00 "100."
```

10.3 Confirming the input command operation

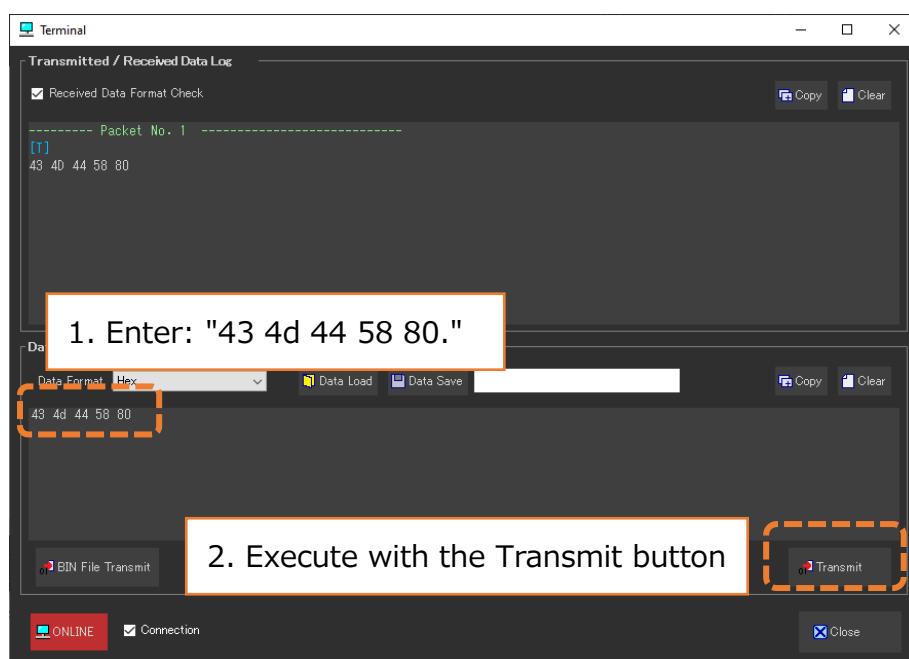
- ◆ Any command can be sent to the GT-SP to check the operation of the GT-SP. Enter a hexadecimal code in the text box in the "Data transmission area" and press the Transmit button  .

[Example 13]

- ◆ In this section, the display brightness setting command is used to change the brightness of the GT-SP to 50%. For specifications of all commands, please refer to the GT-SP Software Specifications.
- ◆ The specifications of the display brightness setting commands are as follows. Please note they are hexadecimal codes.



- ◆ Enter the hexadecimal command code "43 4d 44 58 80" in the "data transmission area" and press the Transmit button  . Check that the input data of the GT-SP is displayed in the "input/output data log area" and that the screen becomes dark.



11 List of objects

◆This section describes objects that can be used with the GT-SP. For details on properties, refer to the **GT-SP Software Specifications**.

Object name	Content
Page	This becomes the background of the screen display. The object is placed on this page. This page is also the background for the "pop-up display."
Button	Show button
Text	Display characters
Edit box	This box allows users to enter text on the GT-SP screen. When the edit box is selected, an input keypad automatically appears. The value entered becomes the Text0 property .
Check box	ON/OFF status can be toggled. The status is entered into the Value property .
Radio button	Radio buttons allow users to select an item. One line of text in the Text0 property is treated as one item. The selected item row number in the object is entered in the Value property.
List Box	Radio buttons and the like
Wheel	Radio buttons and the like
Drop-down list	Radio buttons and the like
Slider	Sliders allow users to adjust values easily. Set the minimum and maximum values with the Min Value and Max Value properties. When the knob is moved on the screen, the corresponding value is entered into the Value property.
Bar	Users can display values with a bar. Minimum and maximum values should be set using the Min Value and Max Value properties. The values are then displayed accordingly.

