
**User's
Manual**

**MPEG2-TS Packet Streamer
VT1200/VT1220**

Foreword

Thank you for purchasing the MPEG2-TS Packet Streamer VT1200/VT1220. This User's Manual contains useful information about the precautions, functions, and operating procedures of the instrument. To ensure correct use, please read this manual thoroughly before operation.

Keep this manual in a safe place for quick reference in the event a question arises.

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. Illustrated screen contents in this manual may differ slightly from what actually appears on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer as listed on the back cover of this manual.
- Copying or reproducing all or any part of the contents of this manual without YOKOGAWA's permission is strictly prohibited.
- The warranty card is included in the packing box, and replacement cards will not be provided. Please read the warranty carefully, and keep the card in a safe place.

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- Other company and product names are trademarks or registered trademarks of their respective holders.

Revisions

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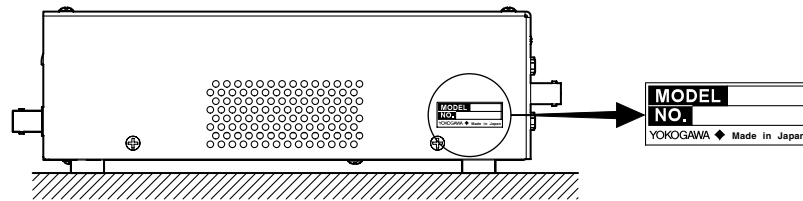
Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If some of the contents are not correct, are missing, or are physically damaged, contact the dealer from which you purchased them.

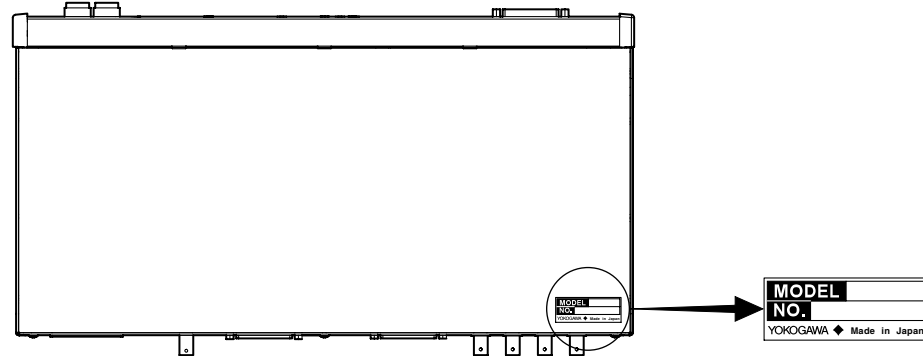
VT1200/VT1220

Check that the model name and suffix code given on the name plate on the rear panel match those on the order.

VT1200



VT1220



MODEL

706550 VT1200 Portable type
706551 VT1220 Rack mount type (Height: 1U)

SUFFIX

Specifications	Code	Notes
Power cord	-U	UL/CSA Standard power cord (Part No.: A1051WD) Maximum rated voltage: 125 V, Maximum rated current: 7 A
	-E	VDE Standard power cord (Part No.: A1004ED) Maximum rated voltage: 250 V, Maximum rated current: 10 A
	-G	AS Standard power cord (Part No.: A1013WD) Maximum rated voltage: 250 V, Maximum rated current: 6 A
	-S	BS Standard power cord (Part No.: A1050WD) Maximum rated voltage: 250 V, Maximum rated current: 10 A

NO. (Instrument Number)

When contacting the dealer from which you purchased the instrument, please quote the instrument number.

Standard Accessories

The following standard accessories are supplied with the instrument:

Part Name	Part Number	Quantity	Notes
1. Power cord	A1051WD	1	For -U, UL/CSA Standard.
	A1004WD	1	For -E, VDE Standard
	A1013WD	1	For -G, AS Standard
	A1050WD	1	For -S, BS Standard
2. CD ROM	B8100SH	1	CD ROM containing TS creation PC software
3. User's Manual	IM706550-01	1	User's Manual (this manual)
4. Fuse	A1347EF	1	250 V, 1A, Timelag

Optional Accessories (Sold Separately)

The accessories in the chart below are sold separately. For information and ordering, contact your dealer.

Part Name	Part Number	Quantity	Notes
BNC cable	366924	1	BNC-BNC, length: 1 m
BNC cable	366925	1	BNC-BNC, length: 2 m
Rack mount kit		1	EIA
Rack mount kit		1	JIS

Safety Precautions

This instrument is an IEC safety class 1 instrument (provided with terminal for protective earth grounding).

The following general safety precautions must be observed during all phases of operation. If the instrument is used in a manner not specified in this manual, the protection provided by the instrument may be impaired. YOKOGAWA Electric Corporation assumes no liability for the customer's failure to comply with these requirements.

The following symbols are used on this instrument.



"Handle with care." To avoid injury, death, or damage to the instrument, the operator must refer to the explanation in the User's Manual or Service Manual.



Alternating current



ON (power)



OFF (power)



ON (power) state



OFF (power) state

Make sure to comply with the following safety precautions. Not complying might result in injury or death, or damage to the instrument.

WARNING**Power Supply**

Ensure the source voltage matches the voltage of the power supply before turning ON the power.

Power Cord and Plug

To prevent an electric shock or fire, be sure to use the power cord supplied by YOKOGAWA. The main power plug must be plugged in an outlet with protective grounding terminal. Do not invalidate protection by using an extension cord without protective grounding.

Protective Grounding

The protective grounding terminal must be connected to ground to prevent an electric shock before turning ON the power.

Necessity of Protective Grounding

Never cut off the internal or external protective grounding wire or disconnect the wiring of protective grounding terminal. Doing so poses a potential shock hazard.

Defect of Protective Grounding and Fuse

Do not operate the instrument when protective grounding or fuse might be defective.

Fuse

To prevent a fire, make sure to use fuses with specified standard(voltage, current, type). Before replacing the fuses, turn off the power and disconnect the power source. Do not use a different fuse or short-circuit the fuse holder.

Do not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Do not Remove any Covers

There are some areas with high voltages. Do not remove any cover if the power supply is connected. The cover should be removed by qualified personnel only.

External Connection

To ground securely, connect the protective grounding before connecting to measurement or control unit. Also, when touching the circuit, turn off the power to the circuit and check that there is no voltage being generated.

Contents

Foreword	i
Checking the Contents of the Package	ii
Safety Precautions	iv
Chapter 1 Names of Parts	
1.1 Front Panel	1-1
1.2 Rear Panel	1-2
1.3 Functions	1-3
Chapter 2 Before Output Operation	
2.1 Usage Precautions on the Use of the Instrument	2-1
2.2 Installing the Instrument	2-2
2.3 Connecting the Power Supply	2-3
2.4 Turning ON/OFF the Power Switch	2-4
Chapter 3 Outputting Contents	
3.1 Outputting the TS from the ASI Output	3-1
3.2 Outputting the TS from the TS PARALLEL OUT (DVB-SPI) Terminal	3-3
3.3 Outputting the TS Using the External Clock	3-5
3.4 TS Check and Through-Output	3-7
3.5 Using the External Control Terminal	3-8
Chapter 4 Operating TSMaker	
4.1 Required PC System Environment	4-1
4.2 Installing TSMaker	4-2
4.3 Operating TSMaker	4-6
4.4 Setting the TS in Detail	4-12
Chapter 5 Troubleshooting and Maintenance	
5.1 Error Messages	5-1
5.2 Preinstalling Contents	5-2
5.3 Replacing the Power Fuse	5-3
Chapter 6 Specifications	
6.1 Specifications	6-1
Index	

