

NS-Series

Programmable Terminals RGB and Video Input Unit


OPERATION MANUAL


OMRON


Notice

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PLC" means Programmable Controller.

The abbreviation "host" means a controller, such as an IBM PC/AT or compatible computer, that controls a PT (Programmable Terminal).

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

Reference Indicates supplementary information on related topics that may be of interest to the user.

1, 2, 3... Indicates lists of one sort or another, such as procedures, checklists, etc.

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

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About this Manual

Section 1 Overview

Provides an outline of the RGB and Video Input Unit, including its features and system configuration.

Section 2 Installing the RGB and Video Input Unit


Describes the nomenclature and functions of each part, the procedure for installing the RGB and Video Input Unit on a PT, and the procedure for connecting external devices to the Unit.

Section 3 RGB and Video Input Unit Functions

Describes the functions available when using an RGB and Video Input Unit along with the setting and adjustment procedures required for its operation.

Appendices

Provides hardware specifications, dimensions, and NS-CA001 comparison information.

 WARNING	Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.
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Related Manuals

The following manuals are used for NS-series PTs. (The boxes at the end of the catalog numbers indicate the revision code.)

● **NS Series -V1/-V2 Setup Manual V083-E1-□**

Provides information on NS-V1/-V2 Series models (i.e., the NS15-V2, NS12-V1/-V2, NS10-V1/-V2, NS8-V1/-V2, and NS5-V1/-V2).

Describes how to connect the PT to the host and peripheral devices, methods to set up communications and operation, and procedures for maintenance.

Refer to the *NS Series Programming Manual (V073)* for information on PT functions and specific operating procedures.

Refer to the *CX-Designer User's Manual (Cat. No. V088)* for the CX-Designer Installation procedure and an overview of the CX-Designer, and refer to CX-Designer online help for detailed operating procedures.

● **NS Series Setup Manual..... V072-E1-□**

Provides information on NS Series models (i.e., the NS12, NS10, and NS7).

● **NS Series Programming Manual V073-E1-□**

Describes the screen configurations, object functions, and host communications for the PT.

● **CX-Designer User's Manual..... V088-E1-□**

Describes the CX-Designer, which is used to create and transfer the screens displayed on the NS-series PTs. This manual provides the installation procedure for the CX-Designer and describes the features of the CX-Designer. Refer to the online help in the CX-Designer for CX-Designer operating procedures.

Terminology

The following terminology is used in this manual.

PT	In this manual, indicates a Programmable Terminal in OMRON's NS Series of Programmable Terminals.
NS Series	Indicates products in OMRON's NS□□ Series of Programmable Terminals. Unless otherwise specified, the information in this manual applies to the NS□□ Series.

Introduction

Thank you for purchasing an RGB and Video Input Unit for the NS-series PT. The RGB and Video Input Unit is an Expansion Unit that is installed on an NS-series Programmable Terminal (PT) to display RGB signals from analog signal output devices, such as personal computers, or pictures from devices such as video cameras and Vision Sensors.

Refer to the *NS Series Setup Manual*, the *NS Series Programming Manual*, the *CX-Designer Operation Manual*, and CX-Designer online help for details on the functions and performance of the PT.

● Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

Personnel in charge of introducing FA systems into production facilities

- Personnel in charge of designing FA systems
- Personnel in charge of installing and connecting FA systems
- Personnel in charge of managing FA systems and facilities

● Notice

This manual provides information for connecting and setting up an RGB and Video Input Unit for the NS-series PT. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during installation and operation.

● General Precautions

- The user must operate the product according to the performance specifications described in the operation manuals.
- Do not use the PT touch switch input functions for applications where danger to human life or serious property damage is possible, or for emergency switch applications.
- Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.
- Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.
- This manual provides information for connecting and setting up an NS-series PT. Be sure to read this manual before attempting to use the PT and keep this manual close at hand for reference during installation and operation.

- **Safety Precautions**

 **WARNING**

Do not attempt to take the Unit apart and do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock.



Precautions for Safe Use

- On unpacking the Unit and peripheral devices, check the external appearance and confirm that there is no damage. Also, shake the Unit gently and be sure there are no abnormal sounds.
- Be sure that metal scraps do not fall into the Unit when preparing the panel for installation.
- The power supply must have reinforced insulation to conform to the EC Directives.
- Be sure to ground the Unit properly to prevent malfunction due to noise.
- Do not touch the surface of the circuit board or the components mounted to it with our bare hands. Discharge static electricity from your body before handling the board.
- Before inserting or removing connectors, make sure that the Unit and the PT are turned OFF.
- After connecting the cables, always secure the cable connectors with screws.
- The cable's tensile load is 30 N max. Do not subject it to loads greater than this.
- Before turning power ON and OFF or pressing the reset switch, check the system to confirm that it is safe to do so.
- The entire system may shut down depending on how the power is turned ON and OFF. Follow the proper procedures for turning power ON and OFF.
- Carefully check the screen data, macros, and host program to make sure they are operating properly before actually using them.
- Do not perform the following while the Memory Card is being accessed.
 - Turning the power OFF on the PT
 - Pressing the reset switch on the PT
 - Removing the Memory Card(Always follow the proper procedure for removing the Memory Card.)
- To ensure that the system operates safely, add a procedure to the program at the host that periodically reads operation signals from the PT to see if the PT is operating properly.
- Do not use more than 30 N of force to press touch switches.
- Before pressing touch switches, check the system to confirm that it is safe to do so.
- Do not press a touch switch when the display is not backlit or is blank.
- Touch switch inputs may not be entered if the switches are pressed too quickly in rapid succession. Confirm each input before moving on to the next one.
- Always make sure that screen data is backed up on the CX-Designer before you initialize screen data.
- Never use chemical wipes or volatile solvents, such as benzene or thinner, to clean the Unit.
- Do not disassemble, repair, or modify the Unit.
- The disposal of the Unit and discarded batteries may be regulated by national or local authorities. Dispose of them in accordance with the laws and regulations of the relevant country and local authority.



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Precautions for Correct Use

- Do not install the Unit at sites subject to the following conditions. Otherwise the product may malfunction.
 - Severe temperature variations
 - Temperature or humidity outside the ranges stated in the specifications
 - High humidity and condensation
 - Splashing of chemical agents
 - Severe oil splashing
 - Corrosive or flammable gases
 - Strong vibration or shock
 - Direct exposure to wind and rain (outdoor sites)
 - Strong ultra-violet irradiation
- Take adequate measures to ensure shielding if the Unit is used at a site subject to any of the following conditions. Otherwise, the product may malfunction.
 - Static electricity or noise from other equipment
 - Strong electromagnetic fields
 - Nearby power cables
 - Potential exposure to radioactivity

Section 1 Overview

This section provides an outline of the RGB and Video Input Unit, including its functions, features, and connection types.

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1-1 RGB and Video Input Unit Features

Install the RGB and Video Input Unit (NS-CA002) on the PT Expansion Interface to display external video images or analog RGB pictures on the PT. The Unit is an option for NS-series PTs.

● Features

- Two video input ports (composite NTSC/PAL signal)
Video input cannot be used on an NS15.
- One analog RGB input port

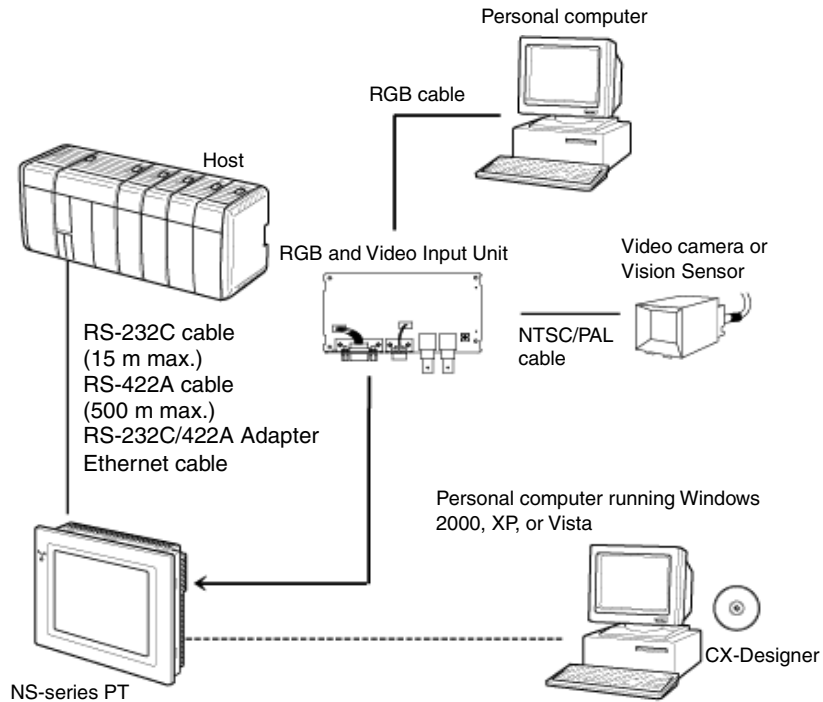
Display resolution	1,024 x 768 (mounted to an NS15 PT) 800 x 600 (mounted to an NS12 PT) 640 x 480 (mounted to an NS10 or NS8 PT)
Horizontal frequency	48.4 kHz (mounted to an NS15 PT) 37.5 kHz (mounted to an NS12 PT) 31.5 kHz (mounted to an NS10 or NS8 PT)
Vertical frequency	60 Hz
- One port for console output to a Vision Sensor Controller (same function key operations as the F160-KP)
- Selectable video display size (and positionable displays)
- Overlapping on video displays (Functional objects and pop-up screens can overlap video displays.)

* The above features apply only to PTs on which the RGB and Video Input Unit (NS-CA002) can be installed. Refer to *1-2 System Configuration* for details.

* There are restrictions in installing an NS-CA002 RGB/Video Input Unit on an NS15 V2 PT. Refer to *1-3 Restrictions in Installing an NS-CA002 RGB/Video Input Unit on an NS15 PT* for details.

1-2 System Configuration

A system configuration using the RGB and Video Input Unit is shown below.



Note

The RGB and Video Input Unit (NS-CA002) operates only when installed on the models in the *Applicable* column of the following table. Do not install it on any other PT.

Applicable	Not applicable
NS15-TX01S-V2	NS12-TS0□(B)
NS12-TS0□(B)-V1/-V2	NS10-TV0□(B)
NS10-TV0□(B)-V1/-V2	NS7-SV0□(B)
NS8-TV□□(B)-V1/-V2	NS5-SQ□□(B)-V1/-V2
	NS5-TQ□□(B)-V2
	NS5-MQ□□(B)-V2
	NSJ12-TS0□(B)
	NSJ10-TV0□(B)
	NSJ8-TV0□(B)
	NSJ5-SQ□□(B)
	NSJ5-TQ□□(B)
	NSH5-SQ□□B-V2

* There are restrictions in installing an NS-CA002 RGB/Video Input Unit on an NS15 V2 PT. Refer to 1-3 Restrictions in Installing an NS-CA002 RGB/Video Input Unit on an NS15 PT for details

1-3 Restrictions in Installing an NS-CA002 RGB/Video Input Unit on an NS15 PT

The following restrictions apply to installing an NS-CA002 RGB/Video Input Unit on an NS15 V2 PT:

- You cannot use the video input ports (channels 1 and 2). Only the analog RGB input port can be used.
- The analog RGB output port will stop while images that are input from the analog RGB input port are being displayed. Therefore, the images input from the analog RGB input port cannot be output on the monitor connected to the NS15-V2 PT after passing through the NS15 V2 PT.

