NS-Series
NS12-TS00_, NS12-TS01_
NS10-TV00_, NS10-TV01_
NS7-SV00_, NS7-SV01_
Programmable Terminals

Quick Start Manual

OMRON

Table of Contents

SECTION 1
How to install the softwares

Please read the following remarks before installing any NS software.

- <u>Do not</u> install NS-Designer in a computer in which FinsGateway Ver. 2 and an SLK, SNT, or SYSMAC Board are installed.

- If NS-Designer Ver. 2.X is already installed, a dialog box to confirm deletion of this version will be displayed. Click the OK Button to start deleting this version. To exit the setup program, click the Cancel Button and then click the Exit Button. FinsGateway will not be uninstalled by this operation.

- If FinsGateway Ver. 2 is already installed, always uninstall it before installing NS-Designer. For details on uninstalling FinsGateway Ver. 2, refer to NS Series Setup Manual (V072-E1-xx), page 2-9.

- Before installing NS-Designer in Windows NT or 2000, log onto the computer as the administrator to ensure that system DLL files can be overwritten. If overwriting system DLL files fails, NS-Designer may not operate properly.

Installation Procedure:

1, 2, 3…   1.   Start up Windows 95, 98, NT, Me or 2000.

2. Close all applications before executing installation. Execute the following files from the NS-Designer CD-ROM according to the OS being used and then restart the computer.

   Windows 95
   a) Execute <CDROM>:\Update\401comupd.exe, and then restart the computer.
   b) Execute <CDROM>:\Update\DCOM\English\dcom95.exe, and then restart the computer.

   Windows NT or 2000
   Execute <CDROM>: \Update\401comupd.exe, and then restart the computer.

   Windows 98, 98SE or Me
   No particular operations are required.

3. Place the NS-Designer CD-ROM in the CD-ROM drive. The setup program is started automatically.
   If the setup program does not start automatically, such as after executing uninstall, locate Setup.exe in the CD-ROM using Windows Explorer, and then double-click the file to execute the setup program.

4. The NS-Designer Setup Wizard will be displayed. Install the NS-Designer by following the instructions in the Setup Wizard.

5. A confirmation message for using FinsGateway Help may be displayed. Click **OK**.

6. When installing FinsGateway, the window for registering user information will be displayed. Enter the user name and

organization.
After entering the information, click the **OK** Button.
A dialog box confirming the registered information will be
displayed. Check the information and then click the **OK** Button.

7. The FinsGateway Units for which installation is possible can be
   selected. ETN_UNIT and Serial Unit, which are already selected,
   are required for transferring projects to the PT. Controller Link
   Unit can be selected only if there is a Controller Link Board
   mounted to the computer.

8. The screen for specifying the installation destination will be
   displayed.

   Specify the directory in which NS-Designer will be installed. The
   following directory is displayed as the default installation
   destination.
   Windows 95, 98, or Me:
         C:\Program Files\OMRON\FinsServer95
   Windows NT or 2000:
         C:\Program Files\OMRON\FinsServerNT
   After specifying the directory, click the **Next** Button.
   (The window will not be displayed if FinsGateway Ver. 3.0 has
   been installed.)

9. The window to specify the folder in the Start Menu in which to
   register a shortcut for the program will be displayed. Specify a
   folder in the Windows Start Menu folder for creating a shortcut to
   FinsGateway.
   The following folder is displayed as the default location for
   creating shortcut keys:
   Start Menu\Programs\Omron\FinsGateway
   After specifying the folder, click the **Next** Button.

10. Installation will be executed. During installation, the installation
    progress is displayed as a percentage.

11. When installation has been completed, the FinsGateway version
    can be upgraded. Click the **Yes** Button to start the upgrade.

12. When installation has been completed, the Finished Window will
    be displayed. Select whether or not to restart the computer
    immediately, and click the **Exit** Button to complete the installation.

13. Always restart the computer after installation before using NS-
    Designer!

Note To uninstall the FinsGateway or/and NS-Designer, please refer to
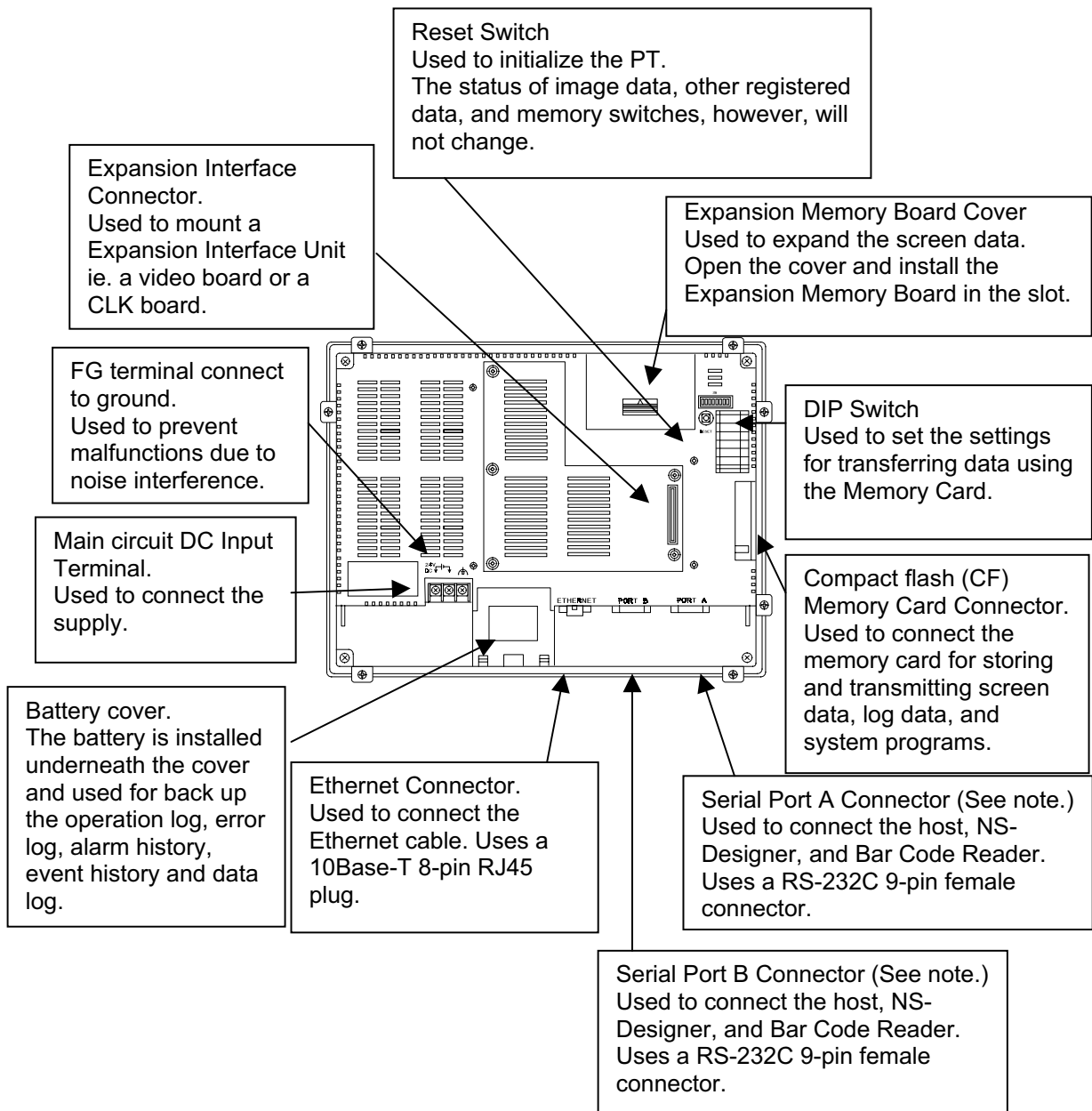NS-Series Setup Manual (V072-E1-xx).

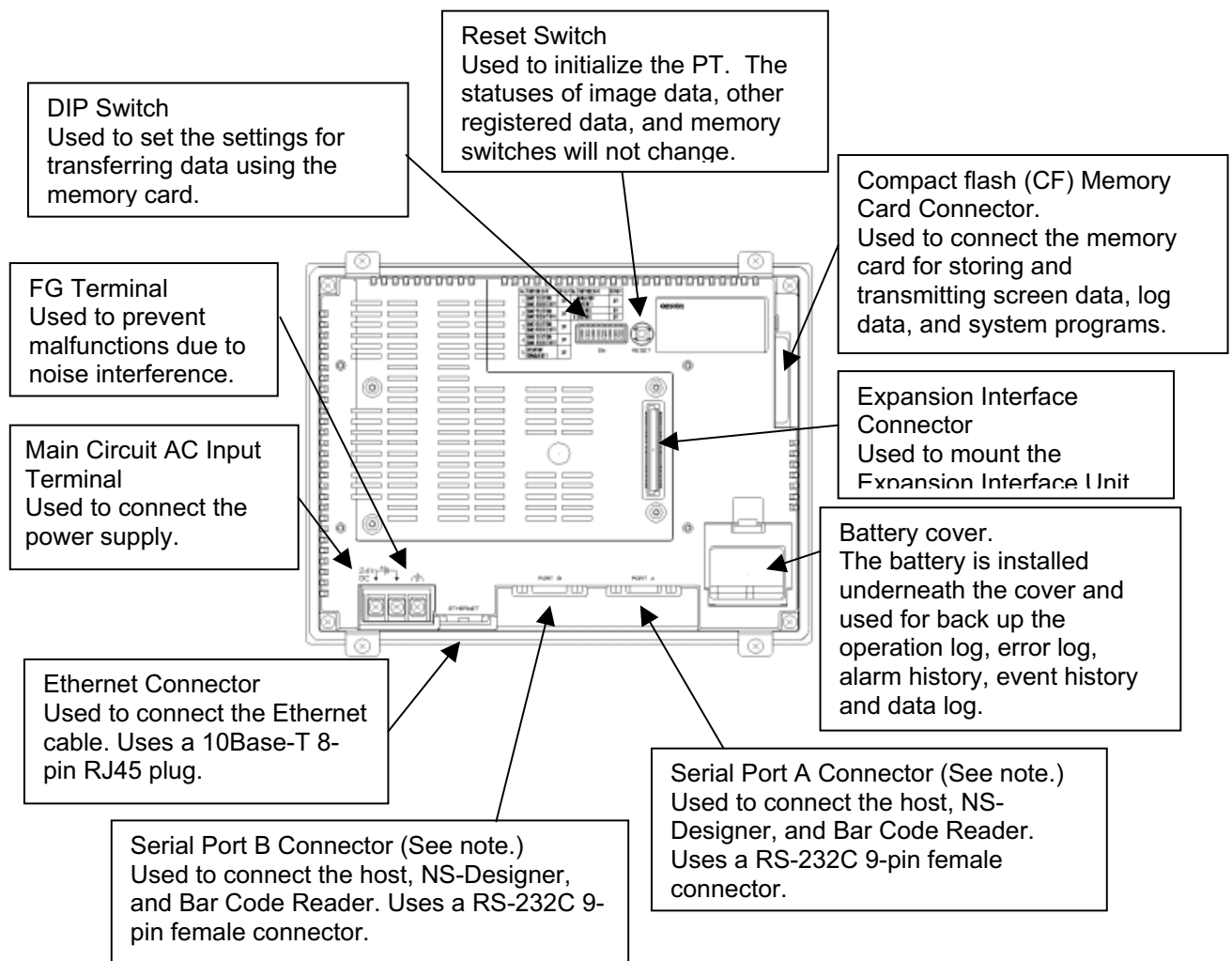# SECTION 2
How to operate with the NS Hardware

The part names and functions of the PT are described below. In general, the PT can operate via RS232/RS422-, Ethernet- and Controller Link (CLK) communication. The host of the RS232/RS422 communication can be PLC, PC or Bar Code Reader. Ethernet and CLK are used for bus communication and the purposes of use are almost unlimited. In addition there is possibility to attach the video board to the NS12 and the NS10. It can be used for view the live video picture from Vision Systems camera or surveillance camera.