12 Employing user fonts

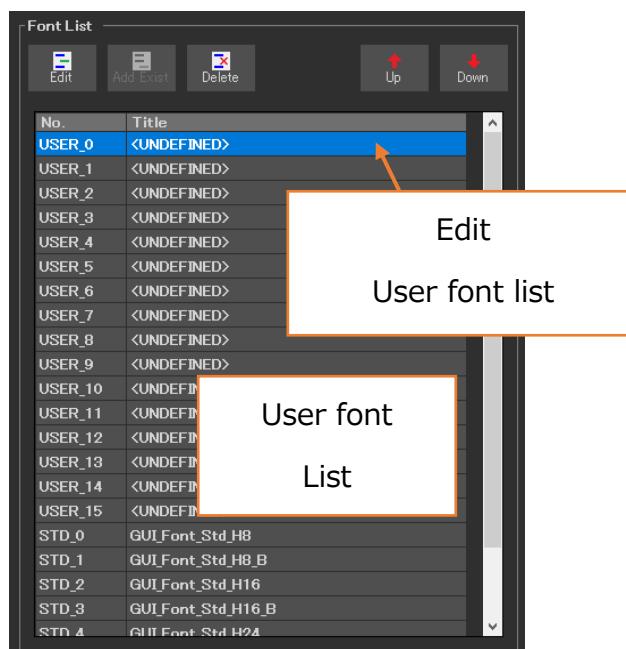
- ◆ If users want to use a font other than a pre-installed standard bitmap font in the GT-SP, they can upload and register a PC user font (bitmap font).
- ◆ Users can register a maximum of 16 user fonts, but since they are entered as images, only one font size can be registered per list. Therefore, if a user wants to use three different font sizes of the same typestyle, they need to register three separate user fonts.

[Attention]

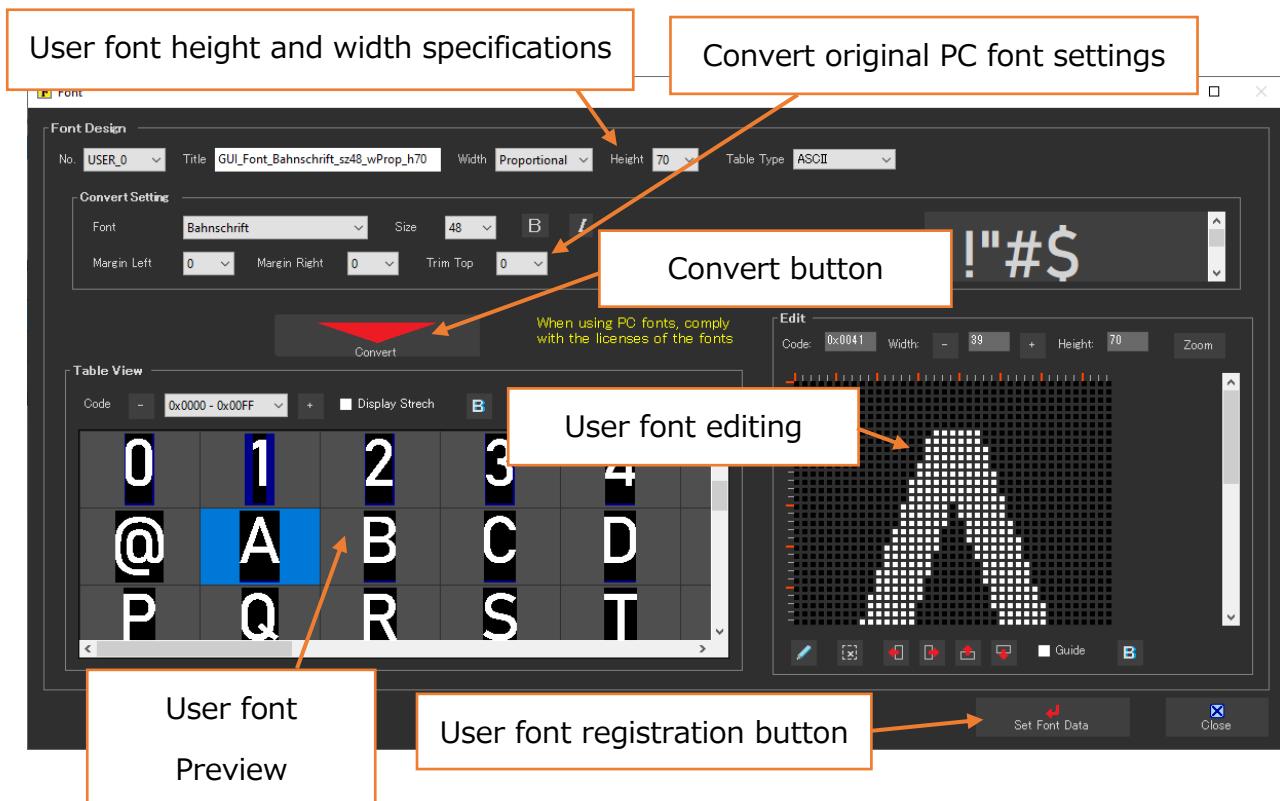
- ◆ If using PC fonts, please comply with all Terms Of Use before uploading them into the GT-SP.