1

2

3

4

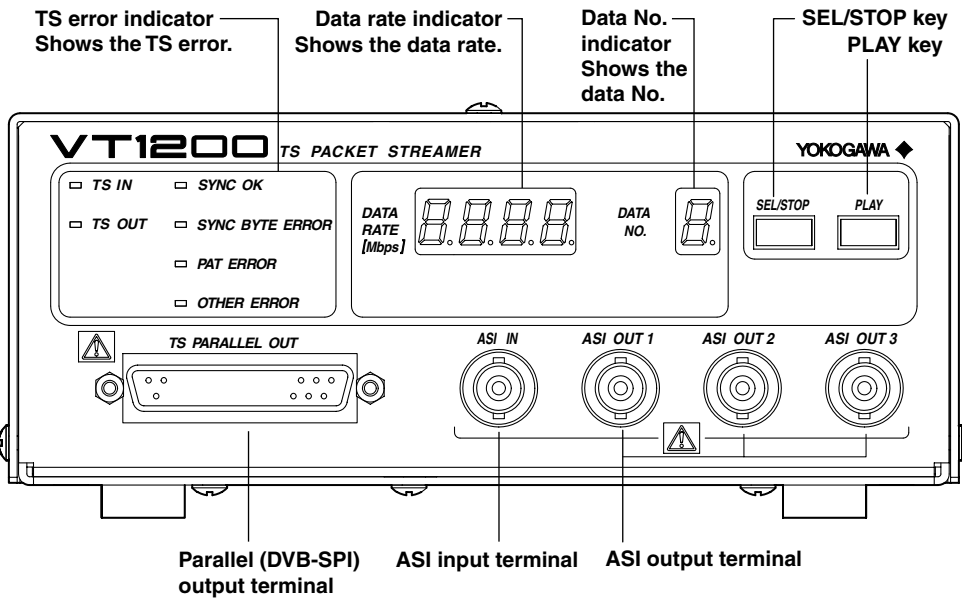
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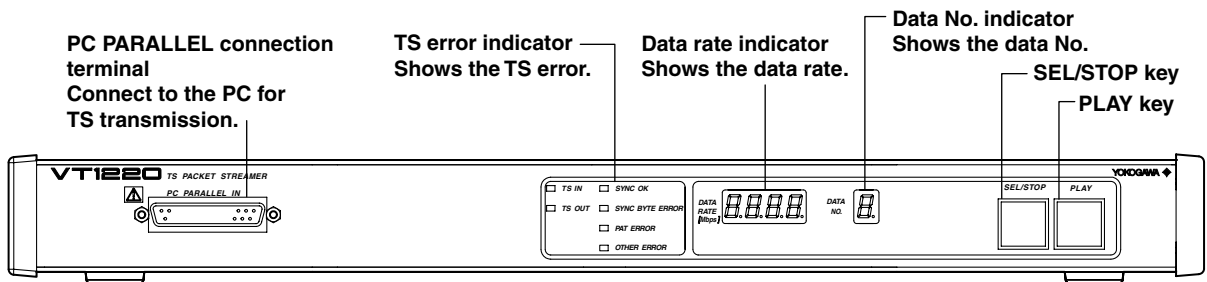
Index

1.1 Front Panel

VT1200

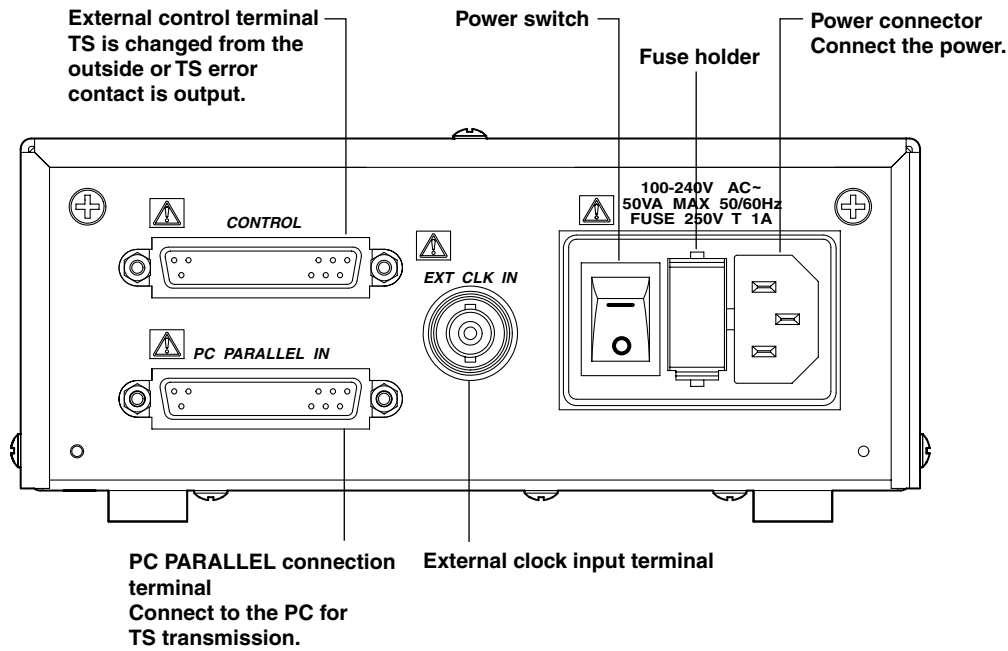


VT1220

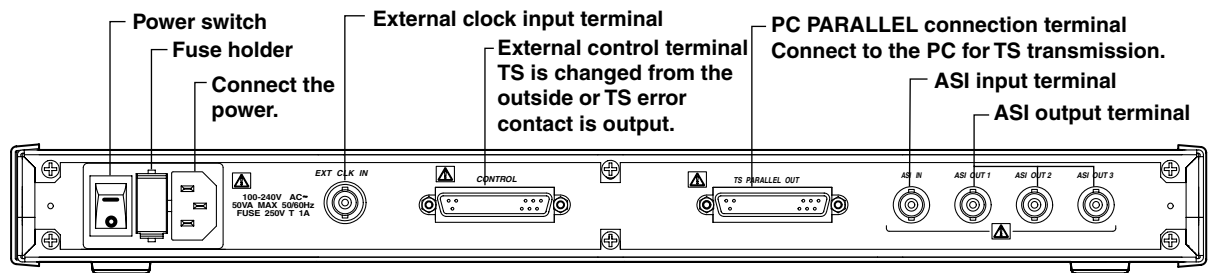


1.2 Rear Panel

VT1200



VT1220



1.3 Functions

Overview

The VT1200 series are compact MPEG2-TS generators containing TS generator absolutely necessary for functional verification, maintenance, or troubleshooting of MPEG2-TS related devices. Two models, portable model (VT1200) convenient for work at field site and system building model (VT1220) are available.

Preinstalling the Contents and Replaying the Simulated Moving Pictures

Patterns, such as color bars are preinstalled for quick operation. Just pressing the selector button makes it possible to utilize such contents. Additionally, it is also possible to replay the simulated moving pictures that play multiple frames continuously. This function is useful to detect the freezing of the screen.

Creating and Registering User's Original Contents

Use of utility software (TSMaker) supplied with this instrument makes it possible to create original contents, and transmit or register them into the memory in the VT1200 series.

Simple Operation

Selecting a pattern No. with the selector button or pressing the PLAY button will ensure the simple operation. Additionally, the instrument provides an external control function (contact input). With this external control function, the instrument is applicable to upgrading of the system with other units.

Through-output and Input TS Monitor Functions

A through-output function is installed in the VT1200 series. With this function, the broadcasting contents are output directly during operation and changed to the built-in contents when necessary.

Additionally, SyncLoss and PTA ERROR of the TS input to the ASI input terminal are monitored in real time. If an error is found, it is informed using the LED and contact output on the front panel of this instrument.

2.1 Usage Precautions on the Use of the Instrument

Safety Precautions

- If you are using this instrument for the first time, make sure to thoroughly read the “Safety Precautions” given on page iv.
- Do not remove the cover from the instrument. Some sections inside the instrument have high voltages that are extremely dangerous. For internal inspection or adjustment, contact your nearest YOKOGAWA dealer.
- Never continue to use the instrument if there are any symptoms of trouble such as strange odors or smoke coming from the instrument. In such cases, immediately turn OFF the power and unplug the power cord. Then, contact your nearest YOKOGAWA dealer.
- Nothing should be placed on top of the power cord. The power cord should also be kept away from any heat sources. When unplugging the power cord from the outlet, never pull by the cord itself. Always hold and pull by the plug. If the power cord is damaged, contact your dealer for replacement.

General Handling Precautions

- Never place any objects containing water on top of the instrument. A water spill can lead to malfunction of the instrument.
- Do not apply shock or vibration to the instrument. This can lead to malfunction. Take extra caution because the built-in hard disk is sensitive to vibration and shock. In addition, applying shock to the input terminal or the connected cable can cause electrical noise to enter the instrument.
- Do not bring charged objects near the input/output terminals. This can lead to malfunction.
- If you are not going to use the instrument for a long period of time, unplug the power cord from the outlet.
- When the instrument is not being used for an extended period of time, unplug the power cord from the outlet.
- When cleaning the case or the operation panel, first remove the power cord from the outlet. Then, wipe with a dry, soft cloth. Do not use volatile chemicals as this may cause discoloring and deformation.