Section 2 Installing the RGB and Video Input Unit

This section describes the procedure for installing the RGB and Video Input Unit on an NS-series PT and the procedure for connecting cables to the Unit.

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2-1 RGB and Video Input Unit Components

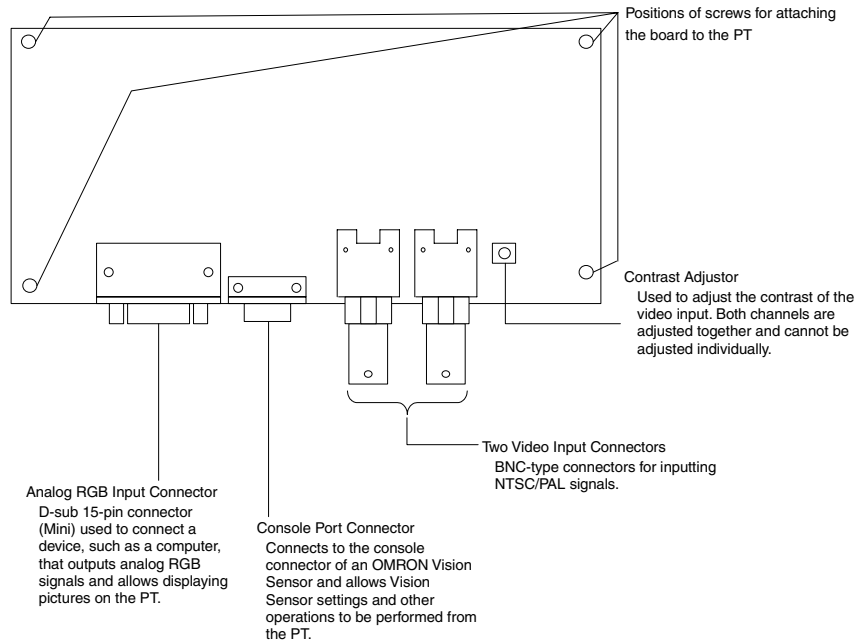
The following table shows the RGB and Video Input Unit model and product configuration.

Model	Components	
	Name	Contents
RGB and Video Input Unit NS-CA002	RGB and video board (1)	Allows video input and RGB input.
	Cover (1)	Protects the RGB and video board.
	Cable (1)	Connects the PT's functional ground terminal and the cover to prevent noise.
	Screws (M3) (9)	These screws are used for the following: <ul style="list-style-type: none">• Securing the RGB and video board to the back of the PT.• Securing the cover to the back of the PT.• Attaching the cable to the cover.
	Operation manual	Manual for the NS-CA002.

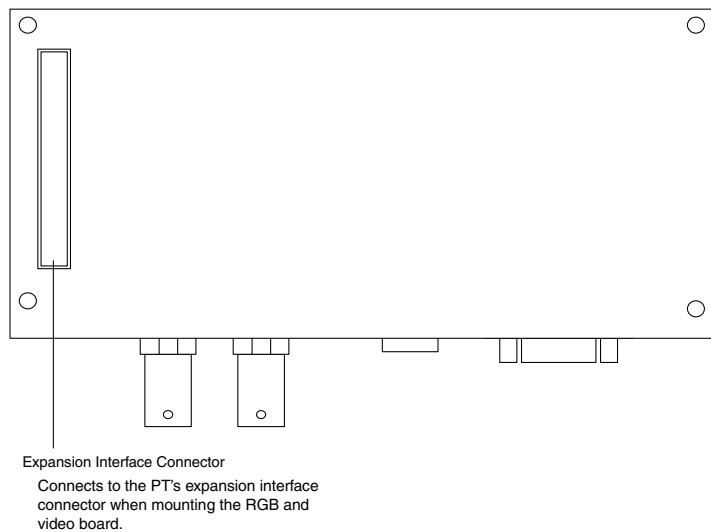
2-2 Nomenclature and Functions

This section describes the names and functions of RGB and Video Input Unit parts.

- **RGB and Video Board: Front View**



- **RGB and Video Board: Rear View**



2-3 Installing the RGB and Video Input Unit

This section describes the procedure for installing the RGB and Video Input Unit on the PT.

Note

- Do not touch the surface of the circuit board or the components mounted to it with your bare hands.
- After installing the Unit on the PT, always secure it with the screws provided. The applicable mounting torque is 0.6 N·m.
- Before installing or removing the Unit, make sure that the Unit and the PT are turned OFF. Make sure that installing or removing is carried out correctly as described in *Installing or Removing*.
- When the Unit is installed, the depth of the PT increases by 24 mm. Make sure that there is enough space in the control panel before installing the Unit.

When complying with the EC Directive for the NS hardware with an RGB and Video Input Unit mounted, make sure that the NS hardware is mounted on the control panel and each cable is connected with a ferrite core.

Recommended Control Panel

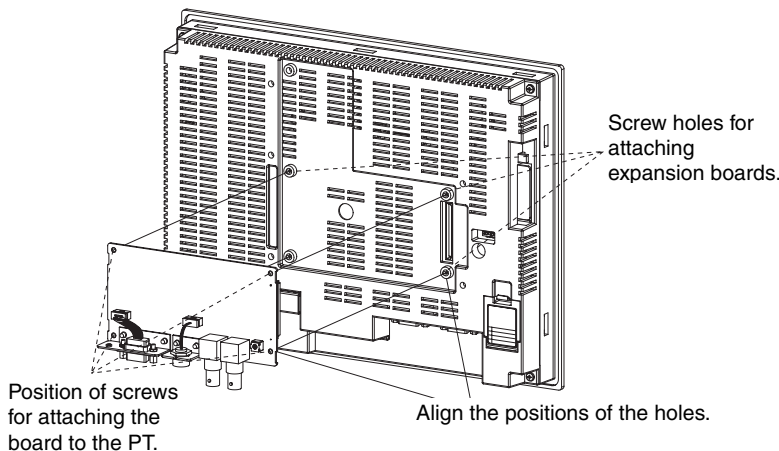
Model	Manufacturer
EC-SCF16-45	Nitto Electric Works, Ltd.

Recommended Ferrite Cores

Model	Manufacturer	Cable
ZCAT1518-0730	TDK	Video Cable
ZCAT1518-0730	TDK	Console Cable
ZCAT2035-0930	TDK	RGB Monitor Cable
ZCAT1325-0530	TDK	FG Cable
ZCAT-3035-1330	TDK	AC Power Cable
ZCAT-2436-1330	TDK	AC Power Cable

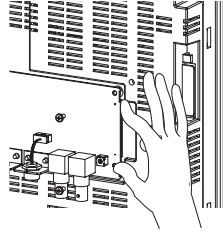
● **Installing the RGB and Video Input Unit**

- (1) Install the RGB and video board so that its expansion interface connector is inserted into the expansion interface connector on the back of the PT and the respective screw holes are aligned. Hold the RGB and video board by the corners, keeping it parallel to the back of the PT.

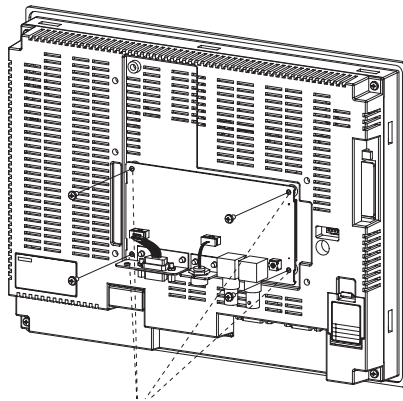


2-3 Installing the RGB and Video Input Unit

- (2) Push firmly on the connector end of the board and make sure that it is inserted sufficiently.

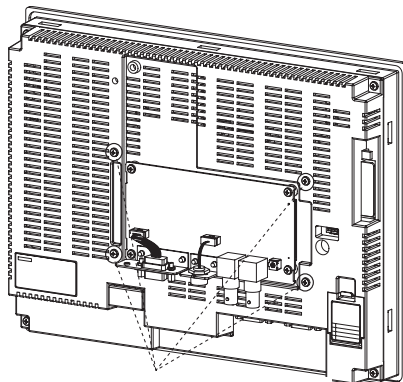


- (3) Secure the four corners of the RGB and video board with screws.



Secure these four places with screws.

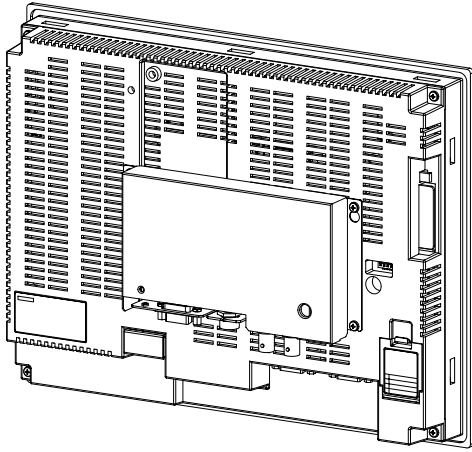
- (4) Insert screws in the screw holes for attaching the cover and tighten them slightly.



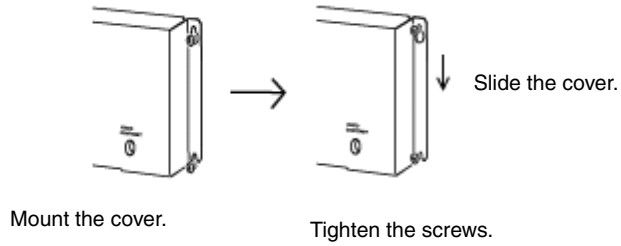
Insert the screws first.

2-3 Installing the RGB and Video Input Unit

(5) Align the cover screw holes with the screws and mount the cover.

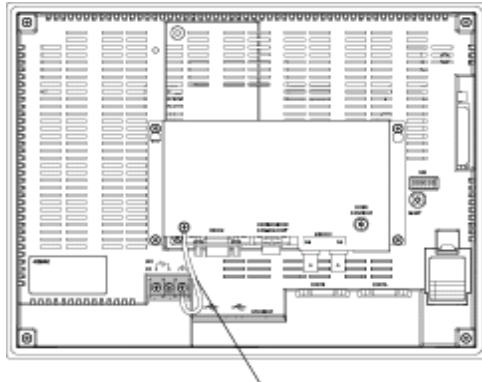


(6) Slide the cover downward and tighten the screws.