12.1 Registering user fonts

- ◆ Press the Font button  on the main screen's toolbar to open the user font selection dialog.



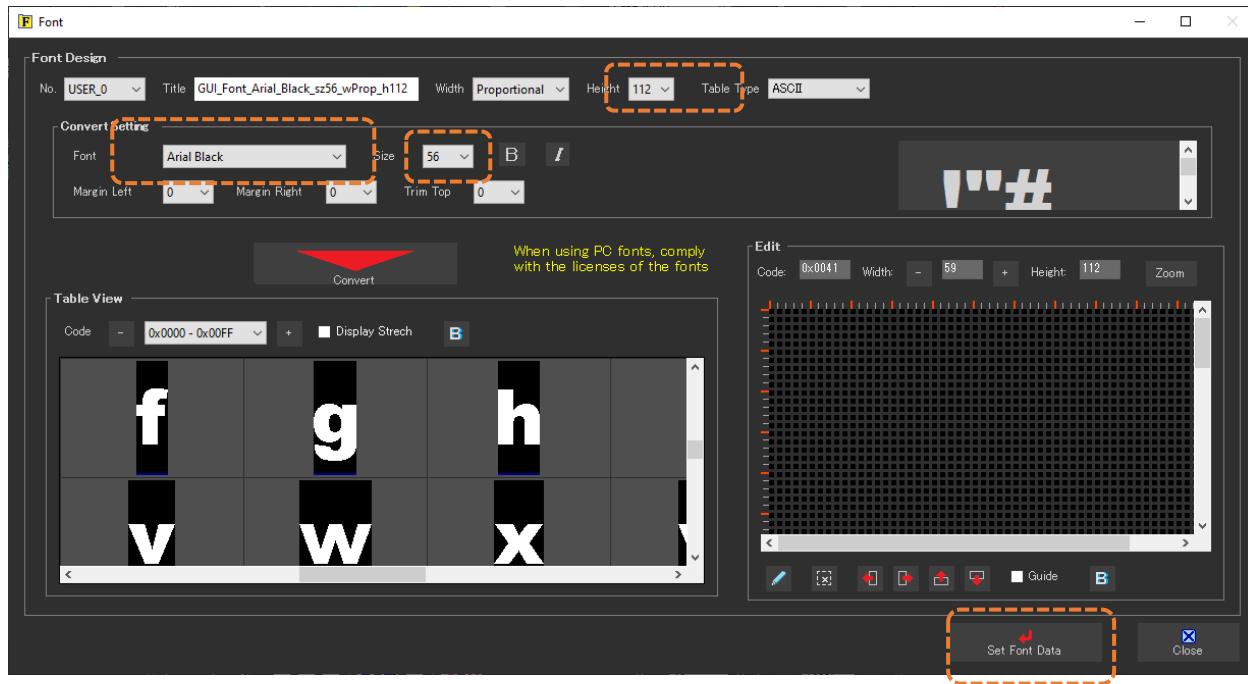
- ◆ Select the user font to be changed. Then double-click or press the Edit button to display the font conversion settings screen.



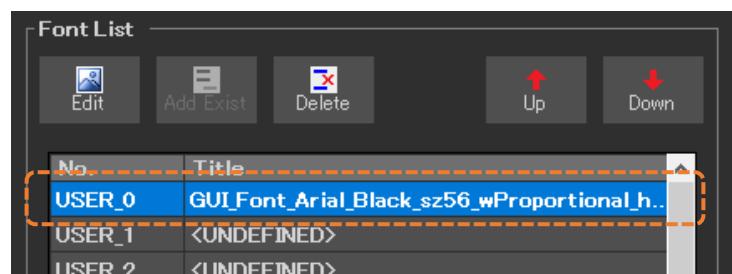
- ◆ Users should select the font they want to use in Convert Setting. Next, specify the size, left and right margins (font gap), and then press the Covert button to generate a bitmap font, which can be previewed in the Table View as a user font. (Please note that when the margin is "0," characters are displayed without spacing, so it is necessary to select "1" or more depending on the font size).