2.2 Installing the Instrument

WARNING

To avoid the possibility of fire, never use the instrument with the rear side facing down. Placing the instrument with the rear side down can cause a fire when the instrument malfunctions. If you must use the instrument with the rear side down, place a metal plate or a flame-resistive barrier (grade UL94V-1 or higher) beneath the instrument.

Installation Condition

Install the instrument in a place that meets the following conditions:

Ambient temperature and humidity

Use the instrument in the following environment:

- Ambient temperature: 5 to 40°C
However, in order to obtain highly accurate measurements, operate the instrument in the 23±5°C temperature range.
- Ambient humidity: 20 to 85% RH
No condensation should be present. However, in order to obtain highly accurate measurements, operate the instrument in the 55±10% RH range.

Note

Condensation may occur if the instrument is moved to another place where the ambient temperature is higher, or if the temperature changes rapidly. In this case, let the instrument adjust to the new environment for at least an hour before using the instrument.

Well-ventilated location

Vent holes are located on the side of the instrument. To prevent internal overheating, allow for enough space around the instrument and do not block the vent holes.

Do not install the instrument in the following places:

- In direct sunlight or near heat sources.
- Where an excessive amount of soot, steam, dust, or corrosive gases are present.
- Near strong magnetic field sources.
- Near high voltage equipment or power lines.
- Where the level of mechanical vibration is high.
- In an unstable location.

Installation Position

Place the instrument in a leveled position.

2.3 Connecting the Power Supply

Before Connecting the Power Supply

Follow the warnings below when connecting the power supply. To prevent the possibility of electric shock and damaging the instrument, follow the warnings below.

WARNING

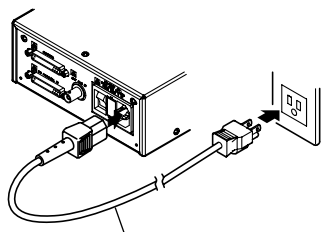
- Ensure that the supply voltage matches the rated supply voltage of the instrument before connecting the power cable.
- Check that the power switch is turned OFF before connecting the power cord.
- To prevent the possibility of electric shock or fire, be sure to use the power cord supplied by YOKOGAWA.
- Make sure to perform protective earth grounding to prevent the possibility of electric shock. Connect the power cord to a properly grounded three-pin outlet.
- To minimize the possibility of electric shock, do not use an extension card without a protective earth ground.

Connection Procedure

1. Check that the power switch on the rear panel is OFF.
2. Connect the power cord plug to the power connector on the rear panel. (Use the power cord that came with the package.)
3. Connect the plug on the other end of the power cord to the socket that meets the conditions below. The AC outlet must be of a three-pin type with a protective earth terminal.

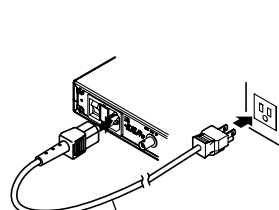
Rated supply voltage:	100 to 120 VAC, 200 to 240 VAC
Permitted supply voltage range:	90 to 264 VAC
Rated supply voltage frequency:	50/60 Hz
Permitted supply voltage frequency range:	48 to 63 Hz
Maximum power consumption:	50 VA

VT1200



**Power cord
(included in the package)**

VT1220



**Power cord
(included in the package)**

2.4 Turning ON/OFF the Power Switch

Things to Check before Turning ON the Power Switch

- The instrument is properly installed.
- The power cord is properly connected.

Location of the Power Switch and ON/OFF Operation

The power switch is located on the rear panel. The power switch is a type of seesaw switch.

Turning the switch to the ON (I) and OFF (O) positions will turn ON and OFF the power to the instrument, respectively.

Power Up Operation

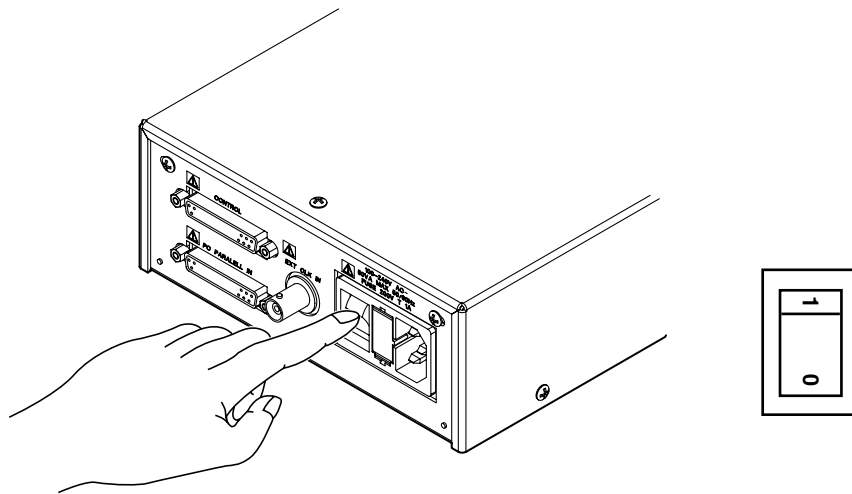
When the main switch is turned ON, [idLE] and [1] will appear on the 7-segment DATA RATE LED and DATA NO. LED.

Note

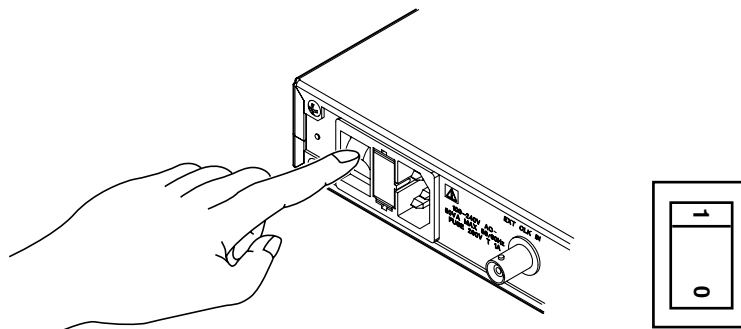
- If the instrument does not function as shown above even though the main switch is turned ON, turn OFF the power switch and check the following points.
 - Is the power cord securely connected?
 - Is the correct voltage applied to the power connector?

If the instrument still fails to power up after checking these points, it is probably a malfunction. Please contact your nearest YOKOGAWA dealer.

VT1200



VT1220

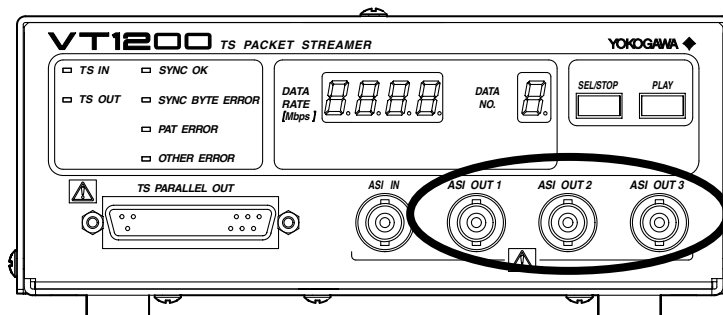


3.1 Outputting the TS from the ASI Output

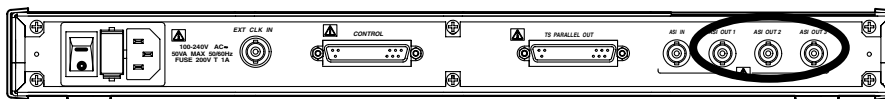
Procedure

1. Connect a coaxial cable with the BNC connector to the ASI output terminal (ASI OUT1 to ASI OUT3) on the front panel (VT1200), or rear panel (VT1220).

VT1200



VT1220



2. Press the SEL/STOP key to set a data No. of the TS to be output.
3. Press the START key. The TS you have selected is then output from the ASI OUT1 - ASI OUT3 terminal.
4. The TS IN LED on the front panel is flashing while the TS is being output.
5. Press the SEL/STOP key to stop the TS output.

Explanation

- The OUT1 to OUT3 terminals output the same TS.
- The ASI OUT and TS PARALLEL OUT terminals output the same TS at the same time.
- The DATA RATE indicator shows 4-digit data rate created by TSMaker. (The actual minimum resolution is 1 Hz.)
- The packet type (188/204) set by TSMaker is output.
- The TS with the ASI type (packet/burst) set in the setup file is output.
- When the DATA No. is set to 0, the TS input to the ASI IN terminal is output directly (through-output).
- The following describes the specifications of the ASI output.