- **Connecting the Cable**

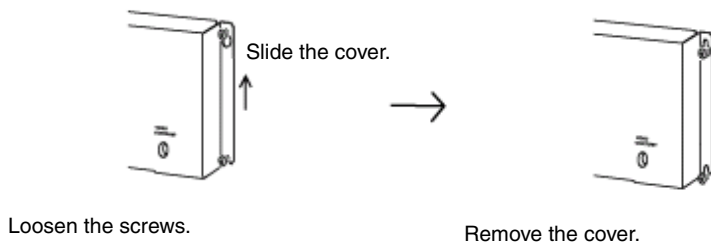
Connect the functional ground terminal of the PT and the cover with the cable to prevent malfunction due to noise.



Connect the functional ground terminal and the cover with the cable.

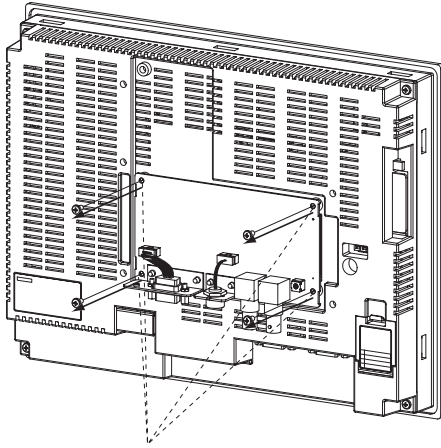
- **Removing the RGB and Video Input Unit**

(1) Remove the cover from the back of the PT. Loosen the cover mounting screws and slide the cover upward.



2-3 Installing the RGB and Video Input Unit

- (2) Remove the cover and remove the screws securing the four corners of the RGB and video board.

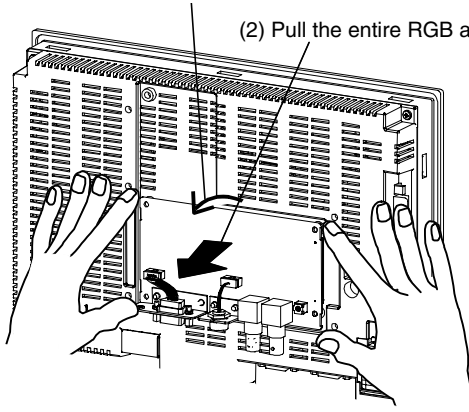


Remove the screws securing the four corners.

- (3) Remove the RGB and video board from the expansion interface connector on the back of the PT in the order shown in the following diagram.

- (1) Hold the RGB and video board by the corners and remove it starting from the top.

- (2) Pull the entire RGB and video board away from the PT.



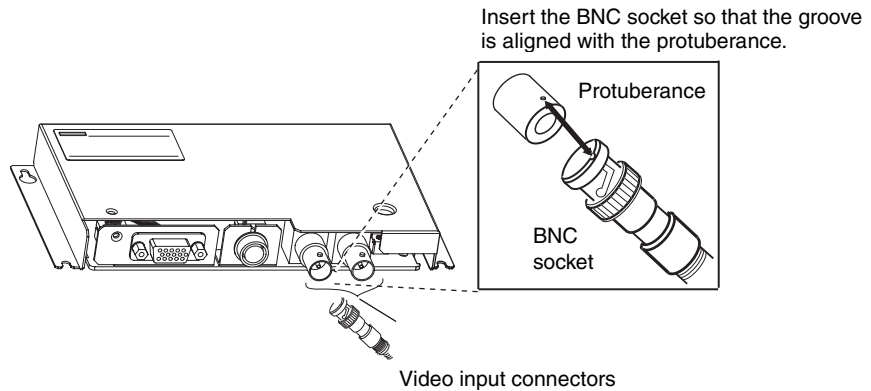
2-4 Connecting Video Input Connectors

This section describes the procedure for connecting cameras to the RGB and Video Input Unit mounted on the PT.

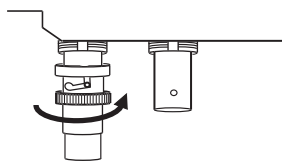
Note The cable's tensile load is 30 N maximum. Do not subject it to loads greater than this.

● Connecting Video Input Connectors

- (1) Insert the BNC socket on the camera's output cable into a video input connector.



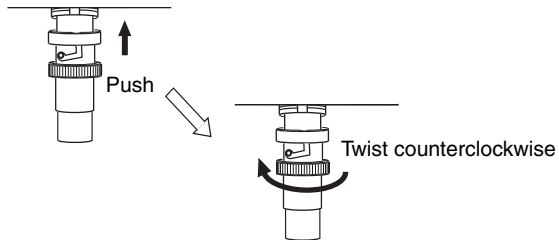
- (2) After inserting the BNC socket, twist it clockwise until it locks into place.



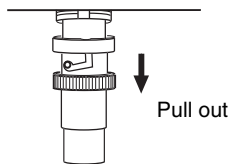
2-4 Connecting Video Input Connectors

● Disconnecting Video Input Connectors

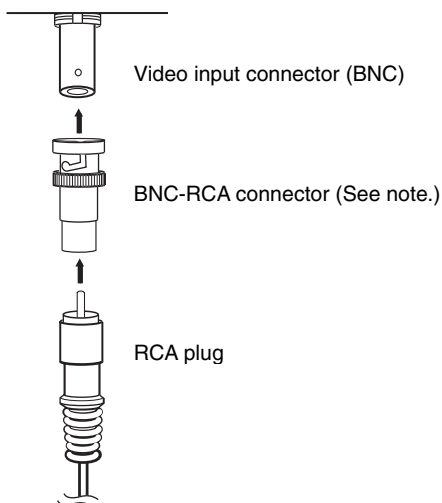
- (1) Unlock the BNC socket on the camera's video output cable by pressing it in and twisting it counterclockwise.



- (2) After unlocking the BNC socket, pull it out.



- (3) If the camera's video output cable uses an RCA plug, connect it to the video input connector using a BNC-RCA connector as way shown below.



* The BNC-RCA connector is not provided with the RGB and Video Input Unit (NS-CA002).

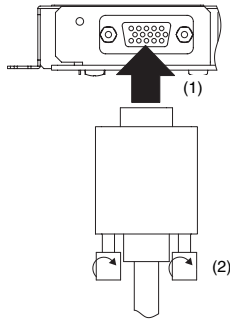
2-5 Connecting the RGB Input Connector

This section describes the procedure for connecting an analog RGB output device, such as a computer, to the RGB and Video Input Unit installed on a PT.

Note The cable's tensile load is 30 N maximum. Do not subject it to loads greater than this.

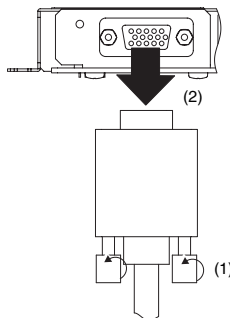
- **Connecting the RGB Input Connector**

- (1) Insert the socket of the RGB cable into the RGB input connector on the RGB and Video Input Unit.
- (2) Tighten the screws firmly to secure the connector.



- **Disconnecting the RGB Input Connector**

- (1) Loosen the screws of the connector.
- (2) Carefully remove the RGB cable from the connector on the RGB and Video Input Unit.

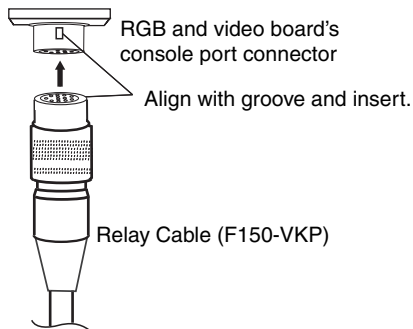


2-6 Connecting the Console Port Connector

This section describes the procedure for connecting the console port connector of an OMRON Vision Sensor (F150-C10V3, F160-C10V2, F180-C10, F400-C10V2, F250-C10, or V530-R150V2) to the RGB and Video Input Unit installed on a PT. This connection requires an OMRON Relay Cable (F150-VKP).

- **Connecting the Console Port Connector**

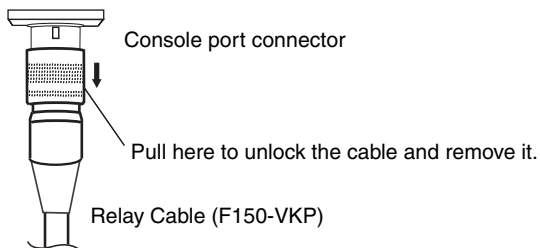
Insert the socket of the Relay Cable (F150-VKP) into the RGB and video board's console port connector.



The socket locks into place when it is inserted.

- **Disconnecting the Console Port Connector**

Remove the Relay Cable by pulling the collar back on the connector as shown below.



Section 3 RGB and Video Input Unit Functions

This section describes the functions available when using the RGB and Video Input Unit along with the setting and adjustment procedures required for its operation.

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3-3	Console Connection	3-17
3-4	Settings and Adjustments	3-19

3-1 Display

A PT screen can display images from devices connected to the RGB and Video Input Unit. The type of devices that can be connected to the Unit range from video cameras, Vision Sensors, and other video equipment to personal computers and other analog RGB output devices.

3-1-1 Video Display

Install the NS-CA002 RGB and Video Input Unit on an NS12-V1/-V2, NS10-V1/-V2, or NS8-V1/-V2 PT to display video images from video devices such as video cameras or Vision Sensors on the PT.

No. of video input connectors	2
Input methods	NTSC or PAL
Max. simultaneous displays	1
Video display size	Any size up to 640 x 480 dots (W x H)
On-screen positioning	Selectable (Images must not extend off the screen.)
Positionable screens	Normal (base) screens only
Functional object overlap	In the order opened (an object can overlap a video display)

Reference

- The RGB and Video Input Unit has two video input connector ports that enable up to two input devices (e.g. video cameras and Vision Sensors) to be connected to the Unit at one time. With only one video display possible per screen, images from a video camera and Vision Sensor cannot be displayed at the same time. One screen cannot display two RGB images either.
- The NTSC/PAL setting is the same for all video input ports. This means that a video camera and Vision Sensor connected to the Unit at the same time cannot be set individually to NTSC or PAL.
- Video displays cannot be performed on the NS5-V1/-V2. Do not transfer screen data containing video images to an NS5-V1/V2 PT.
- You can install the NS-CA002 RGB/Video Input Unit on an NS15-V2 PT, but you cannot use the video display function.