Screen memory can be increase in the NS12 and NS10 models by inserting expansion memory board. Also e.g. logged data and screen data can be saved in the Compact Flash memory card.

2-1   NS12/NS10 Rear Panel

Reset Switch
Used to initialize the PT.
The status of image data, other registered data, and memory switches, however, will not change.

Expansion Interface Connector.
Used to mount a Expansion Interface Unit ie. a video board or a CLK board.

Expansion Memory Board Cover
Used to expand the screen data.
Open the cover and install the Expansion Memory Board in the slot.

FG terminal connect to ground.
Used to prevent malfunctions due to noise interference.

DIP Switch
Used to set the settings for transferring data using the Memory Card.

Main circuit DC Input Terminal.
Used to connect the supply.

Compact flash (CF) Memory Card Connector.
Used to connect the memory card for storing and transmitting screen data, log data, and system programs.

Battery cover.
The battery is installed underneath the cover and used for back up the operation log, error log, alarm history, event history and data log.

Ethernet Connector.
Used to connect the Ethernet cable. Uses a 10Base-T 8-pin RJ45 plug.

Serial Port A Connector (See note.)
Used to connect the host, NS-Designer, and Bar Code Reader.
Uses a RS-232C 9-pin female connector.

Serial Port B Connector (See note.)
Used to connect the host, NS-Designer, and Bar Code Reader.
Uses a RS-232C 9-pin female connector.

2-2   NS7 Rear Panel

DIP Switch
Used to set the settings for transferring data using the memory card.

Reset Switch
Used to initialize the PT. The statuses of image data, other registered data, and memory switches will not change.

Compact flash (CF) Memory Card Connector.
Used to connect the memory card for storing and transmitting screen data, log data, and system programs.

FG Terminal
Used to prevent malfunctions due to noise interference.

Expansion Interface Connector
Used to mount the Expansion Interface Unit

Main Circuit AC Input Terminal
Used to connect the power supply.

Battery cover.
The battery is installed underneath the cover and used for back up the operation log, error log, alarm history, event history and data log.

Ethernet Connector
Used to connect the Ethernet cable. Uses a 10Base-T 8-pin RJ45 plug.

Serial Port A Connector (See note.)
Used to connect the host, NS-Designer, and Bar Code Reader. Uses a RS-232C 9-pin female connector.

Serial Port B Connector (See note.)
Used to connect the host, NS-Designer, and Bar Code Reader. Uses a RS-232C 9-pin female connector.

2-3   Starting the NS Terminal for the First Time

Always perform the following operations when turning ON the PT for the first time after purchase.

A. Select the operating language.

B. Format the screen data area.

C. Set the date and time.

Operate according to the following conditions.

1.   When the power is turned ON to the PT, the error message will be displayed. Press the OK Button.

2. The System Menu will be displayed. Almost all texts are Japanese. You should see the language selection box on the lower right (Select Language). Select English and press the [Write] button. The question window will appear. Press the left button, which means YES (text is Japanese). The completed message will appear so press [OK] button. Now all texts should be in English. See the picture below:
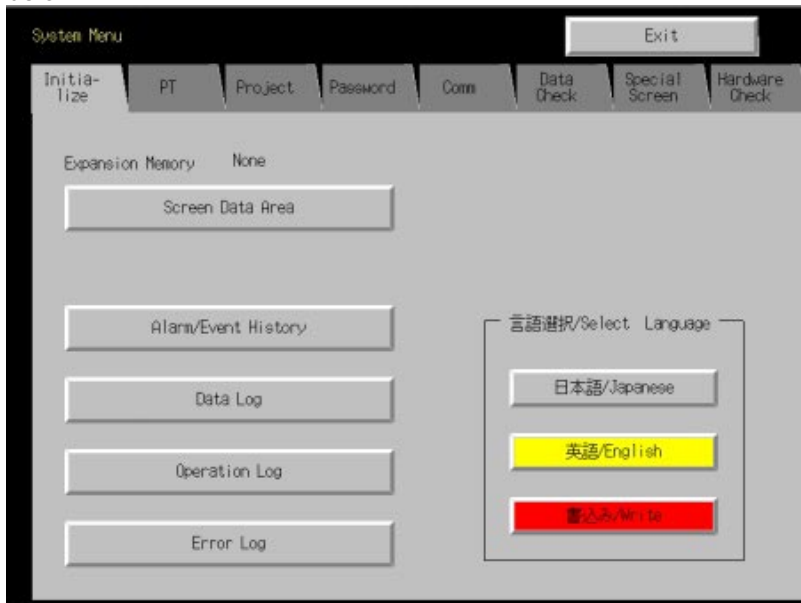
3. You are already in the [Initialize] tab (the first tab). Press the [Screen Data Area] button.

4. The warning message will be displayed. Press the Yes Button to format the screen data. Do not turn OFF the power while formatting is in progress. If an Expansion Memory Board is installed in the PT, do not remove the Expansion Memory Board while formatting is in progress.

   The time required for formatting depends on whether expansion memory is used and the size of the expansion memory. The NS7 finishes formatting instantly.

5. When formatting has been completed, the message will be displayed. Press the OK Button.

6. Select the [PT Settings] tab. Set the time and date.

7. Press the date display area under the heading "Calendar Check". A dialog box will be displayed. Input the date in yyyy/mm/dd format.
   Example: Enter January 1st, 2000 as 2000.1.1.

8. Press the time display area under the heading "Calendar Check". A dialog box will be displayed. Input the time using a 24-hour clock in hours/minutes/seconds format.
   Example: Enter 06:01:01 p.m. as 18.1.1.

9. The red [Write] button is the lower right corner in the [PT Settings] tab. The write operation is not needed because the time and date settings will be enabled immediately after they have been input in the dialog box.

   This completes the procedure required to start the PT for the first time. Now it is possible to transfer the project data. The PT can reset by pressing [Exit] button or you can leave it into System Menu mode.

2-4   How to use System Menu

The system menu can be displayed by pressing two of the four corners of the touch panel simultaneously. There are many settings in the PT's System Menu. Many of those are the same as System Settings in the NS-Designer. For more information, please refer the NS-Series Setup Manual (V072-E1-xx) section 6.

2-5   Communication methods

Al NS terminals have two serial ports. The NS12-TS01(B), NS10-TV01(B), and NS7-SV01(B) also have a Ethernet interface. These communications ports can be used for the communications methods shown in the table below.

Communications ports	Supported communications methods
Serial port A	- 1:1 NT Link - 1:N NT Link (See note.) - For connecting NS-Designer or Bar Code Reader.
Serial port B	- 1:1 NT Link - 1:N NT Link (See note.) - For connecting the NS-Designer or Bar Code Reader.
Ethernet interface	- FINS communications - For connecting NS-Designer.

Note: NT Link can be set on either normal or high-speed communications.

The following three communications methods can be used to transfer data between the PT and NS-Designer (computer). The data can be *project data* or *systems data*. The meaning of the Systems Data in described in the Terminology chapter at the end of this manual.

Serial communications
Screen data (project data) can be transferred by simply connecting a cable between the computer and PT. Serial communications does not require settings such as those used for Ethernet. The baud rate, however, is not as fast as Ethernet.

Ethernet
The speed is faster than serial transfer and screens can be transferred from a remote location (via the network). The communications parameters must be set on the PT, NS-Designer and FinsGateway.

Memory Card
By using a memory card, screen data can be transferred faster than with Ethernet. *Before using Memory Card functions, please read more specific instructions from NS-Series Setup Manual (V072-E1-xx), section 3-6 or NS-Series Operation Manual (V074-E1-xx).* First the data has be transferred from NS-Designer to the Memory Card. By turning ON pin 6 of the DIP-switch and using a startup program the NS terminal is set to read screen data from a memory card.
Note that <u>systems data can be transferred using Memory Cards only</u>.

SECTION 3
How to create a simple screen

The following instructions will explain how to make a small project with the NS Designer software. Next sections will explain how to simulate the project and how to download it to the NS hardware.

3-1   Creating a New Project

Start the NS-Designer program. Before creating screens, you need to create a project, which stores screens.

1, 2, 3…   1. Create new project.
Select [File] - [New Project]

2. Specify the NS hardware model.
Select the right model and click on [OK] button
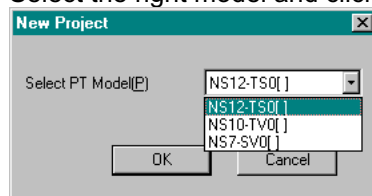
3. Choose the screen creating procedure.
Select [New Screen] and click on [OK] button
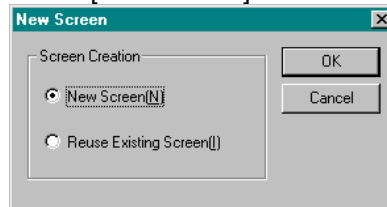
4. New screen opens:
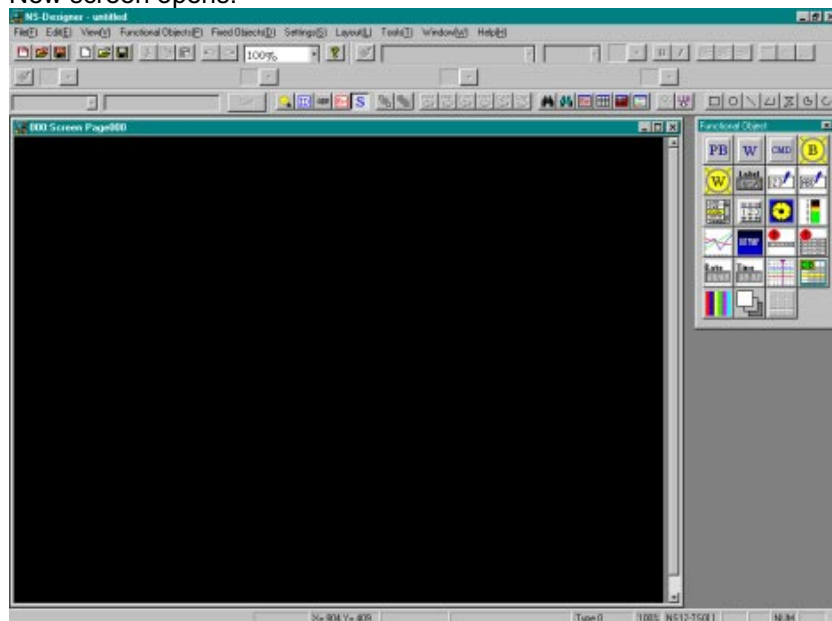
3-2   Project & Screen properties

Make a parameter settings of the project.