Specifications of ASI output

Item	Specifications
Data output	Complied with DVB-ASI (BSEN 5083-9). Level: 800 mVp-p Output connector: BNC (75 Ω)

Note

The output impedance of ASI is 75 Ω. The instrument does not function properly if the impedance of a BNC cable to be connected is not 75 Ω.

3.1 Outputting the TS from the ASI Output

- The TS has been preinstalled when the VT1200/VT1220 is purchased. The following shows the information about the TS, which has been preinstalled.

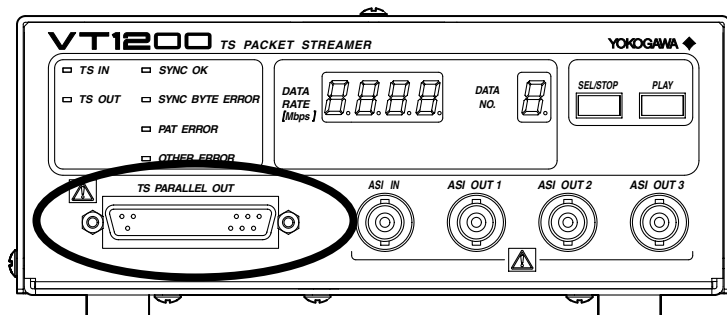
Data No.	Type	Size	FR (Hz)	GOP structure	Data rate	Simulated moving picture
1	Color bar 1	710×480	29.97	I only	10 Mbps	Not provided.
2	Color bar 2	710×480	29.97	I only	60 Mbps	Not provided.
3	Color bar 1	710×480	29.97	I only	10 Mbps	Provided.
4	Color bar 2	1920×1080	29.97	I only	40 Mbps	Provided.
5	Color bar 2	1280×720	59.94	I only	40 Mbps	Provided.
6	Original	710×480	29.97	I only	10 Mbps	Provided.
7	Original	710×480	29.97	I, P, and B	3.75 Mbps	Provided.

3.2 Outputting the TS from the TS PARALLEL OUT (DVB-SPI) Terminal

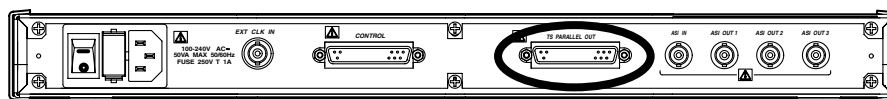
Procedure

1. Connect a Dsub-25pin cable to the TS PARALLEL OUT terminal on the front panel for the VT1200 or the TS PARALLEL OUT terminal on the rear panel for the VT1220.

VT1200



VT1220



2. Press the SEL/STOP key to set the DATA No. of the TS to be output to 1 to 7.
3. Press the START key. The TS you have selected is then output from TS PARALLEL OUT terminal.
4. The TS IN LED on the front panel is flashing while the TS is being output.
5. Press the SEL/STOP key to stop the TS output.

Explanation

- The ASI OUT and TS PARALLEL OUT terminals output the same TS at the same time.
- The DATA RATE indicator shows 4-digit data rate created by TS Maker. (The actual minimum resolution is 1 Hz.)
- The packet type (188/204) set by TS Maker is output.
- The TS synchronized with DVB_EDGE (fall/rise) set in the setup file is output.
- When DATA No. 0 is selected, the output is stopped.
- The following describes the specifications of the TS PARALLEL output.

Specifications of parallel output (DVB)

Output level: LVDS (DVB-A010)

Connector: Dsub-25pin

3.2 Outputting the TS from the TS PARALLEL OUT (DVB-SPI) Terminal

Connection

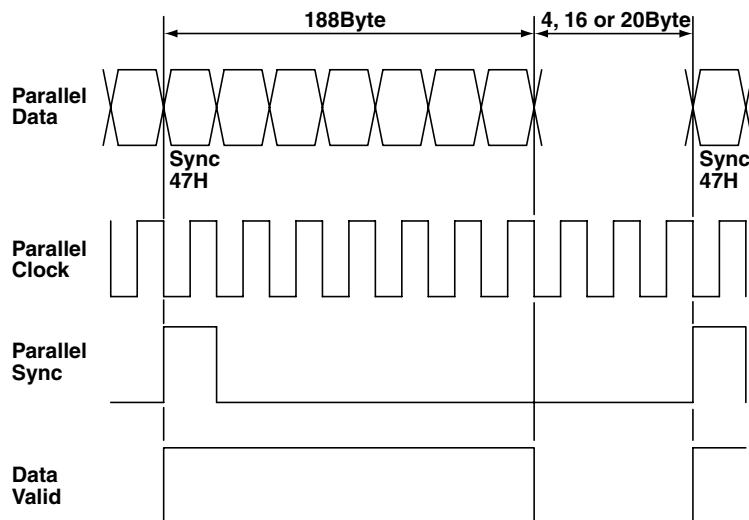
Pin No.	Signal name	Pin No.	Signal name
1	CLKA	14	CLKB
2	SYS GND	15	SYS GND
3	DATA7 A	16	DATA7 B
4	DATA6 A	17	DATA6 B
5	DATA5 A	18	DATA5 B
6	DATA4 A	19	DATA4 B
7	DATA3 A	20	DATA3 B
8	DATA2 A	21	DATA2 B
9	DATA1 A	22	DATA1 B
10	DATA0 A	23	DATA0 B
11	DATA VALID A	24	DATA VALID B
12	SYNC A	25	SYNC B
13	NC		

Parallel Output Timing

The following figure shows the parallel output timing. If you select 204-byte in the setup file, 188-byte packet and 16-byte Dummy Out are output. All of the Dummy Out data become 0.

The relationship among Parallel Sync, Data Valid, and Data is shown in the following figure.

The Parallel data is output with it synchronized with the edge set by DVG EDGE (Fall/Rise).

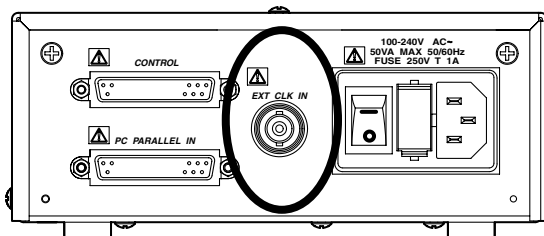


3.3 Outputting the TS Using the External Clock

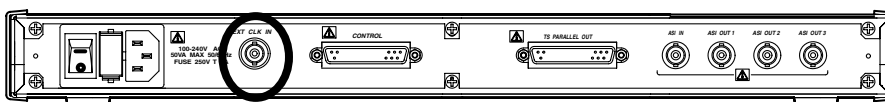
Procedure

1. Connect a cable with the BNC connector to the EXT CLK IN terminal on the rear panel to input the external clock.

VT1200



VT1220



2. Press the SEL/STOP key to set the DATA No. of the TS to be output to 1 to 7.
3. Press the START key. The TS you have selected is then output from the ASI OUT1 to ASI OUT3 and TS PARALLEL OUT terminals.
4. The TS IN LED on the front panel is flashing while the TS is being output.
5. Press the SEL/STOP key to stop the TS output.

Explanation

Setting the External Clock

When using the VT1200/1220 with an external clock, create a TS by setting the EXT_CLOCK line in the vt_setup.rc file to ON. For details refer to section 4.4, "Setting the TS in Detail."

External clock frequency and data rate

In the VT1200/1220, the clock frequency input by the external clock becomes the data rate in units of bytes. The unit of the data rate displayed on the VT1200 becomes bbs (bit/sec.).

Therefore, when a frequency, which is 1/8 of the display, is input, this becomes equivalent to the display.

In the VT1200, it is necessary to input a value larger than the data rate. Normally, since the data rate becomes the standard value, a frequency of the external clock is determined, a value smaller than this value is set using TSMaker, and it is transmitted to the VT1200.

For example, to output the TS with a data rate of 8 Mbps, follow the steps below. The external clock is 1 MHz (8M/8).

Set the data rate of TSMaker to 8 Mbps or less. Approximate target is about 90% of this value.

Data rate setting of TSMaker = $8M \times 0.9 = 7.2$ Mbps.

3.3 Outputting the TS Using the External Clock

The following shows the specifications of the external clock input.