● Procedure for Displaying Video Images

1. Mount the RGB and video board on an NS-V1/-V2 PT.
Follow the procedure for installing the RGB and Video Input Unit on the back of the PT. Refer to *2-3 Installing the RGB and Video Input Unit* for details.
2. Connect a video camera, Vision Sensor, or other input device to a video input connector.
Connect the input device to the video input connector on the RGB and Video Input Unit. Refer to *2-4 Connecting Video Input Connectors* for details.
3. Create a project.
Use the CX-Designer to create the RGB and Video Input Unit project.
 - Creating New Projects
Set the *System Version* field to **5.1 or later** in the New Project Dialog Box.
 - Opening Existing Projects
A project with screen data that was edited or saved using CX-Designer Ver. 5.0 or earlier must be converted to System Ver. 5.1 or later. Select version 5.1 or latter under the **Tools – Convert – Version** Menu.
4. Set system settings from CX-Designer.
 - (1) Select **PT – System Setting** on the CX-Designer.
 - (2) Select the Video Tab from the System Setting Dialog Box.
 - (3) Set the *Video Board* field to **RGB/Video Input Unit with 2 channels (NS-CA002)**, and click the **OK** Button.

Reference

Observe the following precautions when changing the *Video Board* field setting.

If the *Video Board* field is changed with a video display object already on the screen, the control object on the screen will be converted or will be deleted.

Check to see if all video display objects and Command Buttons in the project operate correctly with the Video Input Unit you selected when you changed the *Video Board* field setting.

Refer to *3-1-3 Changing the Video Board Field Setting* for details.

3-1 Display

5. Set the video input method.


- (1) Select **PT – System Setting** on the CX-Designer.
- (2) Select the Video Tab from the System Setting Dialog Box.
- (3) Set the *Video Input Method* and click the **OK** Button.

Reference

The NTSC/PAL setting is the same for all video input ports. A video camera and Vision Sensor connected to the Unit at the same time cannot be set individually to NTSC or PAL.

6. Create a video display.

Create a video display object on the screen to display video images.

- (1) Select **Functional Objects – Video Display** or select the  icon on the CX-Designer.
- (2) Place the video display object on the screen. The size and position of the object can be adjusted at this time, or they can be changed later from the Property Setting Dialog Box.
- (3) Select the channel of the video port that will be displayed.
Select the video input channel where a video camera, Vision Sensor, or other input device is connected. Set the channel in the *Select Input ch* field in the Properties Setting Dialog Box from the Video Display Window.

Reference

- When the RGB and Video Input Unit (NS-CA002) is selected, pop-up screens and keypads may be displayed on the video display.
- The video display object and other functional objects are organized in the order they were opened. This may place functional objects on top of the video display object.
- A video display object can be any size up to 640 x 480 dots (W x H).
- A video display object cannot be placed with all or part of it off the screen.
- Video display objects can be placed on normal (base) screens only. They cannot be placed on pop-up screens, sheets, or frames.
- Only one video display object can be placed on a screen at a time.

7. Transfer the newly created screen data to the NS-V1/V2 PT.

Save the newly created screen data, and then transfer it to the PT. Refer to *Transferring Data to the PT* in the CX-Designer's online help for details.

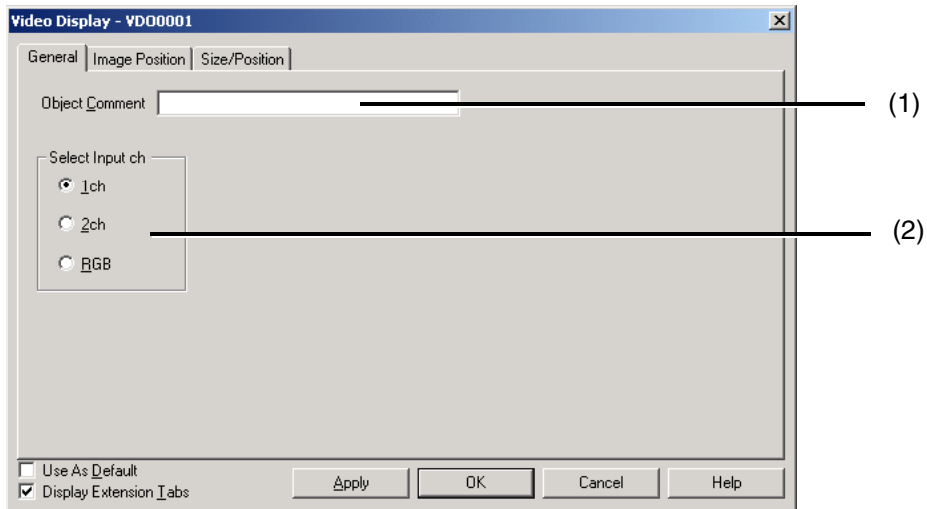
Reference

- Video displays cannot be performed on the NS5-V1/V2. Do not transfer screen data containing video images to a NS5-V1/V2PT.
- You can install the NS-CA002 RGB/Video Input Unit on an NS15-V2 PT, but you cannot use the video display function.

● **Property Settings for Video Display Objects**

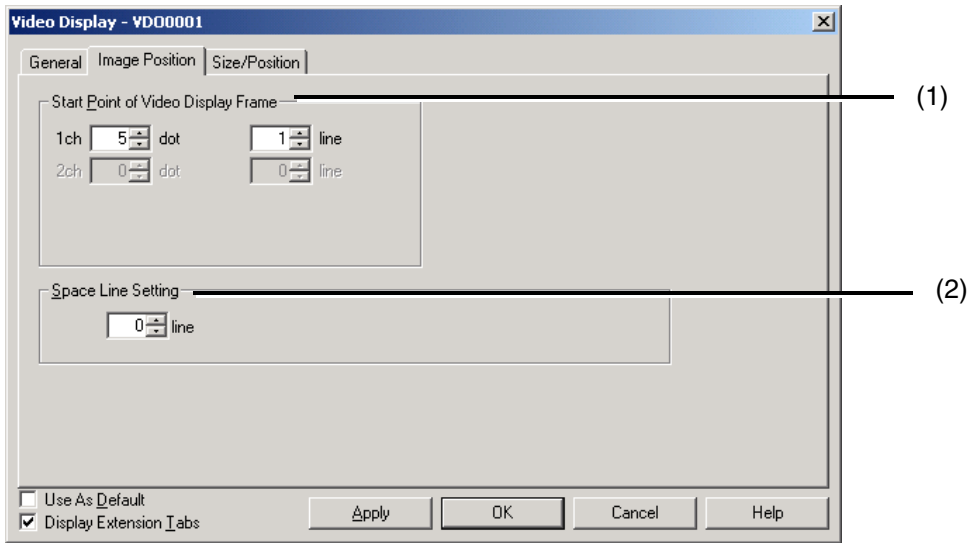
This section describes video display items in the Functional Objects Properties Dialog Box from the Video Display Window.

General	Selects the input channel for the video signal displayed by the video display object.
Image Position	Selects the video display frame start point and space line setting for data input from a video camera or Vision Sensor.
Size/Position	Sets the size of the video display object.

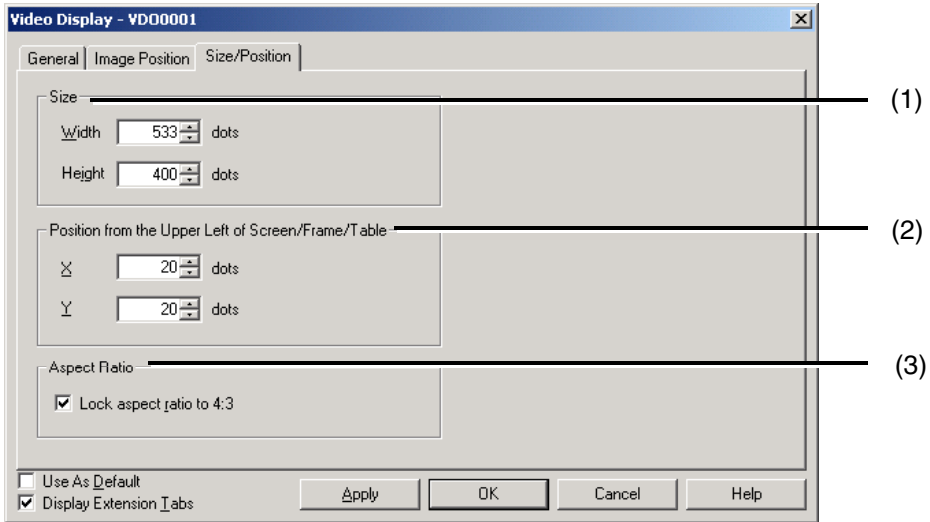


No.	Item	Contents
(1)	Comment	Used to write descriptive comments about the video display object (up to 32 characters long).
(2)	Select Input ch	Selects the input channel for the video signal displayed by the video display object. 1 ch: Channel 1 video input connector 2 ch: Channel 2 video input connector

3-1 Display



No.	Item	Contents
(1)	Start Point of Video Display Frame	Sets the start point for image data input from the video camera or Vision Sensor at each channel. The setting range is as follows: Dot position: 0 to 66 (depending on size of video display) Line position: 0 to 48 (depending on size of video display)
(2)	Space line setting	If the image input from a video camera or Vision Sensor is smaller than the display area, the image can be displayed with the difference filled in with black. This setting sets the size of the black fill area. The range is as follows: 0 to 479 (Video display height – 1 is the maximum value.)

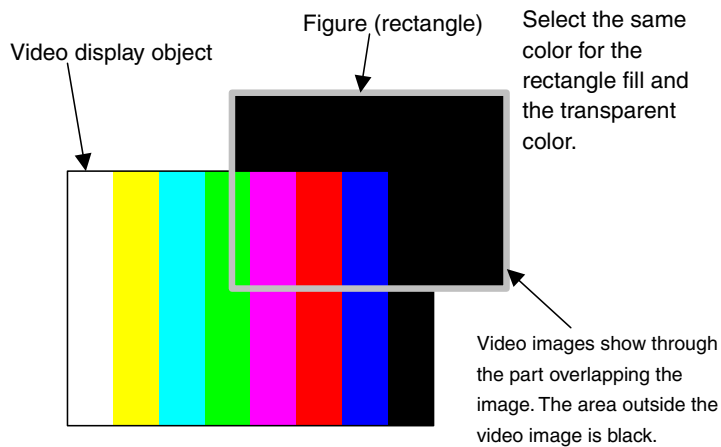


No.	Item	Contents
(1)	Size	Sets the height and width of the video display object in dot units. The range is as follows: Height: 1 to 480 Width: 1 to 640
(2)	Position from the Upper Left of Screen	Sets the position of the video display object based on its horizontal (X axis) and vertical (Y axis) position from the upper left side of the screen. The range is as follows: X coordinate: 0 to 639 (as long as non of the video display is positioned off the screen) Y coordinate: 0 to 479 (as long as non of the video display is positioned off the screen)
(3)	Aspect Ratio	Used to lock or change the ratio of width to height for the video display object. When this setting is cleared, the height and width of the object can be set individually.