1, 2, 3…   1.   Select - [Settings] - [Project properties].

2.   Set a title for a project. This can be anything.
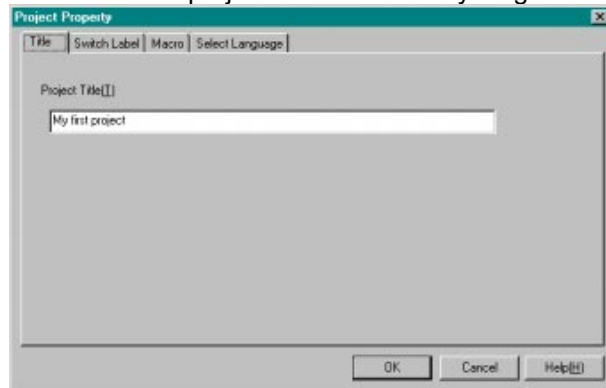
3.   Set a number of labels. Screens can contain several languages.
Project Properties is the only place to specify different languages.
This setting will affect the whole project.
(1) Click of [Switch Label] tab
(2) Set the number of languages (e.g. "2") for [No. of labels]
(3) Set first language for [Label Name] of [Switch No. 0]
(4) Set second language for [Label Name] of [Switch No. 1]
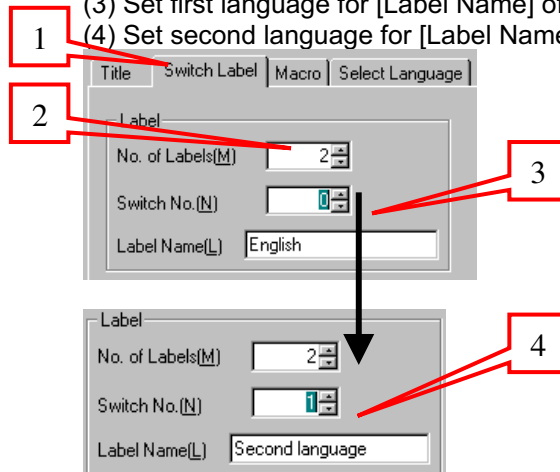
Note   Maximum number of languages is 16 !!

The macro execution conditions can be set in the [Macro] tab. This
should be ignored at this time.
The NS terminal's system language can be change in the [Select
Language] tab (Japanese or English).

4.   Click on [OK] button. Confirmation dialog will be displayed. Click
on "Yes".
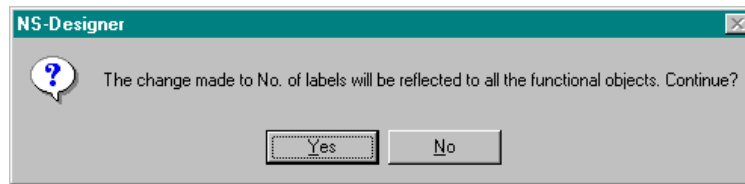
5. Save the project.
   (1) Create a new folder
   (2) Input a file name
   (3) Click on [Save] button
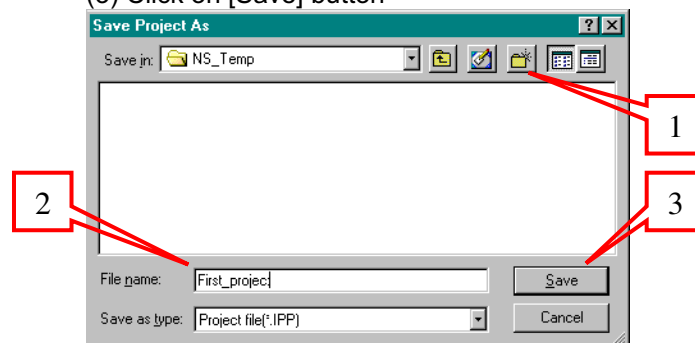
6. Confirmation dialog will be displayed. Click on [Yes to all] button.
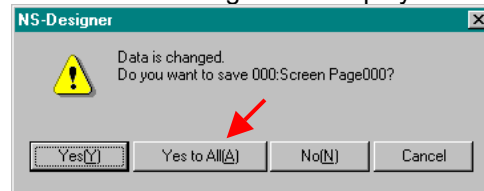
7. The screen will be closed when saving a project. Dialog box to open a screen will be displayed automatically. Open the screen again by clicking on [OK] button.
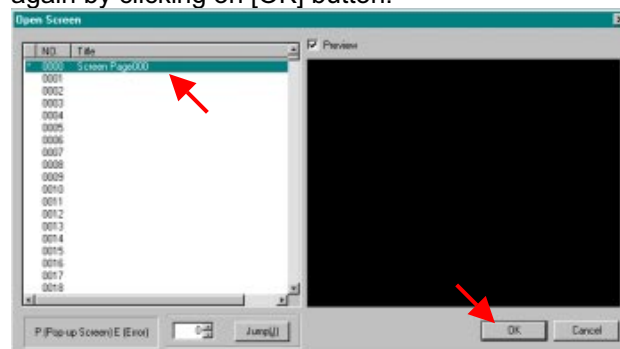
8. Select [Settings] - [Screen Properties] or click right click on screen and select [Screen Properties]

Settings(S) Layout(L) Tools(T) Window(W) Help(H)
Object Properties(Q)...   Enter
Edit Label(E)   Space
Change Settings at Once(L)... Ctrl+K

Flicker(F)...
Password(A)...
Unit&Scale(U)...
Alarm/Event(B)...
Data Log(G)...
Data Block(K)...

Project Properties(S)...
Screen Properties(W)...
System Setting(R)...
Reset Defined Default(D)   ▶

Change PT Model(C)...
Register Host(H)
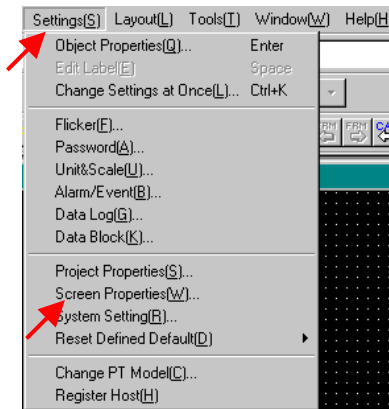
9. The Screen Property window will appear.
    (1) Screen title can be input in the [Title] tab.
    (2) Screen size settings are in the [Size/Pop-up] tab.

1

Screen Property   ⊠

Title | Size/Pop-up | Background/Others | Macro

┌ Screen Size ────────────────────────
2
  Width(W) 320   Height(H) 240   Set scre
                                       on NS

  ☐ Use as Default Screen Size(D)

Check this if you
want use these
settings also in the
future.

Check this when
you want use
screen as window.

☑ Use as Pop-up Screen(P)

┌ Pop-up Screen Display Position ─┐ ┌ Pop-up Screen Setting ──────────
│ Any Position   ▼ │ ☐ Enable input on other screens(M)
│   │
│ X   0   Y   0   │ ☐ Closes when base screen switches(C)
│ (X)   (Y)   │ ☐ No title bar(T)

The Screen type can be Normal or Pop-up Screen. Check the
"Use as Pop-up Screen" if window-like screen is wanted. Note
that the first screen should be normal screen so do not check this
option at this time!

10. Click on the [Background/Others] tab. Then click on the [Set
    Color…] button.
    (1) Background color can be set in the [Color Setting] window.
    (2) Macro execution condition can be set in the [Macro] tab (refer
    the Macro Reference Manual).
    (3) Click on [OK] button when settings are made.
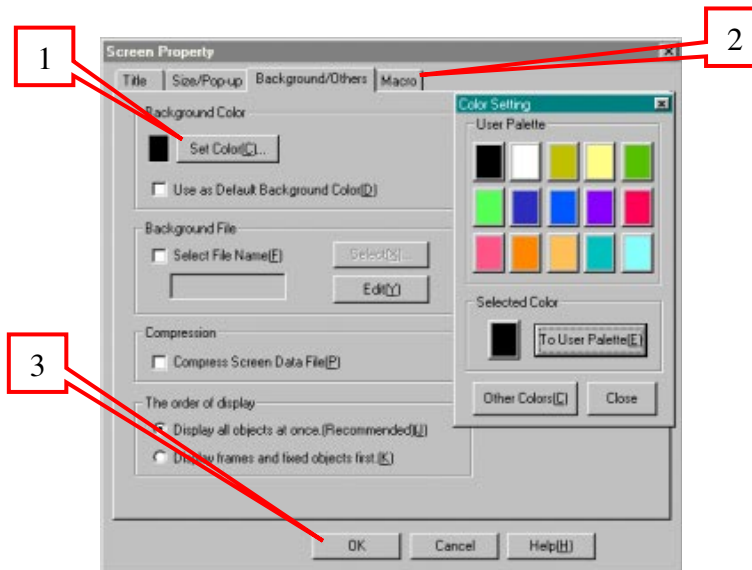
3-3 Explanation of NS Terminal memory

PT (Programmable Terminal) memory is made up of internal memory and system memory. Both of the memory areas are divided into bit and word sections.

3-3-0 The Internal Memory ($B, $W)

The internal memory in the PT can be read and written by the user. Internal memory can be allocated as required for settings, such as the communications addresses of functional objects.

The bit memory in a PT is indicated by **$B**. The size of this memory is 32,768 bits. Addresses from $B0 to $B32767 can be read and written by the user. Bit memory is used to signal pieces of information that indicate ON/OFF status for functional object addresses and control flags.

The word memory in a PT is indicated by **$W**. The size of this meory is 2,048 words. Addresses from $W0 to $W2047 can be read and written by the user. Word memory is used to store all numeral and character string data, including data for allocated addresses for functional objects. Each word contains 16 bits, but consecutive words can be used as required for character strings and 32-bit data.