- ◆ Please inspect the preview and, if needed, adjust the height of the user font so that all characters are displayed correctly.

[Example 14]

- ◆ Register a typestyle in the user font (USER_0). Register "Arial Black" with a font size of "56." After conversion, the lower part of the characters, such as the bottom of the "g," is cut off. Therefore, adjust the height of the user font to "112" and convert again. If the adjustment is suitable, register the font in USER_0 using the Set Font Data button.



- ◆ Users can confirm that a user font was registered in USER_0.

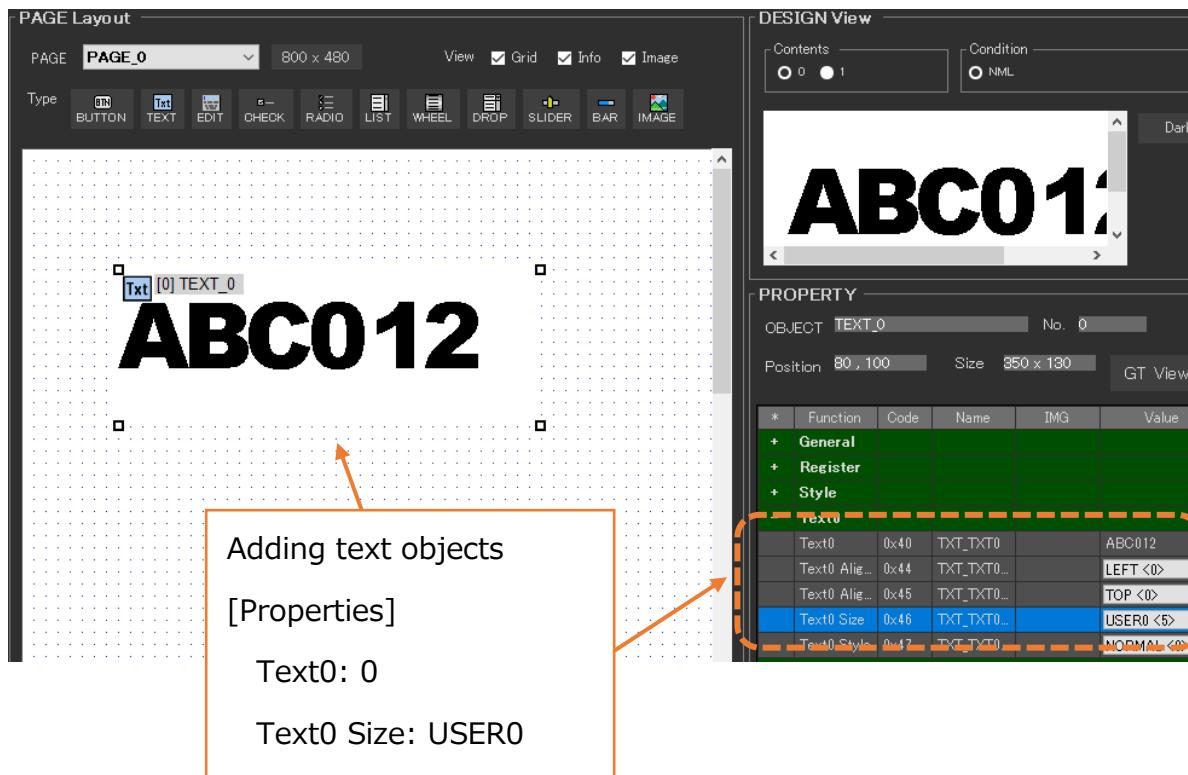


12.2 Displaying user fonts

- ◆ Registered user fonts can be used to display text on objects. To do so, specify the registered user font in the font size property of each object.

[Example 15]

- ◆ Enter "ABC012" in the display content of the text object (Text0 property). Select the registered user font (USER0) for the text size (Text0 Size property). Confirm that the text on the preview screen and the GT-SP convert to the user font after execution.



13 Saving and loading projects

13.1 Saving a project

◆Created projects can be saved using the Save button  **Save**. If users wish to save the project under a different name, use the Save As button  **Save as**.

◆The following files are generated when saving and registering a project.

- XXXX.gup : Project file
- XXXX.iml : Image list file
- XXXX.h : Various header files
- XXXX.bin : Binary file for registration
- Image folder : Image folder
- font_data folder : Font data folder
- XXXX_FONT_STD.bin : Font file
- XXXX_FONT_STD.bin : Standard font file
- XXXX_FONT_USER.bin : User font files, etc.