Specifications of external clock input

Item	Specifications
External clock	Level: TTL (50 Ω) Input timing: Signal fall Connector: BNC (50 Ω)

Note

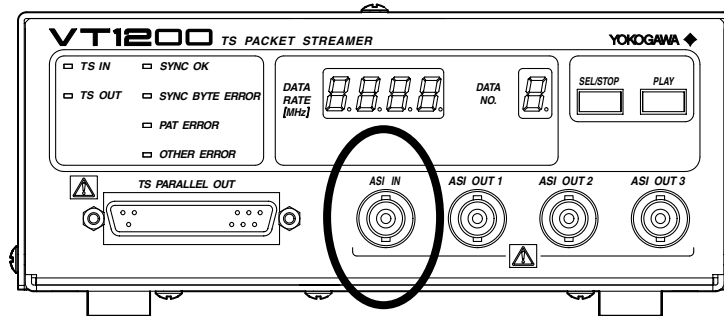
- When using the output rate for the external clock, the external clock to be input must be continuous clock.
At this time, the burst clock is not applicable to the clock signal. Additionally, if the external clock is stopped while the data is being output, the instrument may not function correctly.
-

3.4 TS Check and Through-Output

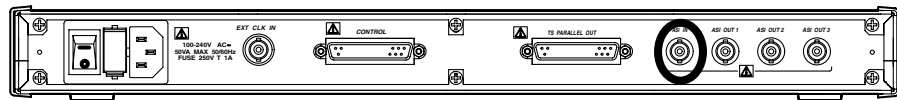
Procedure

1. Input TS to be checked to the ASI IN terminal through a cable with the BNC connector.

VT1200



VT1200



2. Press the SEL/STOP key to set the DATA No. of the TS to be output to 0.
3. Press the START key. When the correct TS is input, the TS IN LED starts flashing.
4. At this time, the TS input to the ASI terminal is directly output from the ASI OUT1 to ASI OUT3 terminals.
5. Press the SEL/STOP key to complete the TS check. The through-output is also stopped at the same time.

Explanation

If an error occurs in the TS input to the ASI IN terminal, the following LED starts flashing. However, the LED does not flash if an error not checked in “setup.rc” occurs.

SYNC OK

A status, in which five or more synchronization bytes (0x47) of the header of the TS continue, is called “synchronization”. This LED flashes in the synchronization status.

SYNC BYTE ERROR

This LED flashes if the synchronization byte of the header of the TS is not “0x47”.

PAT ERROR

This LED flashes if any of the following three conditions arises.

- Packet with PID = “0x00” does not appear in the period set by PAT_INTERVAL.
- Table_id of the packet with PID = “0x00” is not “0x00”.
- Packet with PID = “0x00” is sent with it encrypted (Scrambling_control_field is not “00”).

OTHER ERROR

This LED flashes if any of the following two conditions arises.

- Discontinuity occurs in Continuity_counter of PAT (PID=0).
- Transport_error_indicator is “1”.

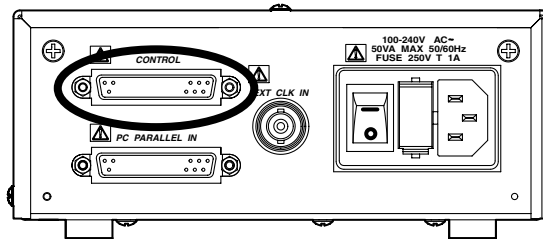
3.5 Using the External Control Terminal

Location of External Control Terminal

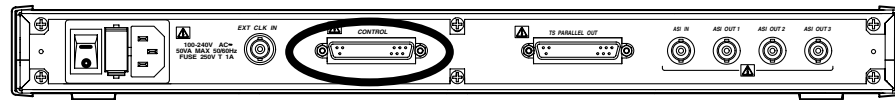
The CONTROL terminal is located on the rear panel.

When using this external control terminal, do not connect the PC PARALLEL IN terminal and a personal computer.

VT1200



VT1220



Specifications of Control Terminal

Pin assignments

Pin No.	I/O	Contact control	Pin No.	I/O	Contact control
1	O	ERROR OUT 1	14	GND	GND
2	O	ERROR OUT 2	15	GND	GND
3	O	SYNC_OK OUT 1	16	GND	GND
4	O	SYNC_OK OUT 2	17	GND	GND
5	OPEN	—	18	GND	GND
6	OPEN	—	19	GND	GND
7	I	DATA7_	20	I	DATA6_
8	I	DATA5_	21	I	DATA4_
9	I	DATA3_	22	I	DATA2_
10	I	DATA1_	23	I	DATA0_
11	I	STOP_	24	I	START_
12	I	—	25	I	—
13	I	SELECT_			

Contact output

The line between the ERROR OUT1 and ERROR OUT2 pins, and that between the SYNC_OK OUT1 and SYNC_OK OUT2 pins use the contact output.

The contact rating is 0.5A, 42 Vp-p.

Contact input

The FUNC0_ to FUNC7_, START_, and STOP_ pins use the contact input. When these contacts are connected to the GND line, these contacts are enabled.

SELECT_

Be sure to connect to ground when using the external control terminal.

Explanation**ERROR OUT1 - ERROR OUT2**

These pins are short-circuited if any of SYNC BYTE ERROR, CONT_COUNT_ERROR, TRANSPORT_ERROR, and PAT_ERROR occurs when data is input to the ASI IN terminal.

For details about error contents, see section 4.4, "Setting the TS in Detail."

SYNC_OK OUT1 - SYNC_OK OUT2

A status, in which five or more synchronization bytes (0x47) of the header of the TS continue, is called "synchronization". These pins are short-circuited in the synchronization status.

DATA0_

When this pin is connected to the GND line, the data output from the ASI IN terminal is through-output to the ASI OUT1 to ASI OUT3 terminals.

DATA1_ to DATA7

When any of these pins is connected to the GND line, data No. 1 to 7 is selected, accordingly.

START_

When this pin is connected to the GND line, the TS is then output.

STOP_

When this terminal is connected to the GND line, the TS output is then stopped.

4.1 Required PC System Environment

Hardware

Personal computer main unit

IBM compatible with Pentium 166 MHz or higher, on which Microsoft Windows 95/98/Me, or Windows NT4.0 is running.

Parallel port

EPP, EPP+ECP, or bi-directional SPP mode must be supported.

Capacity of internal memory

64 MB or more

Capacity of hard disk drive

Free capacity is 100 MB or more.

Drive

One CD-ROM drive. This drive is absolutely necessary to install TSMaker.

Mouse or pointing device

Mouse or pointing device applicable to Microsoft Windows 95/98/Me, or Windows NT4.0.

Display

Display applicable to Microsoft Windows 95/98/Me, or Windows NT4.0.

OS (Operating System)

Microsoft Windows 95/98/Me, or Windows NT4.0 is absolutely required. When using Windows2000 Professional, please contact your nearest YOKOGAWA dealer.

Note

Simply running Setup.exe from the installation CD is not sufficient to begin using TSMaker. After running Setup.exe, you need to change the registry and install drivers. Perform the installation as described in section 4.2, "Installing TSMaker" and enter the default settings.

4.2 Installing TSMaker

Preparations before Installation

Prepare the TSMaker install disc supplied with the VT1200/VT1220 (CD-ROM supplied with the VT1200/VT1220). Before installing TSMaker, exit all programs currently running on your computer.

Check that the parallel port of the BIOS setting of your computer is set at the EPP or EPP+ECP mode.

If the above parallel port is not set, change the mode to EPP or ECP+EPP.

If your personal computer includes a parallel port not supporting the EPP or ECP+EPP mode, set the parallel port to the bi-directional SPP mode (this mode is called "PS/2" or "NORMAL", which may vary depending on the computer manufacturer).