3-1 Display

● Blank Channel Fill-in Color

The blank channel fill-in color is one that is replaced by an image to display video images on a PT screen. The color is transparent to video images on the screen. When a blank channel fill-in color is selected for functional and other objects (excluding video display objects), the area with the blank channel fill-in color becomes transparent and video images show through the color. The part above the display area shows video images and the part outside the display area is black. If a rectangle is placed on the screen and the blank channel fill-in color selected for the rectangle is the transparent color for example, then video images are displayed in part of the rectangle.



Select **PT - System Setting** on the CX-Designer, and then set the *Color which fills blank channels* field from the System Setting Dialog Box that is displayed.

3-1-2 RGB Display

Install the NS-CA002 RGB and Video Input Unit on an NS12-V1/V2, NS10-V1/V2, or NS8-V1/V2 PT to display an analog RGB signal from devices such as personal computers on the PT.

No. of RGB input connectors	1
Max. simultaneous displays	1
RGB display size	Mounted to the NS15 PT: 1024 x 768 dots (W × H) Mounted to the NS12 PT: 800 x 600 dots (W × H) Mounted to the NS10 or NS8 PT: 640 × 480 dots (W × H) (full-screen display only)
On-screen positioning	Fixed (full-screen display only)
Positionable screens	Normal (base) screens only
Functional object overlap	No (RGB display is full screen)

Reference

- The RGB and Video Input Unit has one analog RGB input connector port that enables only one device, such as a personal computer, to be connected to the Unit at a time.
- The analog RGB signal input must conform to input specifications for the Unit. Otherwise the image may not be displayed or may be distorted on the PT screen.
- The RGB display fills the entire PT screen. The display size of the analog RGB signal input must match the screen size (resolution) of the mounted PT.
- When you are using the analog RGB output from an NS15 V2 PT, the analog RGB output will stop while the signal input from the analog RGB input port is being displayed.

● RGB Display Procedure

1. Mount the RGB and video board on the NS-V1/V2 PT.

Follow the procedure for installing the RGB and Video Input Unit on the back of the PT. Refer to *2-3 Installing the RGB and Video Input Unit* for details.

2. Connect a device such as a personal computer to the analog RGB input connector.

Connect the device to the analog RGB input connector on the RGB and Video Input Unit. Refer to *2-5 Connecting the RGB Input Connector* for details.

3. Create a project.

Use the CX-Designer to create the RGB and Video Input Unit project.

3-1 Display

- **Creating New Projects**

Set the *System Version* field to version 5.1 or higher in the New Project Dialog Box.

- **Opening Existing Projects**

A project with screen data that was edited or saved using CX-Designer Ver. 5.0 or earlier must be converted to System Ver. 5.1 or later. Select version 5.1 or later under the **Tools – Convert – Version** Menu.

4. Select the RGB and Video Input Unit.

- (1) Select **PT – System Setting** on the CX-Designer.
- (2) Select the Video Tab from the System Setting Dialog Box.
- (3) Set the *Video Board* field to **RGB/Video Input Unit with 2 channels (NS-CA002)**, and click the **OK** Button.

Reference

Observe the following precautions when changing the *Video Board* field setting.


If the *Video Board* field is changed with a video display object already on the screen, the control object on the screen will be converted or will be deleted.

Check to see if all video display objects and Command Buttons in the project operate correctly with the Video Input Unit you selected when you changed the *Video Board* field setting.

Refer to 3-1-3 *Changing the Video Board Field Setting* for details.

5. Create an RGB display.

Create a video display object on the screen to display the RGB image.

- (1) Select **Functional Objects – Video Display** or select the  icon on the CX-Designer.
- (2) Place the video display object on the screen. The size and position of the object is not important at this time.
- (3) Select the input that will be displayed to RGB.
Set the *Select Input ch* field to RGB in the Properties Setting Dialog Box from the Video Display Window.

Reference

- Pop-up screens and keypads cannot be seen with an RGB image displayed because the RGB image is a full-screen display at the top layer on the PT.
- Do not create other functional objects with an RGB image displayed. The objects cannot be seen because the RGB image is a full-screen display at the top layer on the PT.
- For an RGB display, the video display object must be the size of the entire screen. The size cannot be changed.
 - Mounted to the NS10 or NS8 PT: 640 x 480 dots (W x H)
 - Mounted to the NS12 PT: 800 x 600 dots (W x H)
 - Mounted on the NS15 PT: 1024 x 768 dots (W x H)
- A video display object cannot be placed with all or part of it off the screen.
- Video display objects can be placed on normal (base) screens only. They cannot be placed on pop-up screens, sheets, or frames.
- Only one video display object can be placed on a screen at a time.

6. Transfer the newly created screen data to the NS-V1/V2 PT.

Save the newly created screen data, and then transfer it to the PT. Refer to *Transferring Data to the PT* in the CX-Designer's online help for details.

Reference

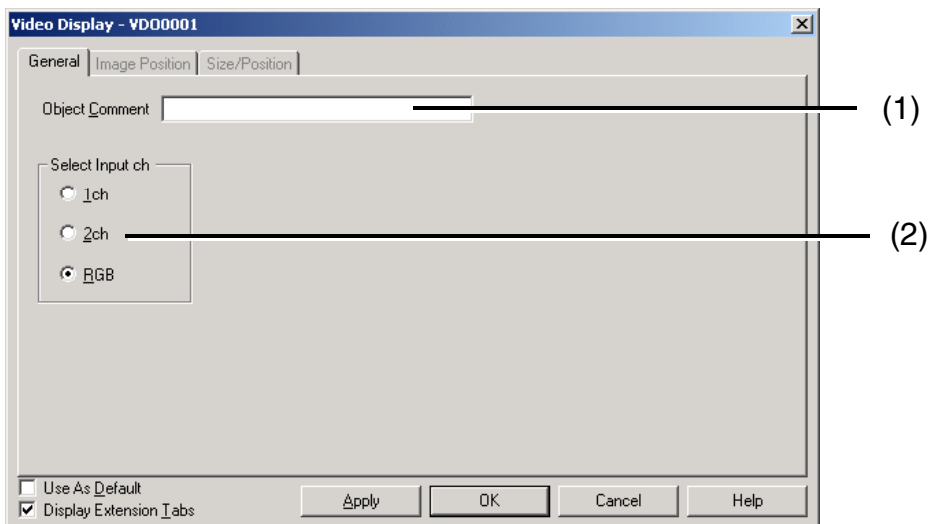
Video displays cannot be performed on the NS5- V1/V2. Do not transfer screen data containing video image to an NS5-V1/V2 PT.

● **Property Settings for Video Display Objects**

This section describes video display items in the Functional Objects Properties Dialog Box from the RGB Display Window.

General	Sets the video display object to display an RGB image.
Image Position	-
Size/Position	-

3-1 Display



No.	Item	Contents
(1)	Object Comment	Used to write descriptive comments about the video display object (up to 32 characters long).
(2)	Select Input ch	Selects analog RGB image display for the video display object. RGB: Analog RGB input

3-1-3 Changing the *Video Board* Field Setting

Select the type of Video Input Unit that will be used in the project from the *Video Board* Field in the System Dialog Box. The System Dialog Box can be displayed by selecting **PT – System Setting** from the CX-Designer menus. (For details, refer to *3-4-1 System Settings*.) It must be set when a project is first created because the functions available with each Unit vary slightly. Changing this setting changes the current project. If you change the setting while a project is being edited and then try to save the project, you will get a dialog box telling you that the project has been changed and asking you where to save it. Specify where to save the project.

Reference

Only the NS-CA002 can be used with the NS15. If the project is set for the NS15, you cannot change the Video Input Unit. If the NS-CA001 is set in the project, you cannot change the PT model to the NS15.

- **When the Video Board Field Setting Changes**

The following changes will be made to screen data that is being edited when the Video Board field is changed.

Switching from an NS-CA001 Video Input Unit to an NS-CA002 RGB and Video Input Unit

Component	Properties	Changes
Video display	Comments	No change.
	Display size	800 x 600: Changes to 640 x 480. Position from upper left side of screen is set to (0, 0). <ul style="list-style-type: none"> • 640 x 480: No change. • 320 x 240: Changes to 320 x 240 with no split screen. Changes the display position to that of the smallest input channel number displayed.
	Split screen designation	Changes to no split screen.
	Select Input ch	Channel 1 or 2: No change. Channel 3 or 4: Changes to channel 1
	Frame	Changes to no frame.
	Start Point of Video Display Frame	The following changes are made depending on the display size after the setting was changed. <ul style="list-style-type: none"> • 640 x 480: dot position = 33, line position = 1 • 320 x 240: dot position = 16, line position = 1
	Space line setting	No change.
	Position from the Upper Left of Screen	The following changes are made depending on the display size before the setting was changed. <ul style="list-style-type: none"> • 800 x 600: X coordinate = 0, Y coordinate = 0 • 640 x 480: No change. • 320 x 240: Changes the display position to that of the smallest input channel number displayed.
Command buttons/ Multifunction Objects	-	No change.

3-1 Display

Switching from an NS-CA002 RGB and Video Input Unit to an NS-CA001 Video Input Unit

Component	Properties		Changes
Video display	---		All video display objects are deleted.
Command buttons/ Multifunction Objects	Video Control – Contrast Adjustment	RGB Color Value	If RGB gain adjustment is set, the Function field will change to None.
	Video Control – Vision Sensor Console Output	Signal type	If a function key (F1 to F9) is set, the Function field will change to None.
	Other		No change

Reference

If *Video Control – Video Capture* is selected as the function in the Command Button or Multifunction Object properties, you can select only *Upper left* or *No split screen* when the *Video Board* field setting is changed.

When you switch the Video Input Unit to the RGB and Video Input Unit and try to use the Command Button or Multifunction Object to capture an image, the capture Command Button or Multifunction Object will not function if *Lower left* is selected, for example.

Confirm that all Command Buttons and Multifunction Objects set for video controls operate correctly whenever you change the *Video Board* field setting.

3-2 Video Capture

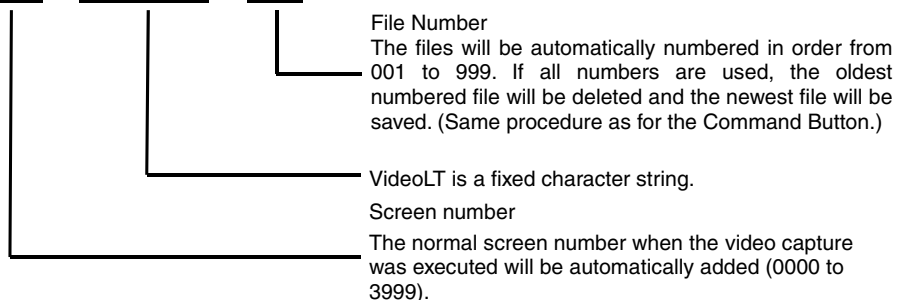
Video images displayed on the PT can be captured and saved on a Memory Card in BMP format. These images may be captured using a system memory bit, or a command button or Multifunction Object on the PT screen.

● Video Capture by System Memory Bit

\$SB24 is used to capture an image when it turns ON. It turns OFF after the video capture is completed. If an error occurs while an image is being captured, \$SB47 will turn ON.