Note Internal memory can not be read and written directly from the host.

3-3-1 The System Memory ($SB, $SW)

System bit memory (**indicated by $SB**) is used to exchange information between the host and the PT, such as for controlling the PT and notifying the host of PT status, in bit units. The system bit memory contains 48 bits with predefined functions.

The system bit memory is listed in the following table:

Address	Classification	Function
$SB0	Notification	Operation signal, pulse
$SB1	Notification	Operation signal, always ON
$SB2	Notification	Screen switch strobe
$SB3	Control	System Menu prohibit

Address	Classification	Function
$SB4	–	Reserved
$SB5	Notification	Numeral and character input detection
$SB6	Control	Backlight brightness adjustment, high
$SB7	Control	Backlight brightness adjustment, middle
$SB8	Control	Backlight brightness adjustment, low
$SB9	–	Reserved
$SB10	Control	Backlight flashing control
$SB11	Notification	Backlight status
$SB12	Control	Continuous buzzer
$SB13	Control	Short intermittent buzzer
$SB14	Control	Long intermittent buzzer
$SB15	–	Reserved
$SB16	Control	Port A NT Link priority registration (for 1:N)
$SB17	Control	Port B NT Link priority registration (for 1:N)
$SB18	Control	Ten key pad display with temporary input
$SB19	Control	Prohibit input
$SB20	Control	Contrast adjustment (+10) (For NS7 only)
$SB21	Control	Contrast adjustment (+1) (For NS7 only)
$SB22	Control	Contrast adjustment (−1) (For NS7 only)
$SB23	Control	Contrast adjustment (−10) (For NS7 only)
$SB24 to $SB31	–	Reserved
$SB32	Notification/control	Alarm/event history initialization
$SB33	Notification/control	Alarm/event history save
$SB34	–	Reserved
$SB35	Notification/control	Data log initialization
$SB36	Notification/control	Data log save
$SB37	Notification/control	Operation log initialization
$SB38	Notification/control	Operation log save
$SB39	Control	Functional object operation log execution
$SB40	Control	Screen switch operation log execution
$SB41	Control	Macro operation log execution
$SB42	Notification/control	Error log initialization
$SB43	Notification/control	Error log save
$SB44	–	Reserved
$SB45	Control	Macro error dialog box display control
$SB46	Notification	Macro error notification
$SB47	Notification	History processing error flag

System word memory (**indicated by $SW**) is used to exchange information between the host and the PT in word units, such as for controlling the PT and notifying the host of PT status. The system word memory contains 37 items with predefined functions.

The system word memory is listed in the following table:

Address	Classification	Function
$SW0	Notification/control	Current screen number
$SW1	Notification/control	Display pop-up screen 1 number
$SW2	Notification/control	Pop-up screen 1 display position (X coordinate)

Address	Classification	Function
$SW3	Notification/control	Pop-up screen 1 display position (Y coordinate)
$SW4	Notification/control	Display pop-up screen 2 number
$SW5	Notification/control	Pop-up screen 2 display position (X coordinate)
$SW6	Notification/control	Pop-up screen 2 display position (Y coordinate)
$SW7	Notification/control	Display pop-up screen 3 number
$SW8	Notification/control	Pop-up screen 3 display position (X coordinate)
$SW9	Notification/control	Pop-up screen 3 display position (Y coordinate)
$SW10	Notification/control	Display label number
$SW11	–	Reserved
$SW12	–	Reserved
$SW13	Control	Password number for input prohibit clear
$SW14	Notification	Current time (min, s)
$SW15	Notification	Current date and time (day, hour)
$SW16	Notification	Current date (year, month)
$SW17	Notification	Current day (day of the week)
$SW18	Notification	No. of generated alarms and events
$SW19	Notification	ID number for generated alarms and events
$SW20	Notification	ID number for cleared alarms and events
$SW21	Notification	Alarm/event ID when alarm/event object macro executed
$SW22	–	Reserved
$SW23	Notification	Macro execution error number
$SW24	Notification	Macro error screen number
$SW25	Notification	Macro error object ID number
$SW26	Notification	Error macro execution timing
$SW27	Control	Offset value for index I0
$SW28	Control	Offset value for index I1
$SW29	Control	Offset value for index I2
$SW30	Control	Offset value for index I3
$SW31	Control	Offset value for index I4
$SW32	Control	Offset value for index I5
$SW33	Control	Offset value for index I6
$SW34	Control	Offset value for index I7
$SW35	Control	Offset value for index I8
$SW36	Control	Offset value for index I9

3-4   System Settings

The setting in here assumes that you are going to use serial port A with NS hardware at the first time.

1, 2, 3…   1.   Select [Settings]- [System Setting].

2.   [System Setting] dialog is displayed.
In the [PT] tab there are a few settings, which *should be leave to default.* Screen Saver function can be set to "OFF" or "Display

Erased" and then start-up time can be between 1…255 minutes.
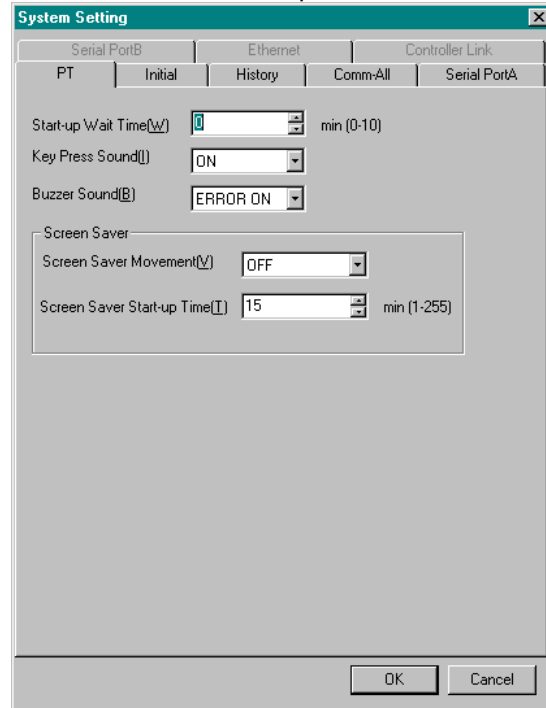
3. [Initial] tab includes settings for initial screen, system memory and video input. *You should use the default settings.* Section 3-3 includes the explanation of system memory. By klicking the [System Memory List] button, the memory list window will open. There are <u>four pages</u> of fixed system memory settings. By selecting check boxes, the desired system bits and words can be activate and will be written to specified addresses (e.g. to the PLC memory).
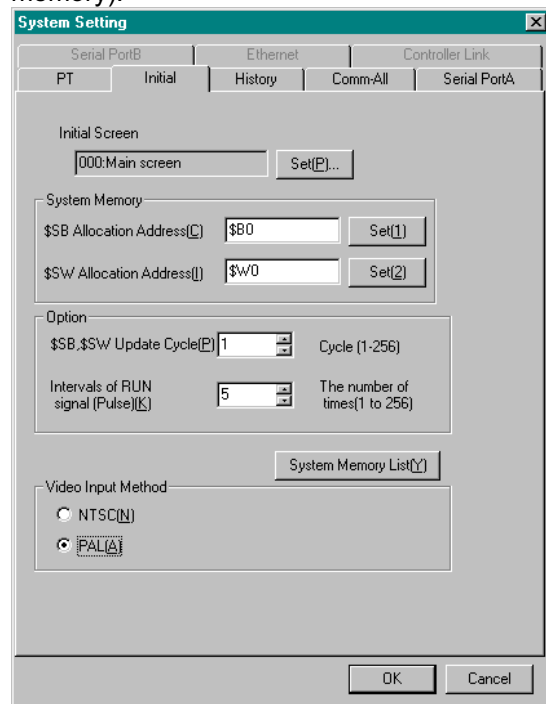
4. Operation log size can be set in the [History] tab. When the "Ring Buffer" is used, oldest marking in the history log will be replaced with the newest one. If "Ring Buffer" is not used, the logging will stop when the log memory is full.
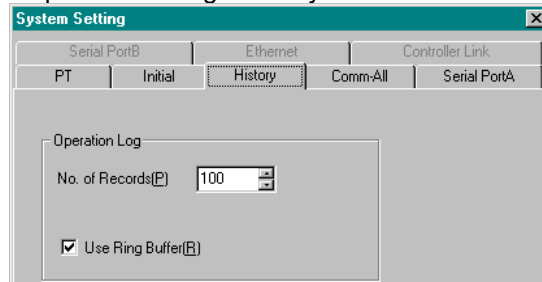
5. The [Comm-All] tab has the most significant settings according to all communications. Other communication tabs are disabled if spesific setting is [None] or [Disable].

Select only the communications that are needed to host communication. Needless communication setting will cause an error in the NS-terminal.

Serial port A and B can communicate with PLC or Bar-Code Reader. If communication is not needed, choose "None".

For example; when "Serial Port A" setting is [PLC], the spesific settings about serial port A are in the [Serial PortA] tab.

You can set all communications at the same time but then there is no quarantee the quality of the connection. The communication speed may be slowered or errors may be occurred because all the communication combinations are not fully tested.
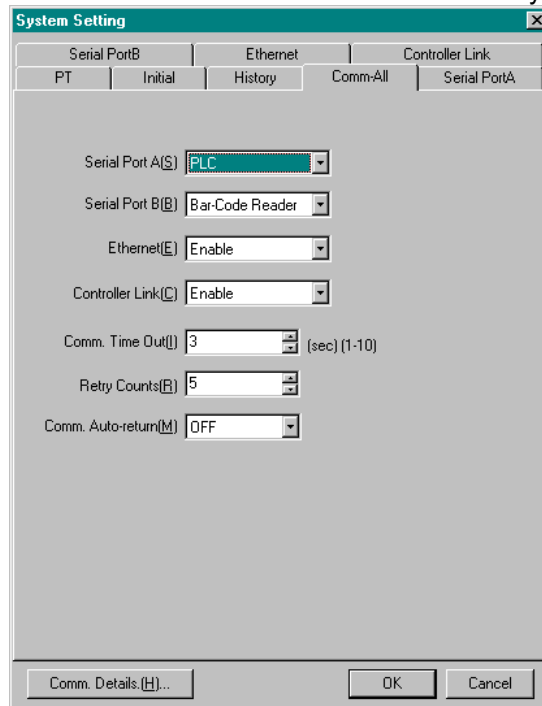
For a first time use, you can leave all the Comm-settings to [None] or [Disable]. The following programming example will use only the internal memory, no PLC-communications. In

case you are only interested in the programming example you may skip the following steps 6-10 in this section !