Note

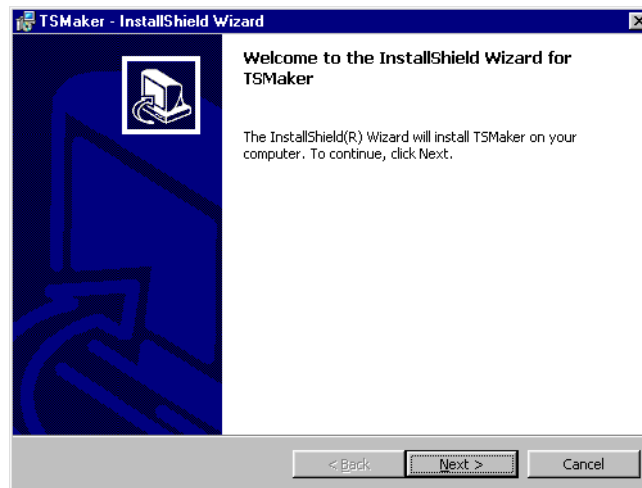
- TSMaker does not run on a computer not supporting the EPP, ECP+EPP, or bi-directional SPP mode.
 - For details about how to set up the BIOS, see the instruction manual supplied with your personal computer.
-

Starting the Installation

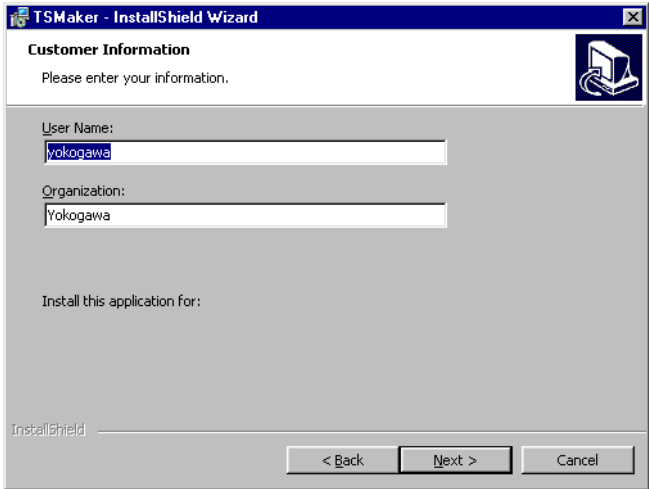
The following shows how to install TSMaker in a computer, on which Windows 95/98/Me is running.

If you use Windows NT, install TSMaker in the same procedure as described in the following.

1. Insert the install CD into the CD-ROM drive.
2. Run "Setup.exe". The Wizard screen will appear. Check the contents and click [Next] to move to the next screen.



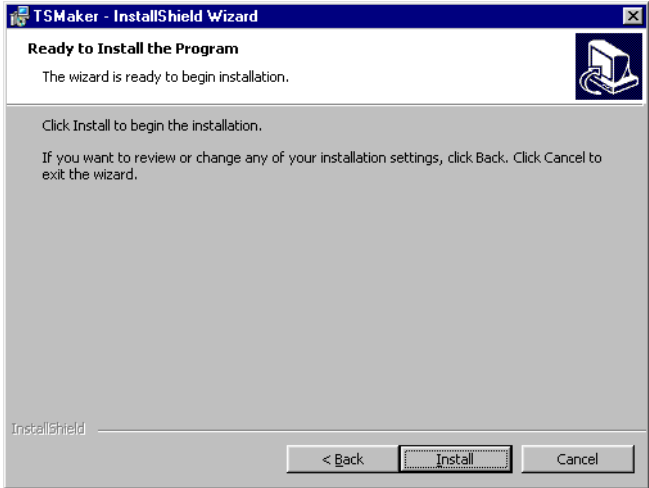
- 3. The User information setup screen will appear. Set a desired user name and company name, and then click [Next] to move to the next screen.



- 4. The Folder setup screen for the installation destination will appear. Check the installation destination and click [Next] to move to the next screen. If you wish to change the installation destination directory, click the [Change] button and specify a desired directory.

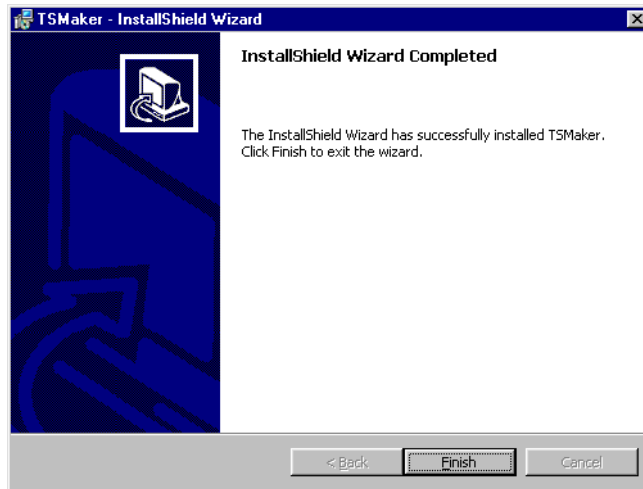


- 5. When the screen is moved to the next screen, the Installation start screen will appear. Click [Install] to start the installation.



4.2 Installing TSMaker

- When clicking the [Install] button, the installation will be started. After a while, the installation is completed and the setup completion screen will appear. Click the [Finish] button to exit the installation.



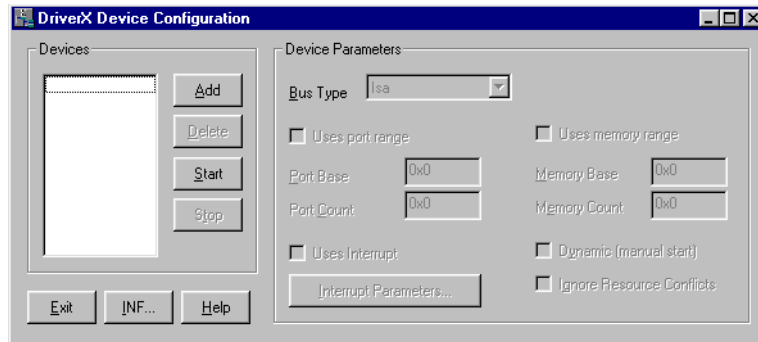
- When the installation is completed, the files are copied into the installation directory so that they have the following directory structure.

<Installation destination directory/((Program Files/yokogawa/TSMaker/)

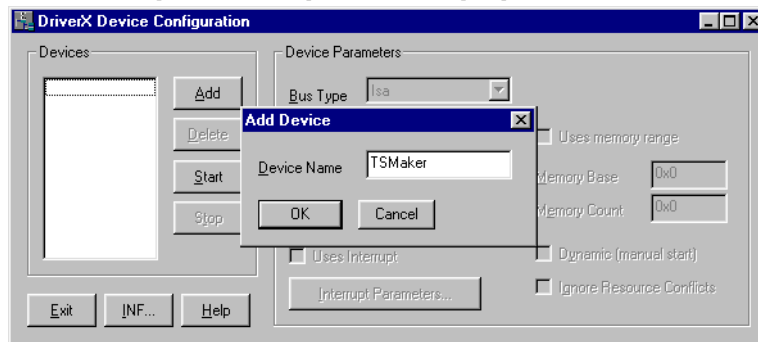
TSMaker.exe:	Execution file for TSMaker main body
ParWriteDll.dll:	DDL file for writing through parallel port
vt_mpeg.rc:	mpeg resource file
vt_setup.rc:	setup resource file
data/:	Directory
Animation BMP file group	
bitmap/:	Directory
Sample BMP file group	
tool/:	Directory
Devcon.exe:	Registry setup application
PreInstall.exe:	Execution file for preinstalling to VT1200
ParWriteDll.dll:	
vt_mpeg_p1.rc:	Resource file for writing preinstallation data
.....	
vt_mpeg_p7.rc	
vt_mpeg_k1.rc	
.....	
vt_mpeg_k7.rc	
vt_setup_p1.rc	
.....	
vt_setup_p7.rc	
vt_setup_k1.rc	
.....	
vt_setup_k7.rc	

- Short cuts for the files, "TSMaker.exe", "PreInstall.exe", and "Devcon.exe" are created in the directory "Start menu\Programs\TSMaker". From the [Start] menu, run "Programs\TSMaker\RegSetting".

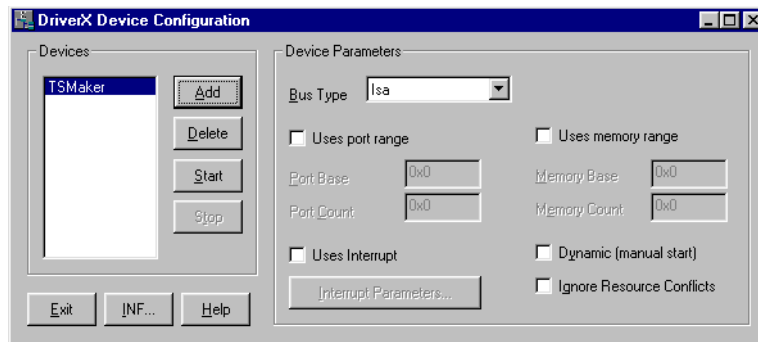
9. When “RegSetting” is run, the following screen will appear. On the following screen, click the [Add] button of [Devices].