A file is created in the log folder (\LOG) under the Memory Card directory for the captured BMP data, and is named according to the following rules. The normal screen number and file number will be automatically added to the file name when the video capture is executed.

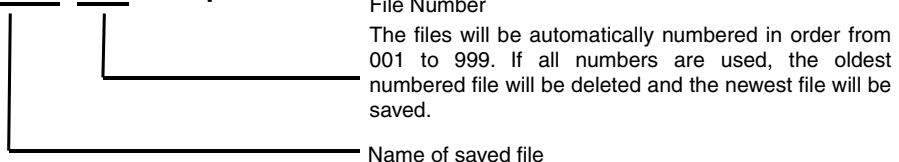
3999_VideoLT_999.bmp



● Video Capture by Command Button

Select *Video Control – Video Capture* from the *Function* field in Command Button properties. Specify the name of the BMP file that will be saved in the *Save File* field. A file is created in the log folder (\LOG) under the Memory Card directory for the captured BMP data, and is named according to the following rules. The file number will be automatically added to the file name when the video capture is executed.

Video999.bmp



3-2 Video Capture

Reference

- When you change the *Video Board* field setting from *System Settings*, the Command Button may not capture video images because the video display settings have changed. Always review the Command Button settings after you change the *Video Board* field setting.
- Operation will be as follows when the *If Memory Card is full* property is set to *Update* and the Memory Card is full when you save a captured video image:
 1. The size of the current file is compared to the size of the oldest file. If the current file is smaller, then the oldest file will be deleted and the current file will be saved.
 2. If the current file is larger than the oldest file, then the second oldest file will be added and the size of the two files will be compared to the current file. If the oldest and second oldest files together are larger than the current file, then the two oldest files will be deleted and the new file will be saved.
 3. If space cannot be secured according to the rules above, the files in the Memory Card will remain unchanged and an error message will be displayed.
- RGB display images cannot be accepted
- When a video image is captured, a file with the same name as the captured image file and an extension of *.mng* will be created in the log folder (LOG) under the Memory Card directory. These files are used to manage numbers for file names. Do not edit or delete these files.

● Executing with a Multifunction Object

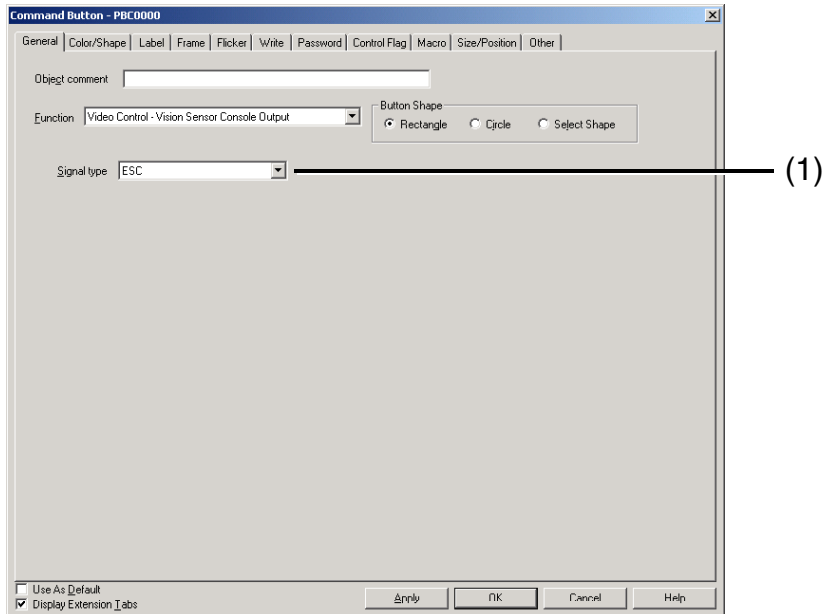
Select *Video Control - Video Capture* for the *Object Control* field of the Multifunction Object properties. Then specify the name of the BMP file to save. The operation is the same as that for command buttons.

3-3 Console Connection

Connect the console connector of an OMRON Vision Sensor Controller to the RGB and Video Input Unit to perform functions, such as setting the Vision Sensor, using buttons on the PT screen.

- **Using Console Connection Functions**

Select *Video Control – Vision Sensor Console Output* from the *Function* field in Command Button properties. Set the console button functions you want to use in the *Signal type* field.



No.	Item	Contents
(1)	Signal type	Selects the type of signal that will be sent to the Vision Sensor.

3-3 Console Connection

Reference

- The operation of the command button is different between the NS15 and other PTs if SHIFT is selected as the control signal.
 - NS15: The ON/OFF status will change each time the command button is pressed.
 - Other PTs: The command button will be ON while it is pressed and will turn OFF when it is released.
- If SHIFT is attached to other control signals and sent to an OMRON Vision Sensor, press another signal button while pressing the SHIFT button. When attaching the SHIFT signal with the NS15, however, press the SHIFT button once to turn it ON and then press another button, and then press the SHIFT button again to turn it OFF.

Video Control - Vision Sensor Console can be selected for the *Object Control* field of the Multifunction Object properties to use the same settings and operation and those for a command button.

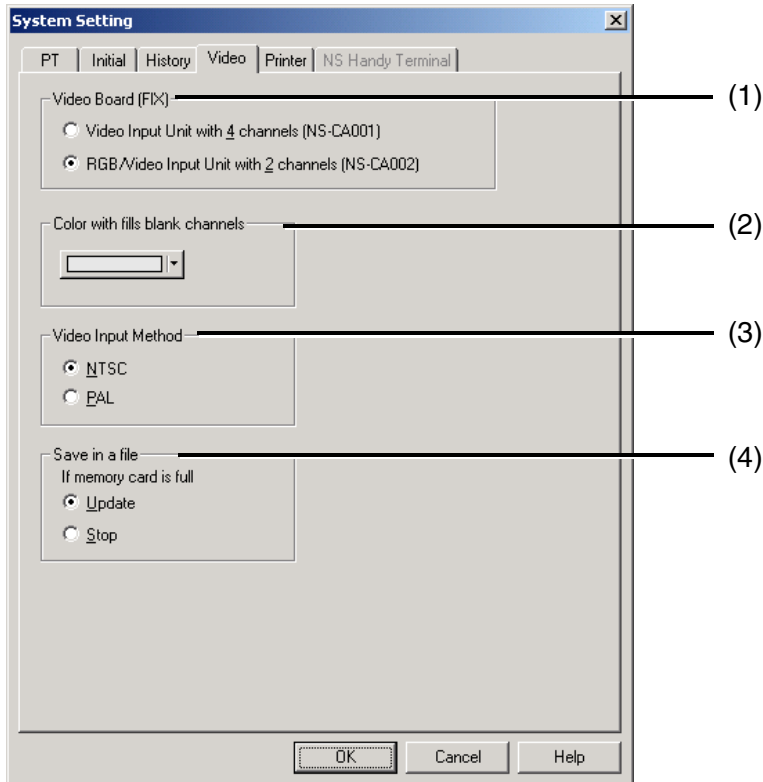
Reference

Multifunction Object with the signal type set to SHIFT cannot be used as a button with the NS15.

3-4 Settings and Adjustments

3-4-1 System Settings

Select the Video Tab from the System Setting Dialog Box.



No.	Item	Contents
(1)	Video Board	Selects the type of video board mounted on the PT. Changing this setting changes the current project. If the NS15 is set as the PT model, only the NS-CA002 Video Input Unit can be used (the video board setting cannot be changed).
(2)	Color which fills blank channels	Selects the color that is used to display video images with the NS-CA002 RGB and Video Input Unit installed.
(3)	Video Input Method	Selects the video signal input method. The setting is the same for all video board inputs.
(4)	Save in a file	Sets the action to perform if the Memory Card is full when you save a file with an image captured by system memory bit. Update: Deletes the oldest file before saving the current file. Stop: File will not be saved.

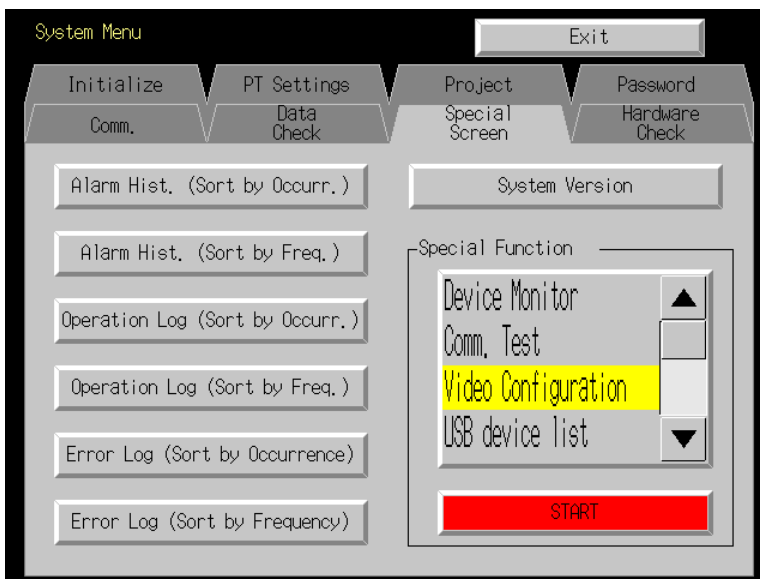
3-4-2 Video Configuration

Install the RGB and Video Input Unit on the PT to display video images on the PT from video cameras or Vision Sensors connected to the Unit. *Video Configuration* can be used to adjust the contrast of images and to output to the Vision Sensor console.

● Opening the Video Configuration Window

The Video Configuration Window is accessed from the System Menu.

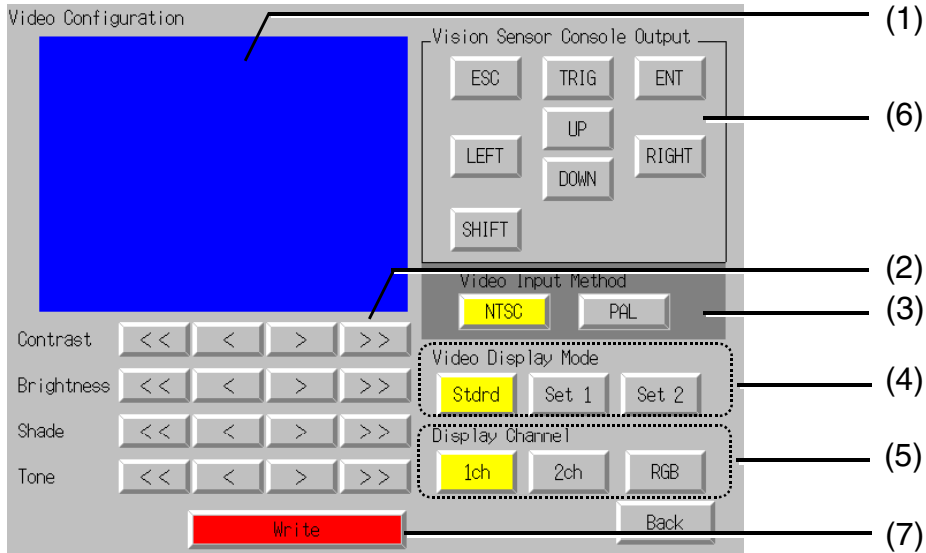
- (1) Display the Special Screen Tab Page from the System Menu and select *Video Configuration* from the *Special Function* field. Then, click the **Start** Button.