6. The [Serial PortA] tab has the serial port A settings. Now there is choosed the PLC as serial port A communication, so the protocol can be "NT Link(1:N)" or "NT Link(1:1)". Communication speed can be "Standard" or "High Speed". When using protocol "NT Link(1:N)" the NT Link unit number must be set different for each NS-terminal (unit number range is 0-7).
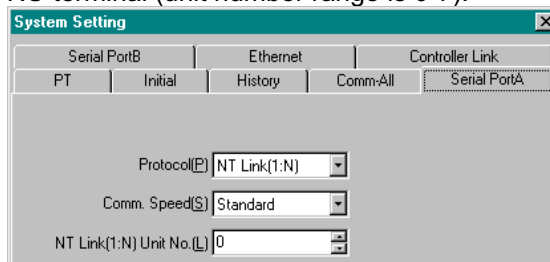
7. The [Serial PortB] tab has the serial port B settings. Now there is choosed the "Bar-Code Reader" as serial port A communication in the [Comm-All] tab, so the protocol can be set to match communication setting of the connected bar-code reader.
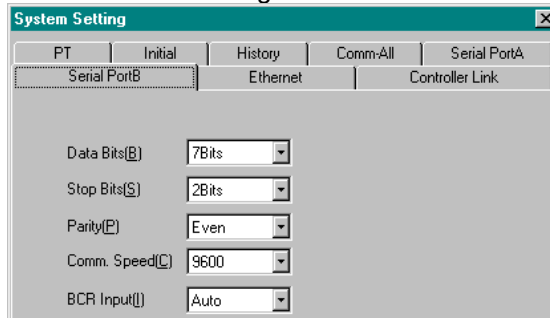
8. When the ethernet is enabled in the [Comm-All] tab, the settings can be set. There are normal network, node and UDP Port number settings, IP address settings but also conversion table. In the conversion table the user must write all IP addresses which are wanted to communicate with NS-terminal. When adding some addresses in the conversion table, only the node number and the

IP address must be input.

9. When the Controller Link (CLK) is enabled in the [Comm-All] tab, the Controller Link settings can be set. There are settings for the network and node numbers. Also the communication speed must be set the same as the rest of the CLK network.

3-5 Host Registration

Registering a host means that the communication settings of any host units must be added to the NS-Designer project. Host Unit can be e.g. Programmable Logic (PLC) or Bar-Code Reader. Each settings have unique Host Names and can be used later in screen creation procedure. So the Host Name specifies the PLC name of communication destination.

1, 2, 3…   1. Select [Settings] – [Register Host].

2. Register a host.
    Select the first line and click on [Edit]

No.	Host Name	Network...	Node A...	PLC Type
1	SerialA	111	1	

    Buttons: Edit(M), Add(A), Delete(D), Move Up(T), Move Down(T)

    Import CSV(I) Export CSV(E) OK Cancel Help(H)
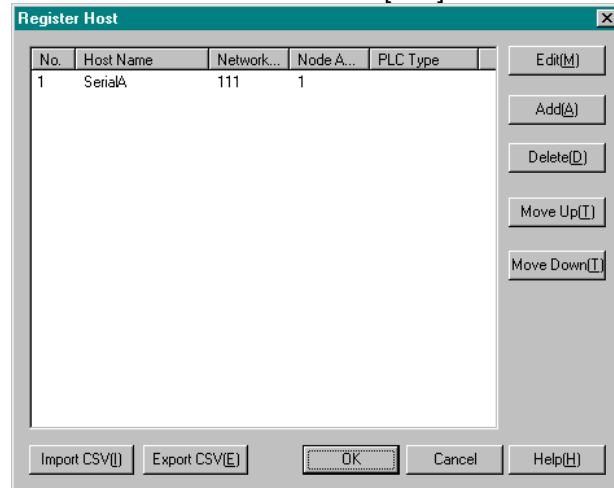
3. The default setting is "SerialA". You can set your own host name
    if you want. All other settings are fixed and can not be altered.

    Edit Host

    Host Name(H)   SERIALA
    Network No.(N)   111
    Node Address(O)   1
    PLC Type(P)

    OK   Cancel
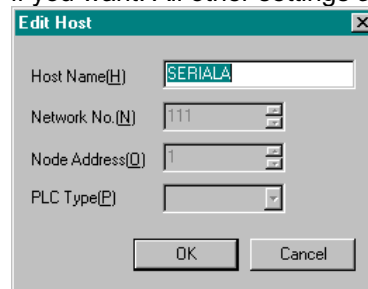
4. To add a new host, click on [Add] button, write any Host Name
    and set the network number, node address and PLC-type. All the
    registered hosts can be used when creating screens and
    configuring other data communications.

    Register Host

No.	Host Name	Network...	Node A...	PLC Type
1	SerialA	111	1	

    Edit Host

    Host Name(H)   CS1G
    Network No.(N)   2
    Node Address(O)   10
    PLC Type(P)   SYSMAC-CS1

    OK   Cancel

    Buttons: Edit(M), Add(A), Delete(D), Move Up(T), Move Down(T)

    Import CSV(I) Export CSV(E) OK Cancel Help(H)
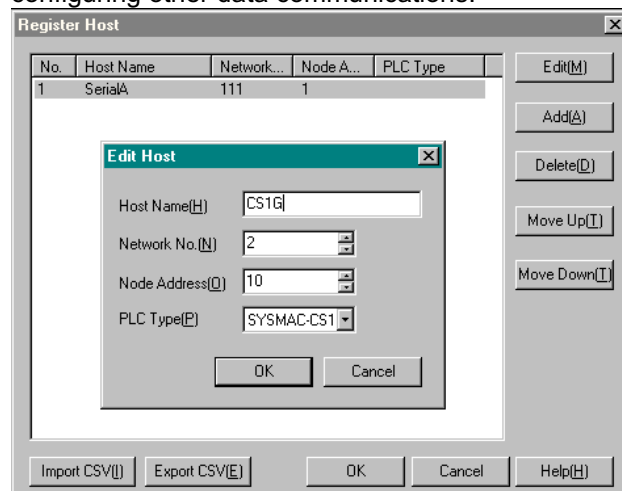
    *If you didn't choose any communications in the System
    Setting window, there are no Hosts in the Register Host list.
    The following programming example will use only the
    internal memory, not any PLC-communications. In that case
    you can ignore this section (3-5 Host Registration).*

3-6   Creating a screen

When creating a new screen, the grid setting will help to put a screen object to the right place. To open the grid settings, select - [Layout] - [Grid].

"Display Grid" means that the grid dots will be displayed on the screen.

"Snap to Grid" means that the screen objects will snap to closest grid dot.

"Grid Size" specifies the width and the height between the grid dots.
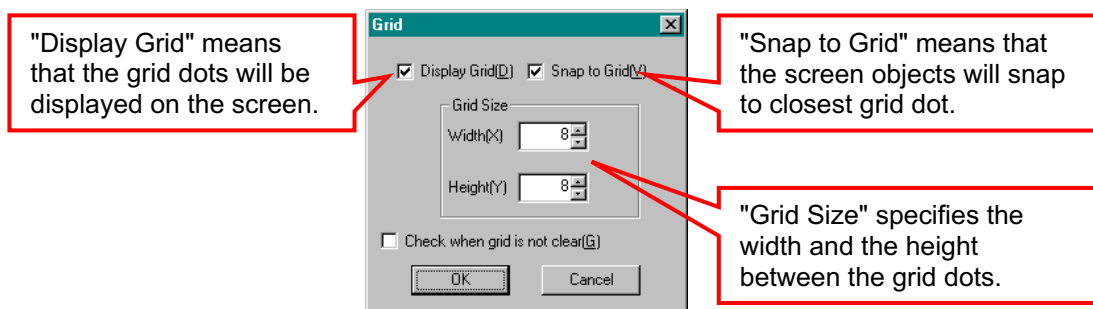
All the viewed toolbars can be chosen from [View] - [Toolbars]
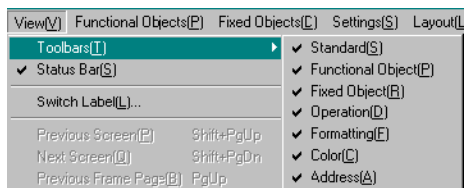
All functional screen objects are in the same window (or toolbar). To use them, just select one, move cursor on the screen and draw the size of the object (by pressing mouse button down while moving the cursor).
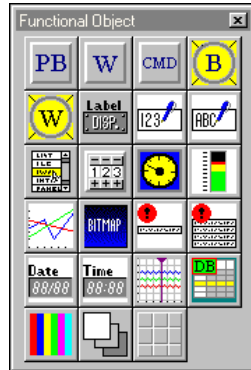
Just select one by mouse and then draw it on screen.

By right-clicking on the object, the option menu will appear (see below). In the menu there are many functions regarding the object.
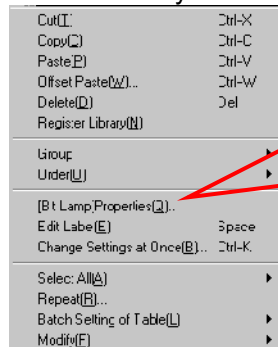
Selected object properties can be edited by selecting [Properties] from the menu or double click on the object.
In the menu there are normal edit functions (copy, paste…) but also advanced setting functions. The content of this menu depends on where on the screen the right-click will be done.

The properties of object can be set by double-clicking on the object. The property window will appear.

3-6-0   Screen Object list

Here are the short expalanations of the functions (for further information, please refer to NS-Series Programming Manual, V073-E1-xx):

Icon	Function
ON/OFF Button PB	Controls the ON/OFF status of the specified write address. The action type can be selected from momentary, alternate, SET, or RESET.
Word Button W	Sets numeric data at the specified address. The contents can also be incremented and decremented.
Command Button CMD	Performs special processing, such as switching screens, controlling pop-up screen and Video display, etc.
Bit Lamp B	Turns ON and OFF according to the ON/OFF status of the specified address.

Icon	Function
Word Lamp	Lights in 10 steps according to the contents of the specified address (0 to 9).
Text	Displays the registered character string.
Numeral Display & Input	Numerically displays the word data from the specified address and input data from a tenkey pad.
String Display & Input	Displays the character string from the word data from the specified address and input data from a keyboard.
List Selection	Displays the registered character strings in a list for selection.
Thumbwheel Switch	Numerically displays the word data from the specified address and increment and decrement the data when increment/decrement buttons are pressed.
Analogue Meter	Displays graphs in three colors in circles, semi-circles, or quarter circles for the word data at the specified addresses.
Level Meter	Displays levels in three colors for the word data at the specified address.
Broken-line Graph	Displays broken-line graphs for the word data at the specified addresses.
Bitmap	Displays screen data. Image data in BMP and JPEG format can be displayed.
Alarm/Event Display	Displays alarms or events that have occurred in order of priority.
Alarm/Event Summary & History	Displays a list of alarms/events and the history.
Date	Displays and sets the date.