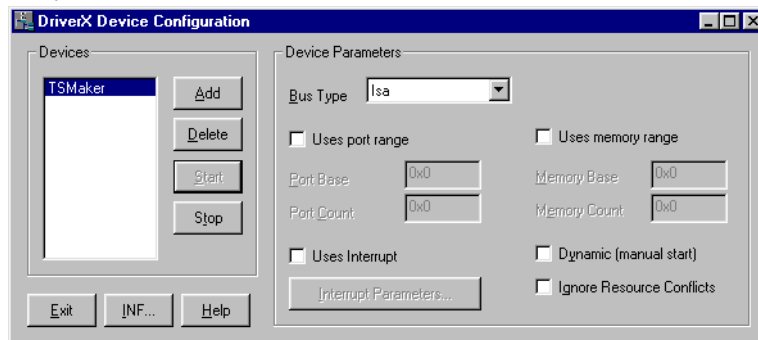
10. When clicking the [Add] button, the Add Device screen will appear. Input “TSMaker” to [Device Name] and click the [OK] button.



11. When clicking the [OK] button, “TSMaker” will be appeared in the Devices area. After checking the “TSMaker” is appear, click the [Start] button.



12. Click the [Start] button. After checking that the application starts running as shown below, click the [Exit] button to exit the application. The installation is then completed.

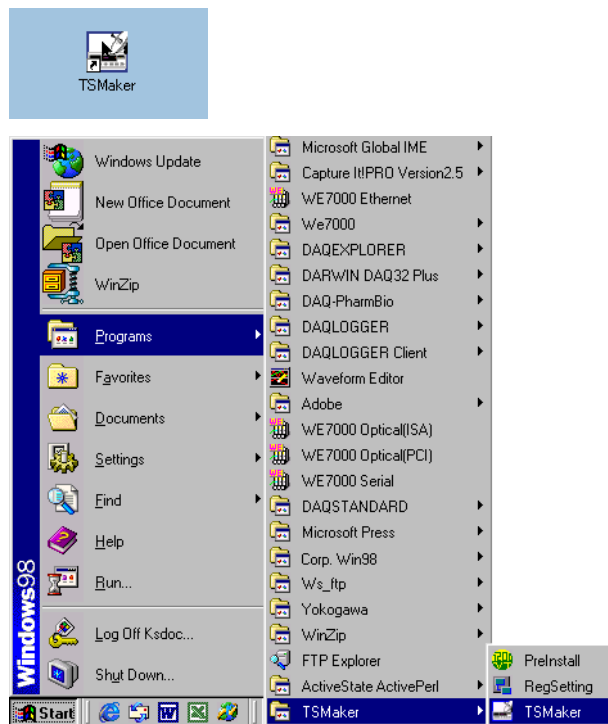


4.3 Operating TSMaker

Procedure

Step 1 Starting TSMaker

1. Connect the PC PARALLEL IN terminal on the VT1200/VT1220 and the parallel port on the personal computer using the Dsub-25pin cable.
2. From the directory where TSMaker has been installed (default directory is "c:\ProgramFiles\yokogawa\TSMaker"), double-click "TSMaker.exe". It is also possible to select "Programs\TSMaker\TSMaker" from the Start menu.

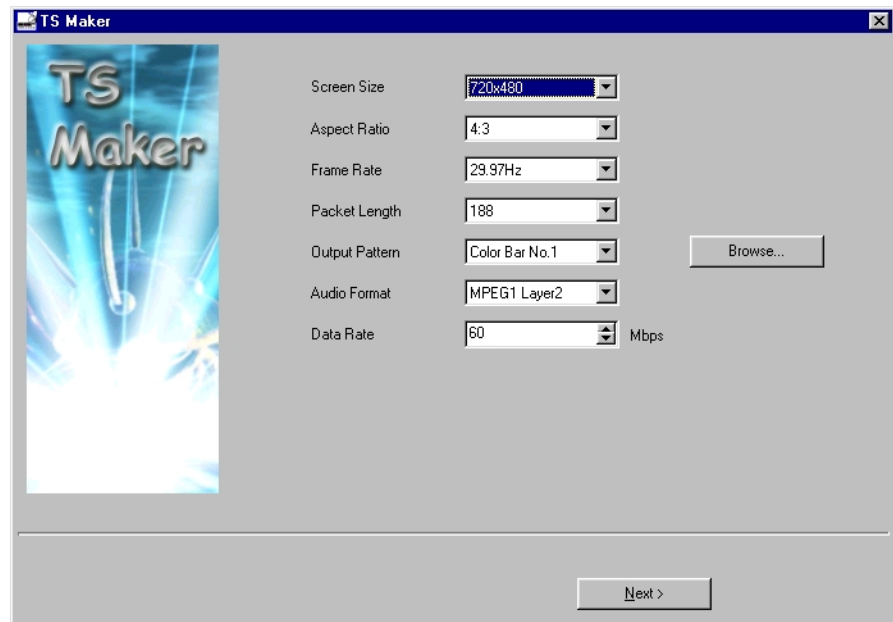


Note

- TSMaker does not operate while something is connected to the external control terminal. You can either disconnect the terminal, or set Select_ to open.
- The Dsub-25pin cable used to connect PC PARALLEL IN terminal on the VT1200/VT2200 to the PC's parallel port is to be used for a straight connection.

Procedure**Step 2 Setting TS to be output**

1. Set a desired screen size from the pull-down menu.
2. Set the aspect ratio to "4:3" or "16:9" from the pull-down menu.
3. Set a desired frame rate from the pull-down menu.
4. Select "188" or "204" for the packet type from the pull-down menu. When "204" is selected, 16-byte dummy packet, the data of which is 00H, is added to 188-byte TS data. At this time, the data rate becomes a value including 16-byte dummy packet.
5. Select "Color bar 1" or "Color bar 2" for the output pattern from the pull-down menu, or click [Reference] and select a prepared BMP file.
6. Select "None" or "MPEG1 Layer2" for the audio pattern from the pull-down menu.
7. Set a data rate ranging 2 Mbps to 80 Mbps. The minimum resolution is 1 bps.



Explanation

Screen size

Select a desired screen size from nine kinds of sizes, 1920×1080, 1440×1080, 1280×720, 720×576, 720×480, 704×480, 640×480, 544×480, and 480×480.

Frame rate

Select a desired frame rate from six kinds of rates, 59.94 Hz, 50 Hz, 29.297 Hz, 30 Hz, 25 Hz, and 24 Hz.

Aspect ratio

The set value affects “aspect_ratio_information” of the sequence header of MPEG2-Video and does not affect the actual picture size.

Audio format

The 1kHz-stereo sin waveform with a sampling speed of 48 ksps and a data rate of 256 kbps is output.

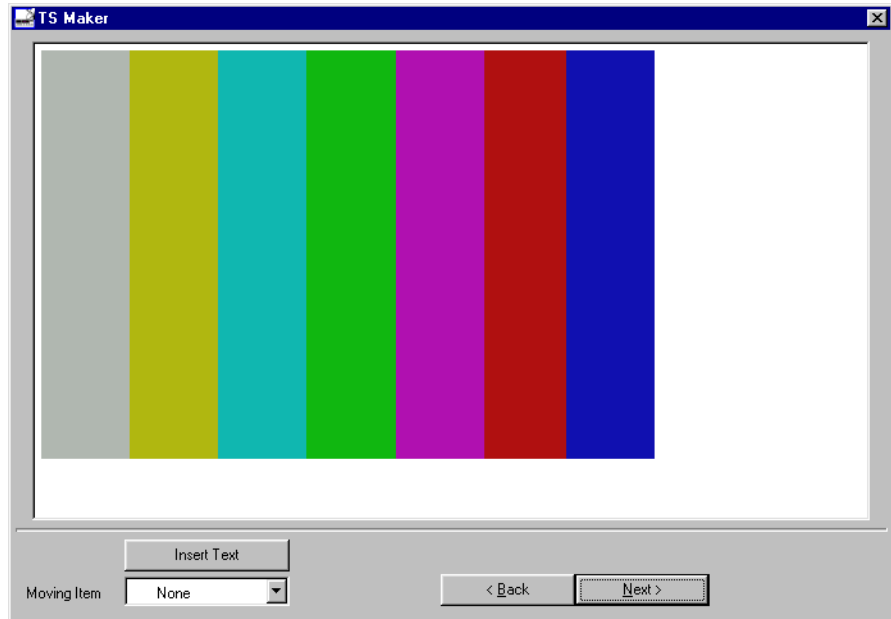
Data rate

When the GOP consists of only I picture, the data rate can be set in a range of 2 Mbps to 80 Mbps. If a low data rate is required for high-quality pictures, the GOP needs to include P and B pictures. The GOP configuration is set using “P_picture” and “B_picture” of the “vt_mpeg.rc” file. If the GOP consists of N pictures, the maximum data rate is limited to 60M/N bps. If the GOP consists of IBBPBBPBBPBBPBBP, the maximum data rate becomes 3.75 Mbps (60M/16). If the data rate is increased, the value of the quantization matrix is fixed at the value described in “vt_mpeg.rc”. The quantization scale code is adjusted to the data rate. If the data rate has an allowance, null packets are inserted. Therefore, the picture quality is not improved. When the data rate has an allowance and the picture quality needs to be improved, change the value of the quantization matrix (Matrix_X of vt_mpeg.rc). If the data rate is insufficient, the error is displayed. If this occurs, simplify the picture created in the TS, make the value of the quantization matrix larger, or configure the GOP by multiple pictures.