● Exiting Video Configuration

Click the **Back** Button on the bottom right side of the Video Configuration Window to exit *Video Configuration*. The window will return to the System Menu.

● Image Quality Adjustments and Console Output Methods



No.	Item	Contents
(1)	Display area	Displays images from a video camera or Vision Sensor connected to the channel 1 or channel 2 video input connector on the RGB and Video Input Unit. Use the <i>Select Input ch</i> field to switch the channel that is displayed. The area turns blue if data is not input to the channel currently being displayed.
(2)	Image adjustments	Adjusts the quality of the image from the selected video input connector channel on the RGB and Video Input Unit. The contrast, brightness, shade, and tone of the image can be adjusted by clicking the buttons. The adjustments are as follows: <<: -10 <: -1 >: +1 >>: +10
(3)	Video Input Method	Selects the method used to input image signals from the video input connectors on the RGB and Video Input Unit.
(4)	Video Display Mode	Select the video display mode. Normally leave this mode set to <i>Stdrd</i> . If the display is not clear, change the setting to the one that produces the clearest display.
(5)	Display Channel	Selects the input channel on the RGB and Video Input Unit that will be adjusted. 1 ch: Video input connector channel 1 2 ch: Video input connector channel 2 RGB: Analog RGB input connector (RGB Configuration is accessed.)

3-4 Settings and Adjustments

No.	Item	Contents
(6)	Vision Sensor Console Outputs	Click these buttons to send control signals to an OMRON Vision Sensor connected to the console output connector on the RGB and Video Input Unit. Refer to the Vision Sensor manual for details on individual button functions. Function keys (F1 to F9) are available only with Command Buttons.
(7)	Write	Saves image quality adjustments. Previous settings will remain if the PT is restarted without clicking the Write Button.

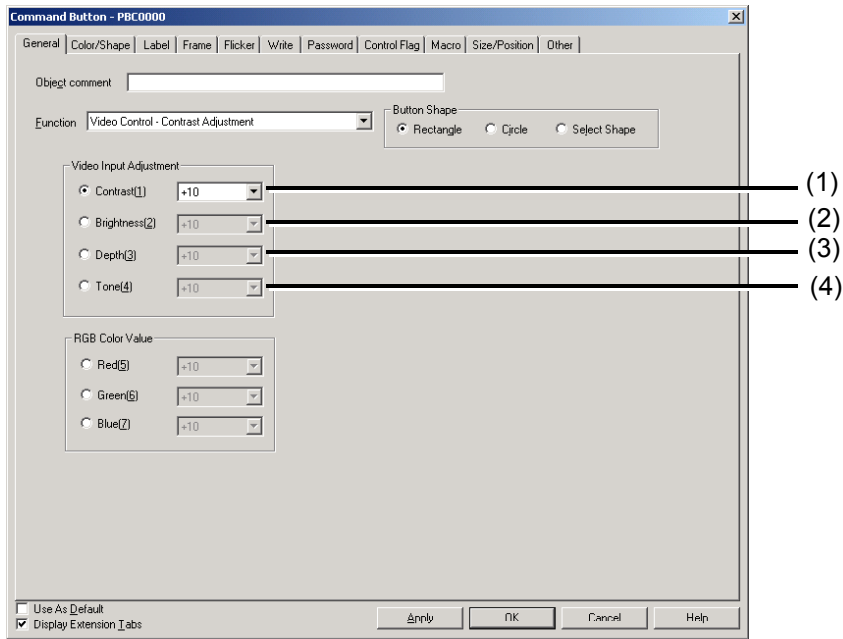
Reference

- If SHIFT is attached to other control signals and sent to an OMRON Vision Sensor, press another signal button while pressing the SHIFT button. When attaching the SHIFT signal with the NS15, however, press the SHIFT button once to turn it ON and then press another button, and then press the SHIFT button again to turn it OFF.
- The operation of the SHIFT button is different between the NS15 and other PTs.
 - NS15: The ON/OFF status will change each time the command button is pressed.
 - Other PTs: The command button will be ON while it is pressed and will turn OFF when it is released.

● Video Configuration by Command Buttons

Image adjustments (contrast, brightness, shade, and tone) can be performed using command buttons or Multifunction Objects. The following example is for command buttons.

3-4 Settings and Adjustments

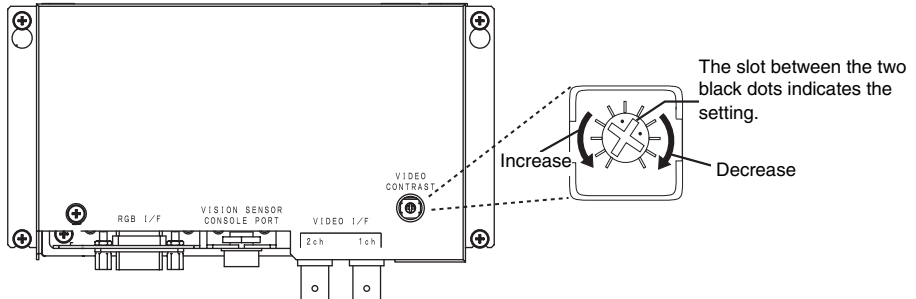


No.	Item	Contents
(1)	Contrast	Setting items: -10, -1, +1, +10 Adjustable in 64 steps.
(2)	Brightness	Setting items: -10, -1, +1, +10 Adjustable in 128 steps.
(3)	Shade	Setting items: -10, -1, +1, +10 Adjustable in 32 steps.
(4)	Tone	Setting items: -10, -1, +1, +10 Adjustable in 256 steps.

3-4 Settings and Adjustments

3-4-3 Contrast Adjustor Settings

The contrast must be adjusted if the image on the PT screen is too bright or too dark. It is usually adjusted using the *Video Configuration* function. If the contrast is not improved this way, then change the contrast adjustor setting on the RGB and video board. Turn the contrast adjustor gradually using a small Phillips screwdriver while checking the image displayed on the PT.



- * The image may be distorted if the contrast adjustor is turned too far. When that happens, turn the adjustor in the opposite direction until the distortion is eliminated.

3-4-4 RGB Configuration

Install the RGB and Video Input Unit on the PT and connect a personal computer to the Unit to display analog RGB images from the personal computer on the PT. *RGB Configuration* can be used to adjust the quality of these images.

● Opening the RGB Configuration Window

Switch from *Video Configuration* to access *RGB Configuration*.

- (1) Display the Special Screen Tab Page from the System Menu and select *Video Configuration* from the *Special Function* field. Then, click the **Start** Button.
- (2) Click the **RGB** Button in the *Select Input ch* field.
- (3) RGB Display is selected. Touch anywhere on the screen.

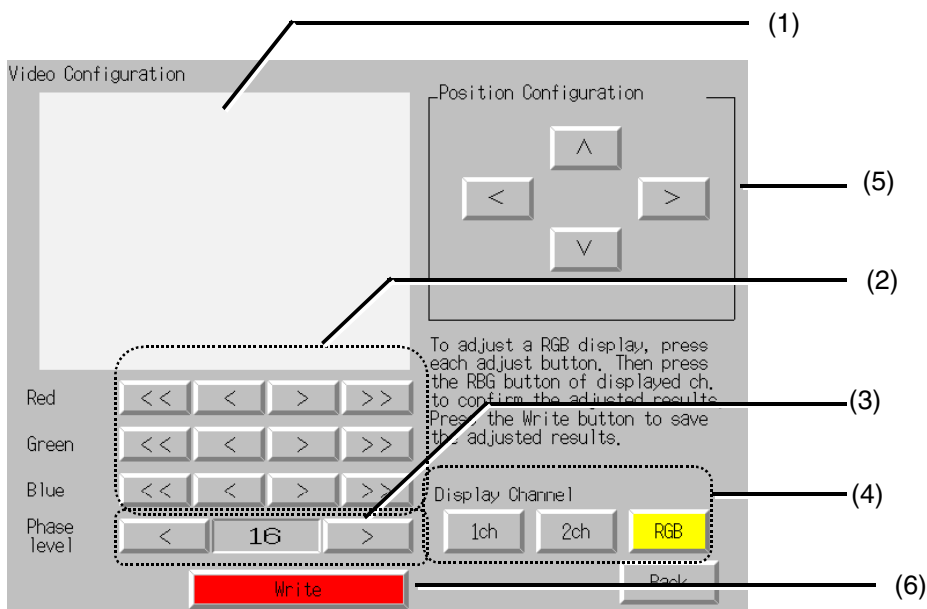
● Exiting *RGB Configuration*

Click the **Back** Button on the bottom right side of the RGB Configuration Window to exit *RGB Configuration*. The window will return to the System Menu.

● RGB Image Quality Adjustments

RGB images are always displayed full screen. This means the display cannot be checked while you are adjusting image quality. Click the **RGB** Button in the *Select Input ch* field to select RGB display, and touch anywhere on the screen to go back to adjusting the image. Switch back and forth between image adjustment and RGB display this way until the RGB image is adjusted.