Icon	Function
Time	Displays and sets the time.
Data Log Graph	Displays trend graphs for the word data at the specified addresses.
Data Block Table	Writes to and reads from PLC preset recipe data, such as instructions for manufacturing process.
Video Display	Displays pictures imported from visual devices, such as a Video camera or vision system.
Frame	Switches the specified rectangle area (frame).
Table	Displays functional objects in a table format.

Fixed objects are (from left):

- Rectangle - displays a rectangle.

- Circle/Oval - displays a circle or ellipse.

- Line - displays a line.

- Polyline - displays a polyline.

- Polygon - displays a polygon.

- Sector - displays a sector.

- Arc - displays an arc.

Operations Toolbar

Displays frequently used functions from the View and Tools Menus as icons.
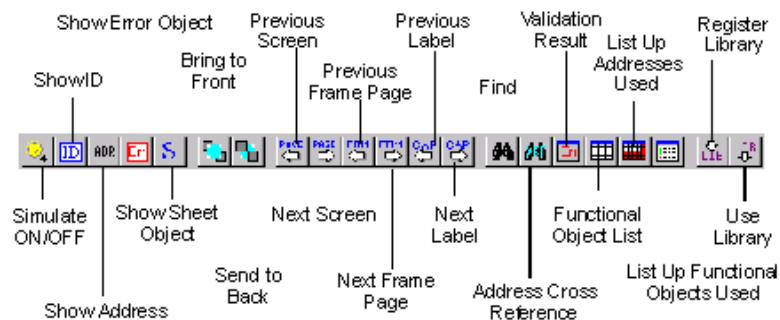
To create a new screen or import screen, select [File] - [New Screen…] or click on New Screen button, see below.

Project buttons from left:
- Create a New Project
- Open Project
- Save Project

Screen buttons from left:
- Create a New Screen
- Open existing Screen
- Save the Screen

3-6-1   Screen example

ON/OFF Button

Select the ON/OFF Button object and draw the button on the screen. Then double click on it. The properties window will appear:
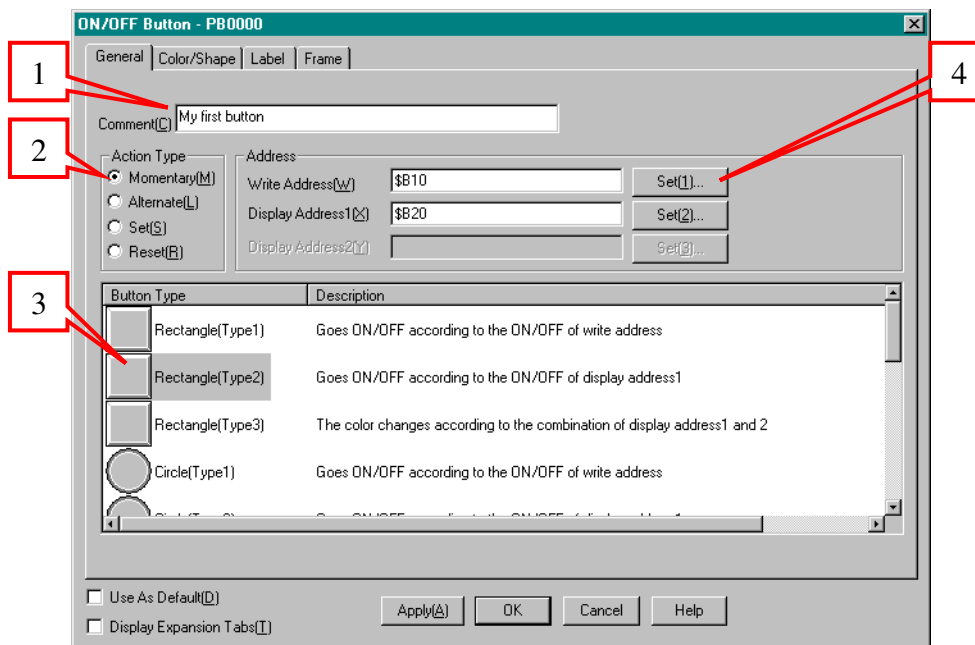
(1) First you can type some comments in "Comments" box.
(2) Action type can be change, select "Momentary".

(3) Then choose the second Button type from the list [Rectangle(Type2)]. There are many other types like ready made shapes and custom shapes.

(4) Now you can specify the "Write Address" and "Display Address1". Click on the Set button of the "Write Address". The "Address Setting" window will appear. You can choose Host Name from registered hosts list. When selecting PT Memory, the acceptable memory area can be "Internal Memory ($B)" or "System memory ($SB)". When selecting SerialA or other Host, the memory area type can be any of the Host PLC.

Note *If you didn't select any communications in the System Setting window, there are no Hosts in the Host Name list. This programming example will use only the internal memory, not any PLC-communications.*

(5) Select the PT Memory as the Host Name.
(6) Select the Internal Memory as the Area Type.
(7) Then type or click the address in Number section, e.g. 10. Note that when the Internal Memory $B is selected, there is no need to set Word and Bit addresses separately because the memory area type is already bit memory. Only the Word address can be set but it means just one memory bit because $B area includes 32768 bits. Refer the chapter 3-3-0.
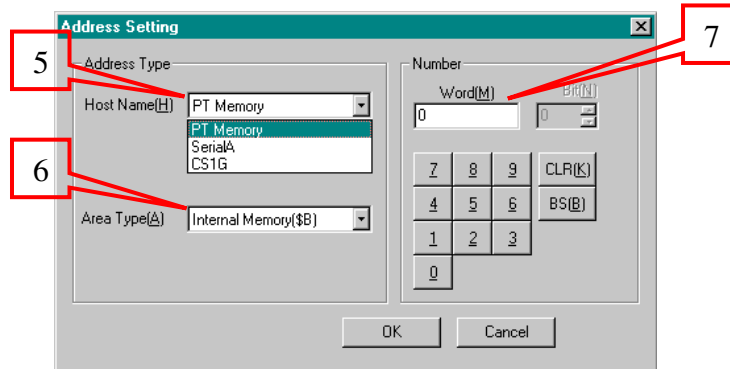
Then click on the [OK] button.
(8) Set the address in the Display Address (e.g. $B20) as previously shown or write the address directly to the address field. This address controls the color of the button.
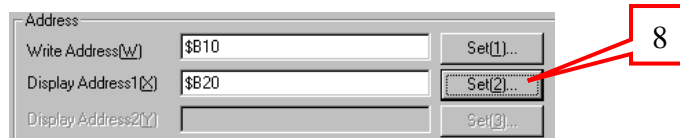
(9) The color of the OFF and ON state can be set in the "Color/Shape" tab.
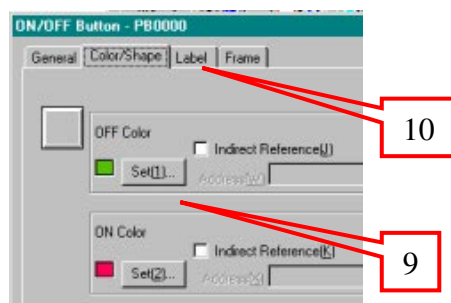
(10) By clicking on [Label] tab, you can type a label of the button.
(11) If you want to use several languages, all the registered languages should be available in the [Switch] menu.
(12) In the [Label] tab, all the text attributes can be changed (font, size, color).
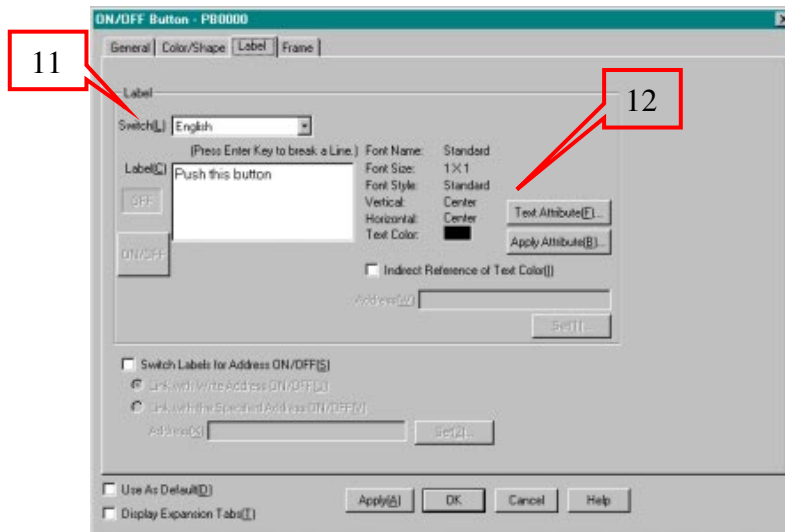
Now you can click on the [OK] button to close ON/OFF Button properties window.
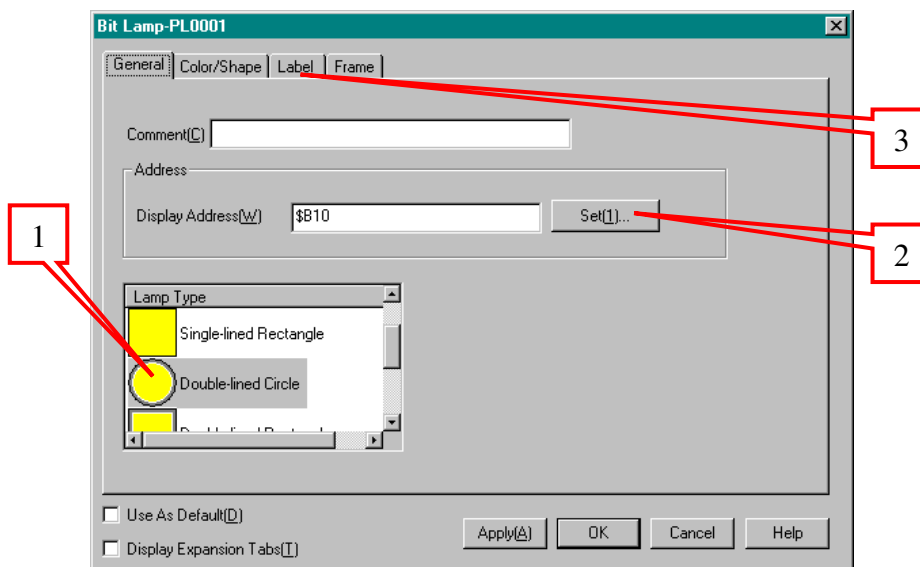
Bit Lamp

Next select the "Bit Lamp" object, draw it on the screen and double klick on it. The Bit Lamp property window will appear.
(1) First choose the Lamp Type; Double-lined Circle.
(2) Then set the Display Address by pressing [Set]-button or type directly in the address field "$B10". This address is the same bit address which we already set to write address in the ON/OFF Button.

(3) Then we can type the label, so click on [Label] tab.

Once the label is typed (e.g. Lamp), klick the [OK] button to close this Bit Lamp window.