[Attention]

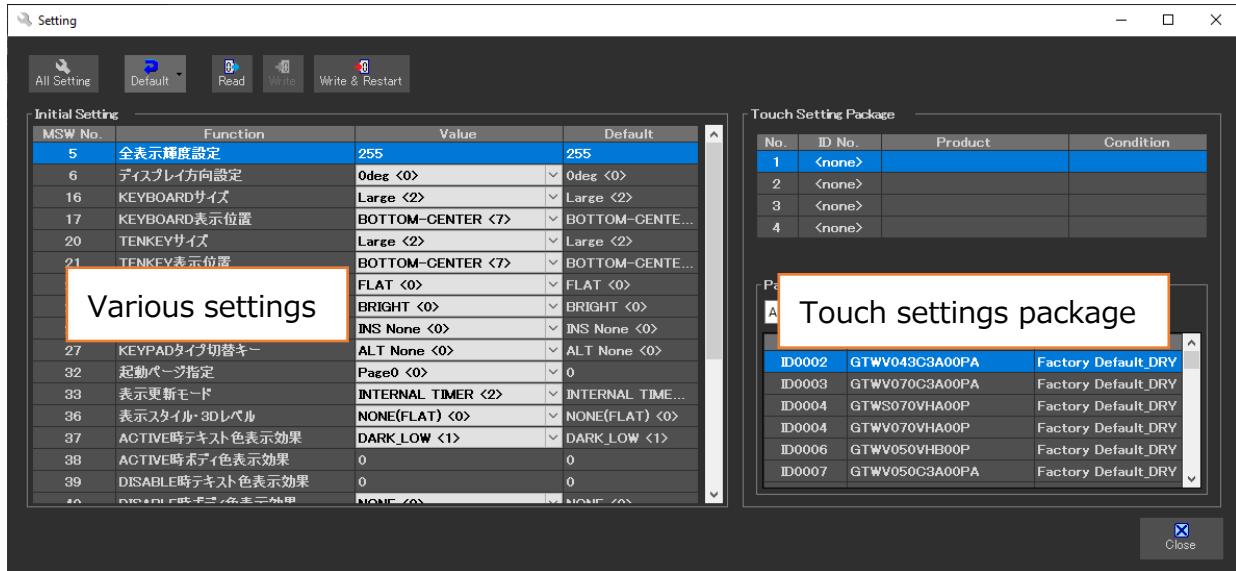
◆An image folder is automatically created on the same hierarchy as the project. Duplicate data of images registered in the project is entered here, and the tool refers to the data in this folder. Do not directly change the image data in this folder, as it will adversely affect the project file. When changing the image data, please do so on the tool.

13.2 Loading a project

◆Saved projects can be loaded using the Open button  **Open**. Recently opened projects can be selected using the Reload button  **Reload**.

14 General settings

◆General settings for the GT-SP can be made using the Setting button  on the main screen's toolbar. The main settings can be seen below. For further details on settings, refer to the GT-SP software specifications.



◆**Backlight Brightness:** Sets the brightness of the TFT screen.

◆**Start Page:** Denotes a startup page after powering on. When "255" is selected, no page is designated.

Async Speed, Async Parity: Settings for asynchronous connections. Set according to the connection environment with the host controller.

◆**Threshold:** Users can easily adjust the touch sensitivity.

◆**Touch Parameter Select:** Selects the reference source for the touch sensitivity setting value. If "MSW Value" is selected, the values from the touch sensitivity (threshold) settings are used. If "PKG Value" is selected, the recommended values in the touch settings package are used.