3-4 Settings and Adjustments



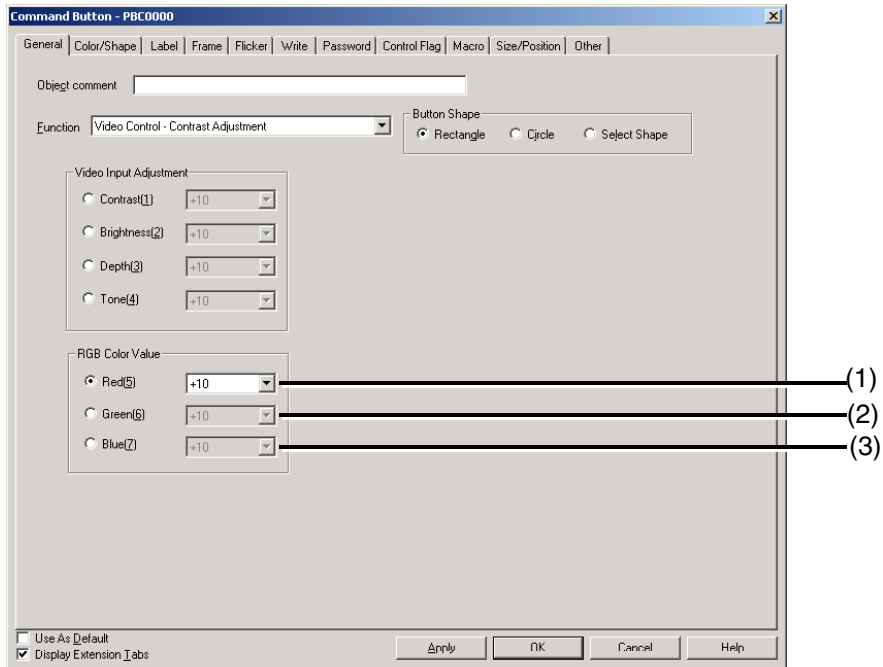
No.	Item	Contents
(1)	RGB display area	Does not display RGB images. Click the RGB Button in the <i>Select Input ch</i> field to switch to full-screen RGB display.
(2)	Gain adjustments	Adjusts the gain of the individual R, G, and B signals in image data from the RGB input connector on the RGB and Video Input Unit. The adjustments are as follows: <<: -10 <: -1 >: +1 >>: +10
(3)	Phase level	Finely adjusts the image signal from the RGB input connector on the RGB and Video Input Unit. Overall sharpness of the RGB image may be improved by adjusting this level.
(4)	Display Channel	Selects the input channel on the RGB and Video Input Unit that will be adjusted. 1 ch: Video input connector channel 1 (<i>Video Configuration</i> is accessed.) 2 ch: Video input connector channel 2 (<i>Video Configuration</i> is accessed.) RGB: Analog RGB input connector
(5)	Position Configuration	The display position of the RGB image can be moved horizontally and vertically one dot at a time up to 15 dots in any one direction. Adjust the display position when necessary.
(6)	Write	Saves image quality adjustments. Previous settings will remain if the PT is restarted without clicking the Write Button.

Reference

- The RGB display may be distorted or text may be blurred for some input devices. If this occurs, try adjusting the display with the phase level buttons. (This may not correct the problem for some input devices.)
- If the polarity of the sync signal is reversed in comparison to the input signal, RGB display screens may appear dark. If this occurs, the polarity can be corrected to produce a proper display by switching the screen once.

● **RGB Configuration by Command Buttons**

RGB image gain can be adjusted using command buttons or Multifunction Objects. The following example is for command buttons.



No.	Item	Contents
(1)	Red	Setting items: -10, -1, +1, +10 Adjustable in 256 steps.
(2)	Green	Setting items: -10, -1, +1, +10 Adjustable in 256 steps.
(3)	Blue	Setting items: -10, -1, +1, +10 Adjustable in 256 steps.

3-4-5 Video Display Control

Video and RGB displays can be turned ON and OFF using system memory bits. When a system memory bit is used for video display control, the RGB display can be turned OFF temporarily by host command.

Video display control is allocated to \$SB15. \$SB15 displays images when it turns ON if there is a video display object on the current screen and there is video or RGB input data available. The video or RGB image display stops when \$SB15 turns OFF.

You know that \$SB15 is ON if there is a video display object present and video starts to play when the screen is switched. You know it is OFF if there is no video display object present and video does not start to play when the screen is switched.

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Appendix 1 Specifications

A-1-1 General Specifications

Item	Specifications
Dimensions	150 x 102 x 22 mm (W x H x D)
Weight	0.5 kg max.
Ambient operating temperature	If the Unit is mounted at an angle between 0° and 30° to the horizontal: 0 to 40°C If the Unit is mounted at an angle between 30° and 90° to the horizontal: 0 to 50°C
Ambient storage temperature	-20 to 60°C
Ambient operating humidity	35% to 85% (with no condensation)
Rated power supply voltage	Power supplied from the PT's expansion interface connector (5 V \pm 5%, 3.3 V \pm 5%)
Operating atmosphere	No corrosive gases.
Vibration resistance	Same as PT.
Shock resistance	Same as PT.

A-1-2 General Specifications

- **External Interface Specifications**

Item	Specification
Video input	2 ports
Analog RGB input	1 port
Console output	1 port
Expansion interface	1 port (for the PT's expansion interface connector)

- **Video Input Specifications**

Item	Specifications
Input method	NTSC/PAL
Signal input connector	BNC connector
Input signal	Standard NTSC or PAL composite video signal 1.0 Vp-p, 75

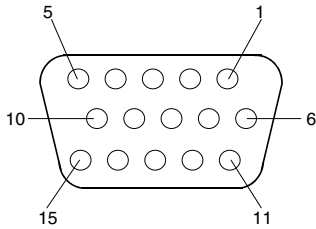
- **Analog RGB Input Specifications**

Item	Specification		
Display resolution (No. of dots)	640 × 480 (Mounted to the NS10 or NS8)	800 × 600 (Mounted to the NS12)	1024 × 768 (Mounted on the NS15)
Horizontal frequency	31.5 kHz	37.5 kHz	48.4 kHz
Vertical frequency	60 Hz		
Signal input connector	D-Sub, 15-pin		
Input synchronization signal	Separate, TTL, positive/negative polarity		
Input picture signal	Analog, positive polarity (0.7 Vp-p/75)		

* Be sure to change the resolution and frequency to levels that can be displayed on the PT before connecting the PT to a personal computer or other devices.

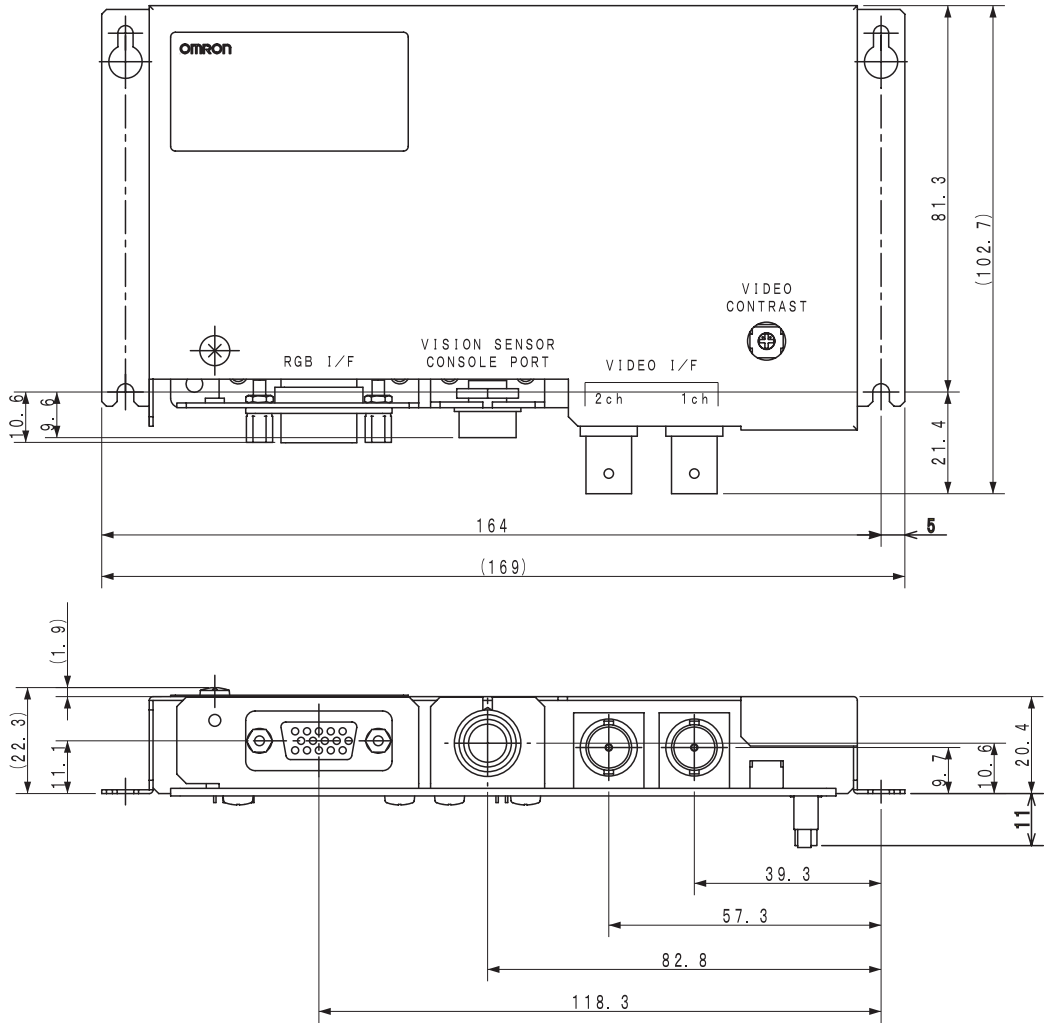
Appendix 2 Pin Arrangement

- **Analog RGB Input Connector**



Pin No.	Signal name	Signal direction
1	Red	Input (personal computer or other external device) -> RGB and Video Input Unit
2	Green	
3	Blue	
4	NC	
5	GND	
6		
7		
8		
9	NC	
10	GND	
11	NC	
12		
13	H SYNCH	
14	V SYNCH	
15	NC	
Connector hood		

Appendix 3 Dimensions

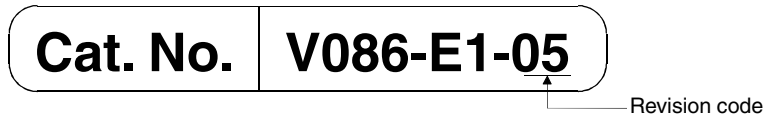


Appendix 4 Comparison to NS-CA001 Video Input Unit

Item	Specification	
	NS-CA002	NS-CA001
Video input ports	2 ports	4 ports
Analog RGB input port	1 port	None
Console output port	1 port	1 port
Video display size	Selectable up to 640 x 480 dots	Fixed sizes <ul style="list-style-type: none"> • 800 × 600 dots • 640 × 480 dots • 320 × 240 dots
Split screen video display	Not supported	Supported (4 screens max.)
Video picture overlap	Supported Functional objects, pop-up screens, and other objects can overlap a video display.	Not supported The video display is always on the top layer.
RGB display size	Fixed display <ul style="list-style-type: none"> • 1024 × 768 dots • 800 × 600 dots • 640 × 480 dots 	-
Simultaneous RGB and video display	Not supported	-
RGB picture overlap	Not supported The RGB picture is always on the top layer.	-
Console button press and hold	Supported The external output signal stays ON as long as the command button or Multifunction Object is held down.	Not supported The external output signal automatically turns OFF even if the command button or Multifunction Object is held down.
Video capture	Supported	Supported
Display control for RGB and video pictures	Supported Using \$SB15	Not supported
Frame display	Not supported	Supported

Revision History

A manual revision code appears as a suffix to the catalog number on the cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	April 2004	Original production
02	June 2004	Added a note about the EC Directive.
03	July 2006	Revisions accompanying release of the CX-Designer.
04	July 2007	Revisions accompanying release of the CX-Designer Ver. 2.1.
05	November 2008	Revisions accompanying a version upgrade and the addition of a new PT model.

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