Thumbwheel Switch

Create one more object, Thumwheel Switch. To do that, choose the object from Functional Object list, draw it on the screen and double klick on it. In the [General] tab you can configure the following settings:

(1) Display Type is setted to "Decimal".

(2) Storage Type is setted to "UINT(unsigned 1 word)". That means that now the numeral range can be between 0-65535 (see the mark 3).

(4) Format is setted to 4 integer and 0 decimal.

(5) The address where this object writes to and reads from is default; $W0
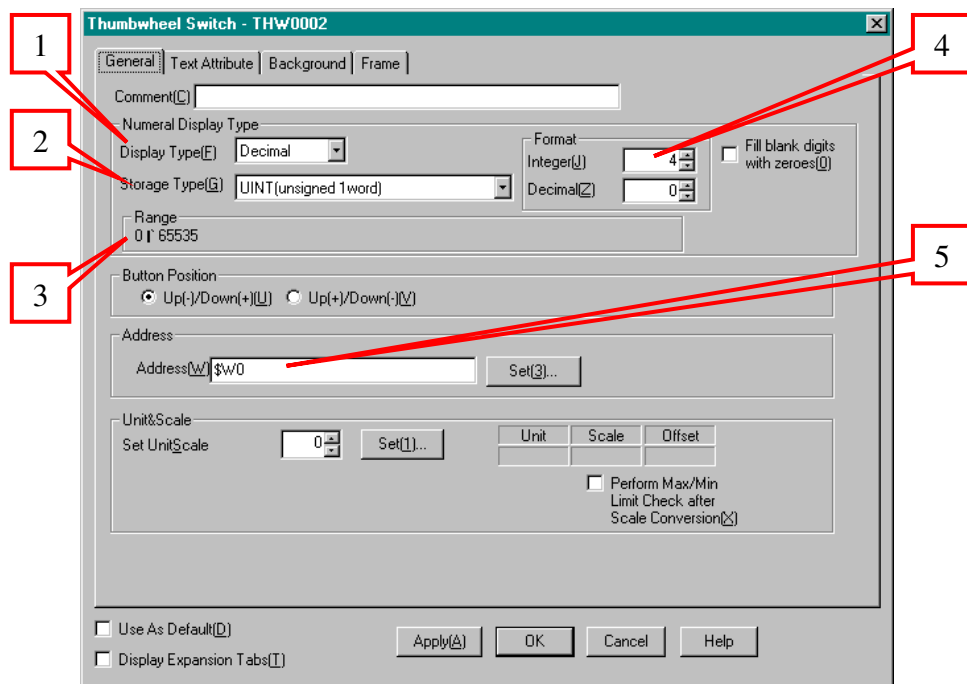
The rest of the settings should be as default, so click the [OK] button. Now the example screen is ready and it should be look like this:

More advanced programming instructions are included in to the NS-Series Programming Manual, V073-E1-xx.

SECTION 4
How to debug a project

The project can be test by selecting [Tools] - [Test…] or pressing Ctrl+T. This feature is included in the NS-Designer and it is very powerfull tool for testing the whole project.

First the project and screens must be saved. Then the [Test] window will appear:
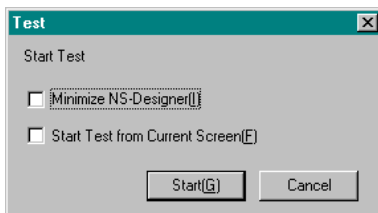
By selecting "Minimize NS-Designer" the NS-Designer will be minimized when Test Tool starts. If selecting the "Start Test from Current Screen", the Test Tool will open the screen which was opened in the NS-Designer. Clicking on Start-button, the Test Tool will start and functions can be test by clicking on the objects, which are just made on the screen.

There is also the Address list (in the Test Tool window) that shows the present values of the addresses. Display types and contents can be change. If you want to change value, just select the address and double-click on it. The "Change Value"-window will appear. You can change the bit state or type new value to word address. Cancel will abort action.
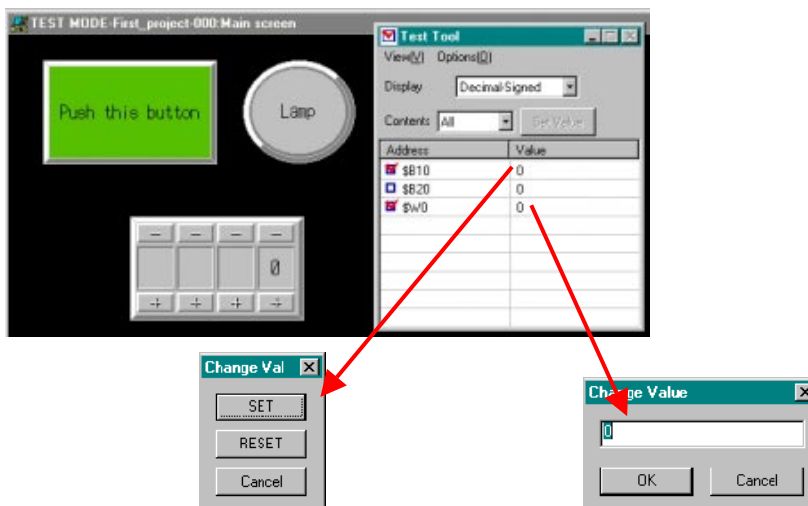
To quit the Test Tool, just click the X-button from the top right of the test window.

Confirmation dialog to exit a test will displayed. Click on [Yes] button.
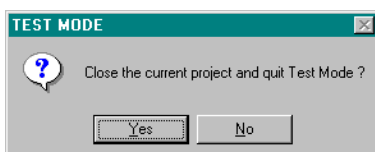
For more information, please refer to NS-Series Operation Manual V074-E1-xx.

4-1 Transferring Data to/from NS

4-1-0 Before Connecting

The FinsGateway settings must be reset to transfer data between the PT and NS-Designer on your computer.

Use the following procedure to set FinsGateway ready to transfer data to and from the PT.

1. Click the Windows Start Button and select *Programs - FinsGateway - Service Manager.*

2. The PLC icon ▉ will be displayed at the bottom right of the screen. Click the right mouse button on the icon and select *Settings*.

3. Set the following settings when connecting to serial communications.

a) Click the *Basic Tab*, and select *Services* from the directory tree at the left of the screen.

b) Select *Serial Unit* under Service Settings, and then click the *Start Button*.

c) Select *Network - Network and Units* from the directory tree at the left of the screen.

d) Double-click *Unit - Serial Unit–COM1* under Network and Unit settings. The Serial Unit Properties–COM1 Dialog Box will be displayed.

e) Click the *Network Tab* and set the unused numbers other than 0 (2, for example) in the Network No field. Check that *Exclusive* is selected, and that [Protocol] is set to *ToolBusCV*, and confirm with the *OK Button*.

4-1-1 Starting Data Transfer

Use the following procedure to transfer data to and from the PT.

Note If you want to transfer data via ethernet, <u>you can not do it for the first time</u>! The reason is that the PT's IP-address list is empty. The first IP-address list must be transfer via RS232-connection (the list that includes the IP-addresses of the PC and the NS-terminal). After that all the future settings and data transfers can be made via ethernet.

1. Select *File - Transfer Data*. Alternatively, click the Windows Start Button and select *Programs - Omron - NS-Designer - Transfer Program*.
   The Screen Data Transfer Dialog Box will be displayed.
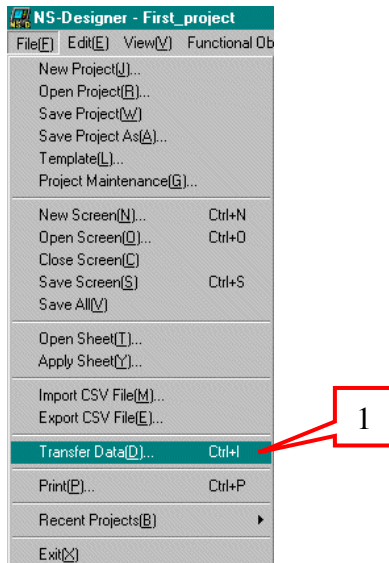
2. Set the communications method. Select the Serial Communication. Before you click the Connect button, make sure that the cable is connected.
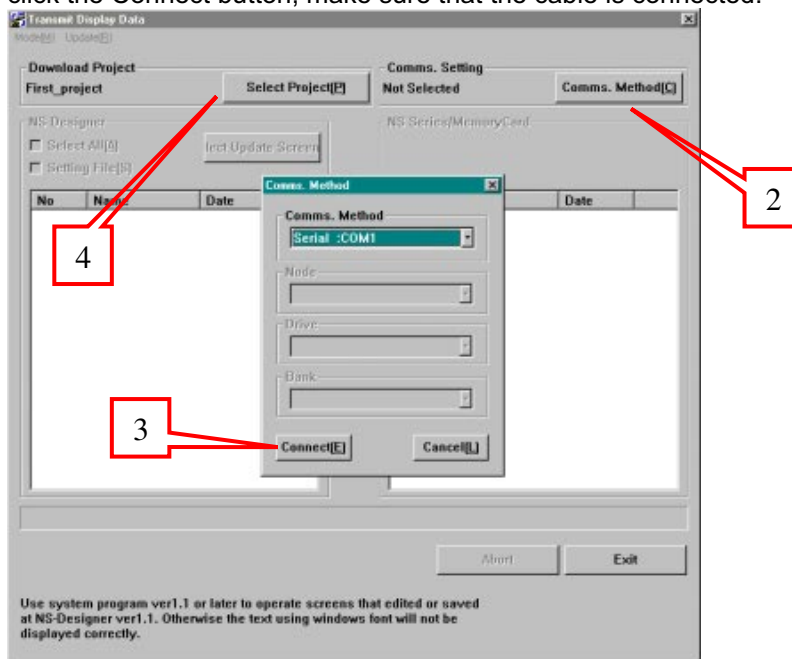

3. After the Connect button is pressed, the PT screen should change to "Connection Completed" screen. If not, check the cable connections and settings (refer the FinsGateway settings in section 4-4-0). Then try to connect again.

4. Click the Open Project Button and select the project to be transferred (when sending only). By the default, the selected project is the same that the project what was edited by the NS-Designer. So, normally you don't need to select the project data.

    The list of screens stored in the selected project will be displayed in the NS-Designer Box and PT/Memory Card Box.