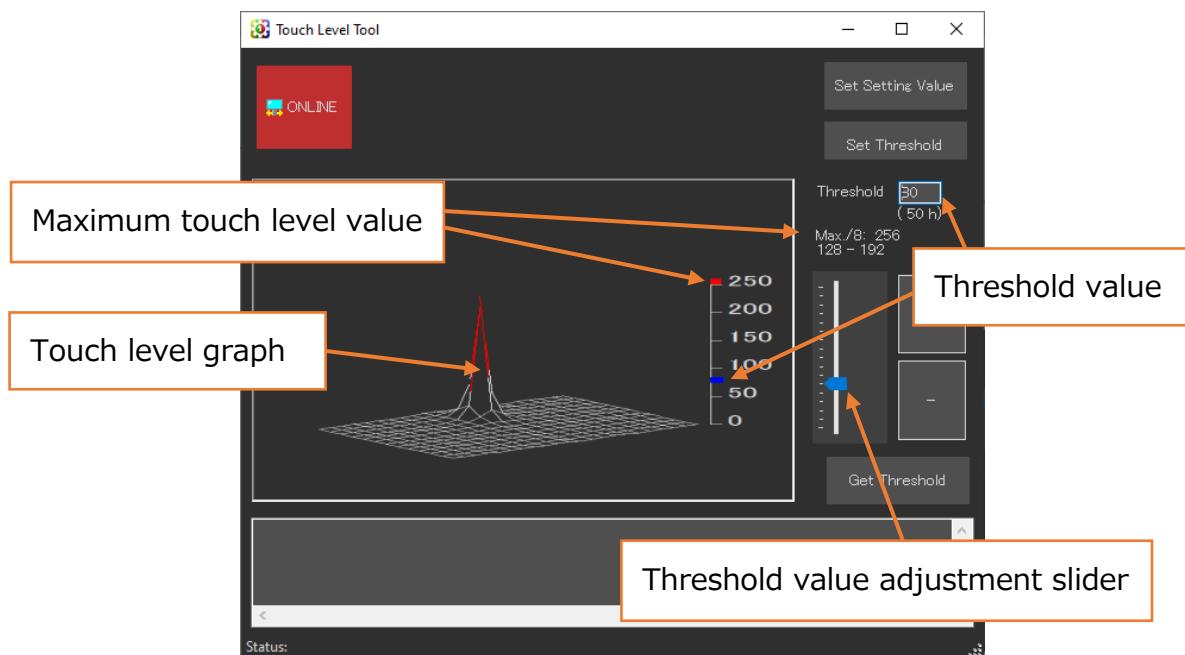
◆**Touch Package Select:** Select the registered package data number when using a touch settings package.

15 Setting and confirming the touch sensitivity

- ◆ Users can set and verify the touch sensitivity settings.

15.1 Confirming touch sensitivity

- ◆ Press the Touch button  on the menu bar to display the touch level confirmation dialogue.
- ◆ When the GT-SP is touched when connected and running, the strength of the touch sensitivity is shown in a graph. The GT-SP recognizes a touch when the maximum touch level exceeds the threshold value.

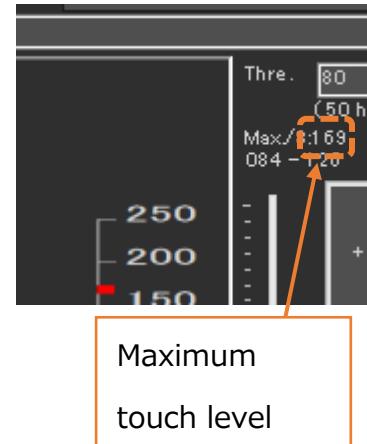


15.2 Adjusting the touch sensitivity

- ◆ When adjusting the touch sensitivity, ensure the GT-SP is fully enclosed within the housing (or the GT-SP screen is protected by a glass or resin cover). To ensure optimal

sensitivity adjustment, simulate an environment as similar as possible to the actual operating environment of the product.

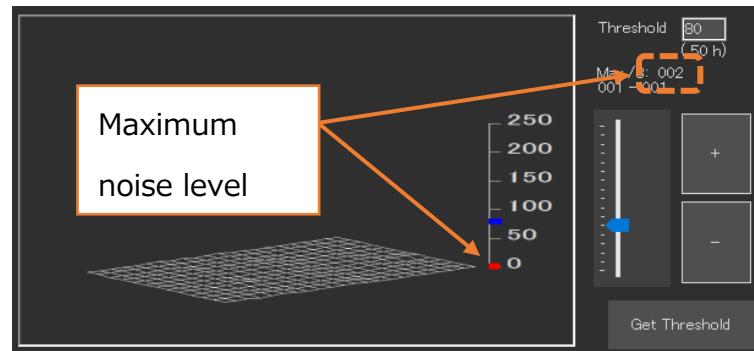
1. Touch several points on the screen (such as on the four corners, in the center, etc.) to record the maximum touch level at each point to find the average of those values.