5. Click [Select All] to select all the screens stored in the project as the target data for transfer.
    Click the [Select Update Screen] button to select only transfer the screens between the PT/Memory Card and your computer that have different refresh dates. This setting is particularly useful for correcting and updating screen data repeatedly.
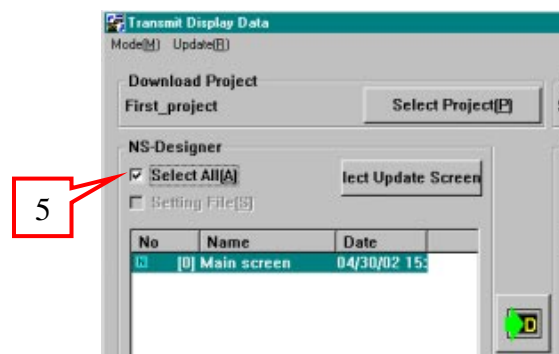
6. Click the Button to send data to the PT/Memory Card from the computer,

    and click the Button to send data to the computer from the PT/Memory Card.
    When uploading data, a dialog box will be displayed for specifying the destination where the project will be saved.

7. The Confirmation Dialog Box will be displayed. Click the Start Button to start transferring data.
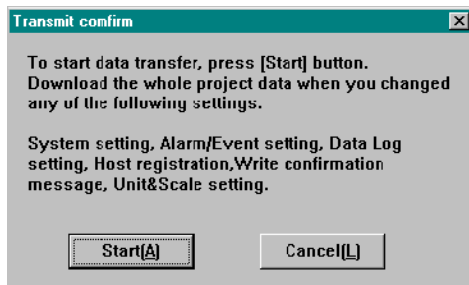
8. When transferring data to and from the Memory Card, a message indicating that downloading/uploading is completed will be displayed when data has finished transferring.
   When data is transferred using serial communications or the Ethernet, the Transmitting screen will be displayed at the PT while data is transferring.

9. The following screen will be displayed in the PT when transferring has finished.

The PT Restart Confirmation Dialog Box will be displayed at the transfer tool. Click the Yes Button to restart the PT.
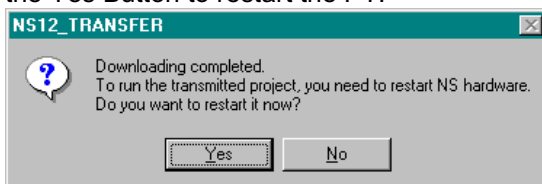
Click the No Button to return to the Screen Data Transfer Dialog Box and continue transferring screens.

Even if the No Button was pressed, the PT Restart Confirmation Dialog Box will be displayed again when the Screen Data Transfer Dialog Box is exited. The PT will be restarted if the Yes Button is pressed, but if the No Button is pressed, the PT will have to be restarted directly from the PT. Press the Cancel Button to return to the Screen Data Transfer Dialog Box.

4-1-2 After the transferring data

When the PT starts up, the PT goes into RUN mode and starts operating according to the screen data in the PT. So RUN mode is entered automatically if screen data already exists.

If you download the programming example (described above), the PT should start the RUN mode and first screen should be displayed.

An error message is displayed when screen data does not exist. Transfer screen data again from the NS-Designer (or from Memory Card).

When the PT is connected using communications conditions other than the set conditions, a message "Connecting…" will be displayed at the bottom right of the screen, and the PT will be in standby status until a normal connection is possible. To change the communications settings, select the System Menu and change the settings.

The system menu can be displayed by pressing two of the four corners of the touch panel simultaneously. There are many settings in the PT's System Menu. Many of those are the same as System Settings in the NS-Designer.

Please be carefull when editing any of these settings, as it may have a negative effect on the proper working of the terminal, please refer to the NS-Series Setup Manual (V072-E1-xx), Section 6 for details!

SECTION 5
Useful Tips

- When editing screen object properties, there are two check boxes at the lower left of the properties window:

  ☐ Use As Default(D)

  ☐ Display Expansion Tabs(T)
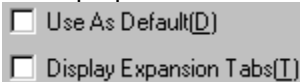
  When setting or typing something to properties window, you can select "Use As Default". Then following screen objects, which are the same type as previous, will contain all these settings and texts as default.

  Selecting the "Display Expansion Tabs" will activate more setting tabs in the properties window. There is e.g. Macro Function settings.

- If you want import existing screen from another project, select [New Screen] - [Reuse Existing Screen]. This is the ONLY way to import screens and components from another projects!

- When editing existing screen objects, the fastest way to edit addresses and colors is simply edit them directly on the toolbar (see the picture below).
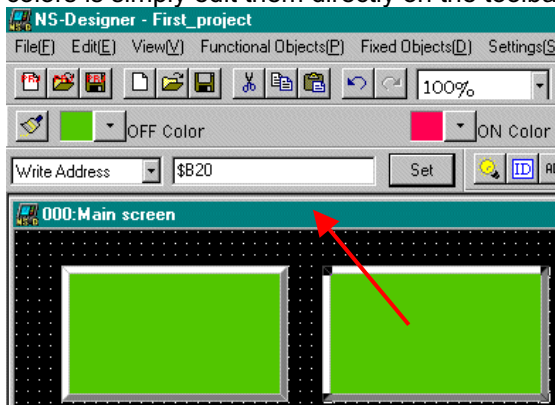
- In the Test mode: Each time you double-click on a screen where no object is registered, the test window style changes. To display a menu bar, make a double-click three times. When a menu bar is displayed, you can e.g. exit a test by selecting [Quit] from [File] menu.
  The Window style is changed to [No title bar]->[Full screen]->[With title bar and menu bar].

- The project can contain three types of Macros; Project Macro, Screen Macro and Object Macro. With the macro, there is possibility e.g. to control the Compact Flash memory, make some scaling, compare the variables, move the screen objects and make number conversions. Please refer the Macro Reference Manual for more information.

- The Data Link Table settings can be made in the Cx-Server Routing Table Component (in the CX-NET).

  OMRON CX-Server Routing Table Component
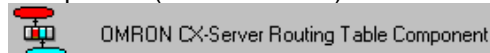
  Settings must be saved in the *.cl3 or *.clk file and then link it to the NS project via NS Designer's [Data Link Table Setting] tab (in the System Settings window).

  Data Link Table Setting(L)

  Data Link Table Setting   ⊠

  Data Link Table File   does not exist

  [   ]   Browze

  [OK]   [Cancel]

  Browze   ? ⊠

  Look in: 🗁 NS_Temp

  📁 First_project

  File name: [   ]   Open

  Files of type: [Controller Link(*.cl3;*.clk)] ▾   Cancel
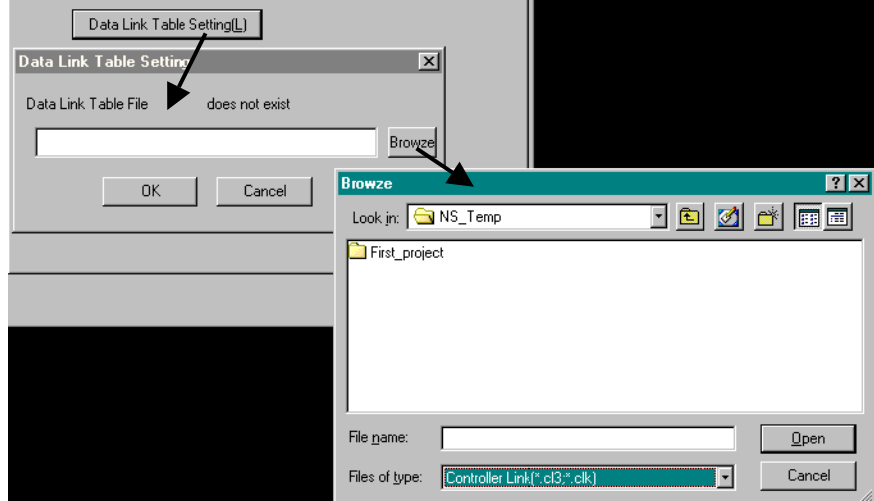
  To operate with CLK, please read more detailed instructions from NS-Series Operation and Setup manuals!

- As mentioned in section 2-5, by using a memory card the screen data can be transferred faster than with Ethernet. Before using Memory Card functions, please read more specific instructions from NS-Series Setup Manual (V072-E1-xx), section 3-6.

- For e.g. the first time downloading, you can make yourself the RS232C-connection cable between the computer and the NS Terminal. Here are the wiring instructions:

Computer	RS-232C D9-pin male connector pin number:		RS-232C D9-pin female connector pin number:	NS Terminal
CD	1		1	FG
RXD	2		2	TXD
TXD	3		3	RXD
DTR	4		4	RTS
SG	5		5	CTS
DSR	6		6	5-V output (250 mA max.)
RTS	7		7	
CTS	8		8	DTR
RI	9		9	SG
Frame ground	Shield		Shield	Frame ground

Terminology

The following terminology is used in this manual and in the NS-Designer software.

BCD (Binary-Coded Decimal)	A system used to represent numbers so that every four binary bits is numerically equivalent to one decimal digit.
bit	The smallest piece of information that can be represented on a computer. A bit has the value of either zero or one, corresponding to the electrical signals ON and OFF.
Data link	An automatic data transmission operation that allows datacommunication between two or more devices via common data areas.
digit	A unit of storage in memory that consists of four bits.
FA	Factory Automation
FINS communication	Factory Intelligent Network Service (FINS) is the protocol, which allows transparent network access.
FinsGateway	FinsGateway is the OMRON's software that provides FA network environment for operating system on a computer or embedded device (like NS-terminal). It adds advanced functions, providing applications with FINS message communications, independent of the network and an EventMemory that allows shared data including data link.
Host	Indicates the PC, FA computer, or personal computer functioning as the control device and interfaced with the NS-series PT.
Initialize	Process whereby some memory areas are cleared, system setup is checked, and default values are set.
Macro (macro programming)	Indicates the programming language that can be used with e.g. some screen objects. Please refer to NS-Series Macro Reference Manual.
Memory Card (Compact Flash, CF)	Indicates the Compact Flash memory Card, that can be used for storing and transmitting screen data, log data, and transfer the system programs.
NS Series	Indicates products in the OMRON NS Series of Programmable Terminals.
NT Link 1:1	Indicates fast communication method (binary protocol) between one PT (NT- or NS-series terminal) and one host PLC. There is no communication speed settings.
NT Link 1:n	Indicates fast communication method (binary protocol) between multiple PT's (NT- or NS-series terminals) and one host PLC. Maximum PT number and communication speed depends on types of PLC or communication unit (3 to 8). Communication speed can be Normal or High-Speed.
PC	Indicates any Personal Computer.

PLC   Indicates any Programmable Logic Controller.

protocol   The parameters and procedures that are standardized to enable two
                                     devices to communicate or to enable a programmer or operator to
                                     communicate with a device.

PT   In this manual, indicates an NS-series Programmable Terminal.

Serial Communication   Indicates the industry standard RS-232C or RS-422/485
                                     communication method.

Systems data   Indicates the data what is part of the PT's operating system. The
                                     Systems Data can be update only from the CF card.

word   A unit of data storage in memory that consists of 16 bits. All data areas
                                     consist of words. Some data areas can be accessed only by words;
                                     others, by either words or bits.