2. The recommended threshold value is 50-75% of the maximum touch level value obtained in Part 1.

3. Adjust the slider bar to set the threshold value.

4. Check the noise on the touch level when not touching. Confirm that the noise does not exceed the threshold value and that there is a sufficient margin.



5. Confirm the touch sensitivity (threshold) setting once the threshold value has been determined. Pressing the Set Setting Value button applies a temporary threshold value until the GT-SP project is restarted. When the Set Threshold button is pressed, the value set here will be entered in the "Touch sensitivity (threshold) setting" of the general settings described above and will be applied after the next project registration.

[User tip]

- ◆ The lower the threshold value, the more touch-sensitive the device is, but also less sensitive to external noise, which may cause malfunctions. In contrast, higher threshold

values are more touch-insensitive and require a firmer touch to operate but are more sensitive to external noise. Therefore, please adjust sensitivity levels according to the environment and operating conditions.

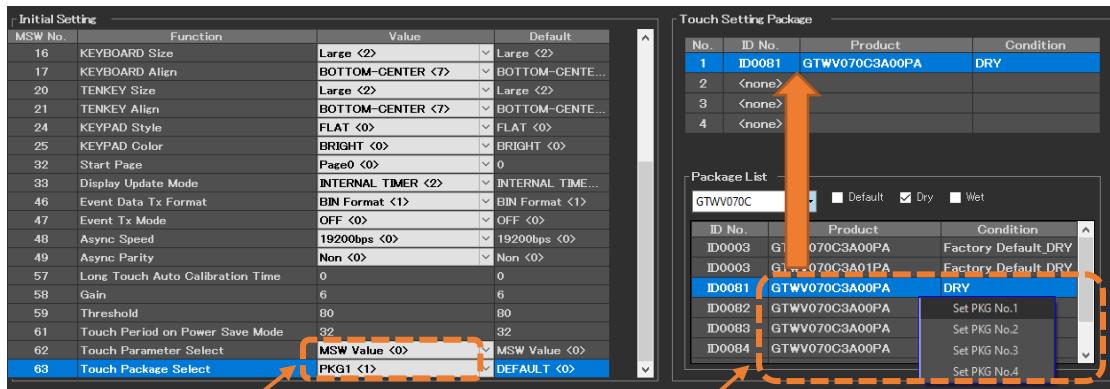
15.3 Using the touch settings package

◆ If the touch sensitivity adjustment described above does not work correctly, users can register up to four additional "Touch Setting Packages" that better match and optimize their GT-SP's installation structure and operating environment.

1. Download the "Touch Setting Package" from the technical support page of our website.
2. Refer to the information in the "Touch Setting Package Search Sheet" in the "Touch Panel Adjustment Guidance (APF820)" and search for the ID number of the most suitable data file. (The data from the GT-CP series can also be used with the GT-SP.)



3. Register the touch setting package with the ID number you found from the abovementioned general settings. Set the touch settings package selection at startup to enable the touch settings.



4. If the recommended touch data sensitivity (threshold) data is being used, change the touch sensitivity setting selection at startup from "MSW Value" to "PKG Value."
5. Verify the touch sensitivity levels and ensure there are no problems. If you want to fine-tune the touch sensitivity (threshold), adjust the touch sensitivity setting selection back to "MSW Value" at startup.

16 Firmware updates

- ◆ The firmware can be updated using the GT-SP tool.

Press the button  to browse the locally stored firmware file while the GT-SP is connected to a PC.

- ◆ Firmware files can be downloaded from our website's technical support page or requested from your sales representative

17 Disclaimers and limitations

- ◆ The information provided in this document does not guarantee it will work perfectly in all environments.
- ◆ The sample code provided may be used in part or in its entirety only for use in our products. Additionally, it is the customer's responsibility to verify the operation of the final product.
- ◆ The contents of this document may not be up-to-date due to ongoing development.
Please check the website for the latest information.
- ◆ Tools provided in the form of installers may contain licensed programs. Do not reverse engineer for analysis, decompilation, or disassembly.
- ◆ All trademarks used in this guide are the property of their respective owners.

18 Contact information

Please contact us via the inquiry form if you have any questions or requests.

- ◆ [North America / EU] <https://www.noritake-elec.com/support/contact-us>
- ◆ [Asia / Other] <https://www.noritake-itron.jp/eng/contact/>