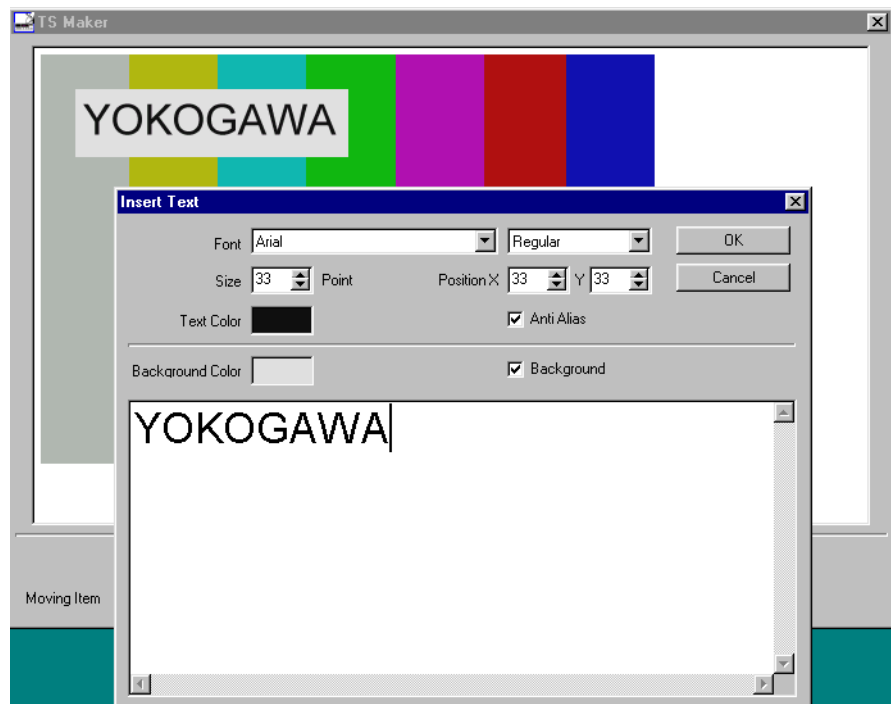
When outputting TS using the external clock, the data rate is 1/8 of the external clock frequency (if the external clock is 1 MHz, the rate would be 8 Mbps). In this case, set a data rate which is smaller than that which would be calculated by the external clock. As an estimate, set it to approximately 90%.

Procedure**Step 3 Creating TS picture data**

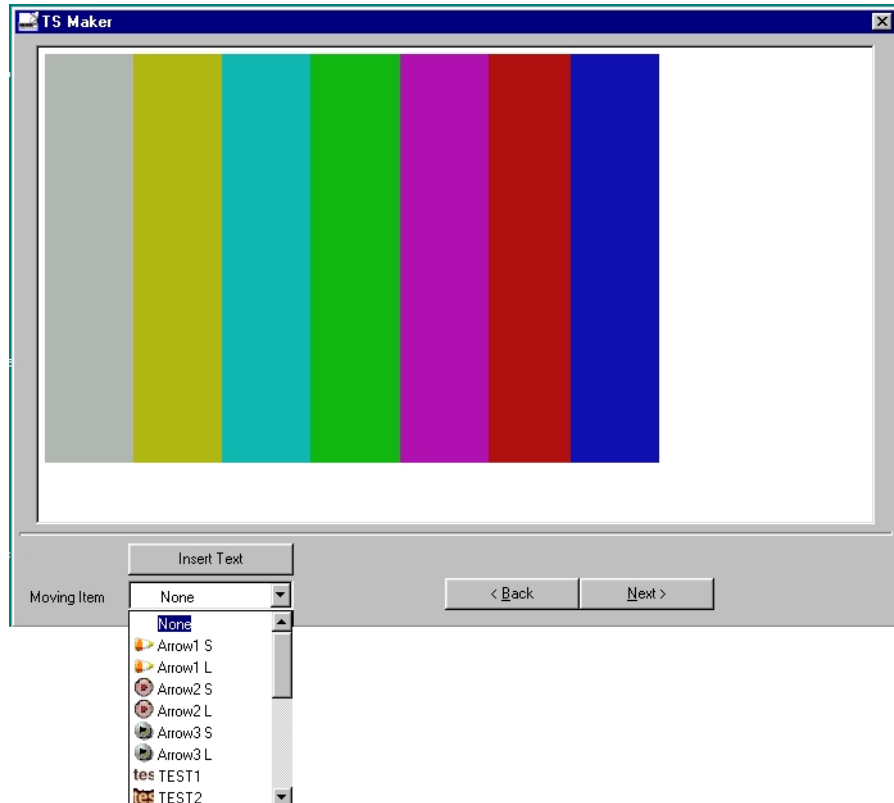
1. Click [Next] to display the picture.



2. To insert a character string, click [Insert Text].
3. Determine a font, size, color, and position of the character string.
4. To give the anti-alias effect to the characters, check on the [Anti Alias] check box.
5. When a background of the character string is required, check on the [Background] check box and determine a desired color.
6. Insert a character string.
7. Click [OK].



8. To insert a moving picture, select a desired item from the pull-down menu.



Explanation

Character color and font color

Double-click a desired character color or font color to select a desired color. In the ITU-R601 brightness scale, IRE0 to IRE00 are assigned to 16 to 235 of RGB. To put the color within this specified value, click [Create Color] to check the RGB value and select a desired color.

Additionally, when turning ON CCIR601 of the "vt_mpeg.rc" file, the levels of all pictures, characters, and moving pictures are corrected to the specified values of ITU-R601. However, if the level correction is performed with color bar 1 or color bar 2 selected for the picture, the color of the color bar may be beyond the standard value.

Font

It is possible to select only a TrueType font.

Anti-alias

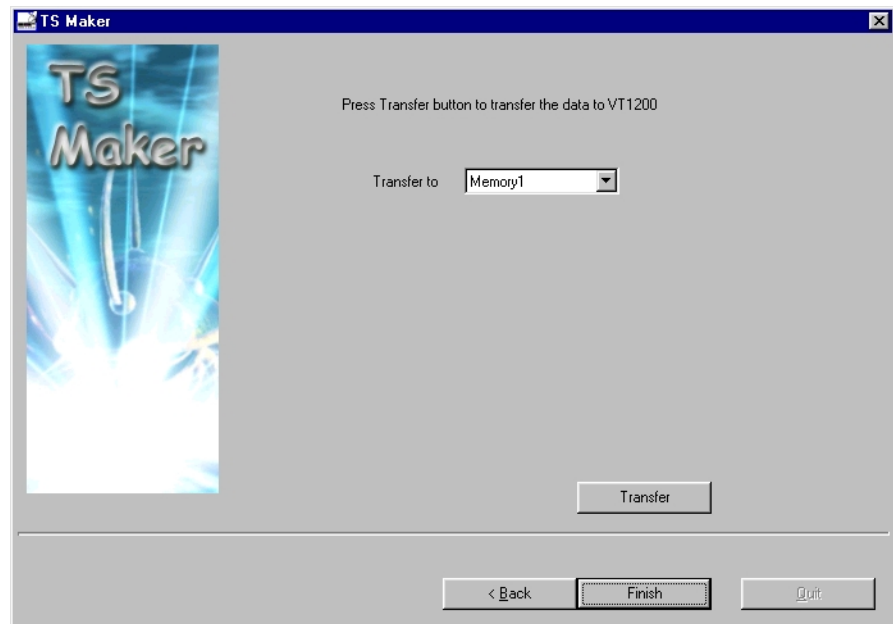
When the [Anti-Alias] check box is checked on, the jaggies on the contour of the character are improved. In the MPEG compression algorithm, this function is effective for photos, the color change of which is gentle. If the brightness or color difference is large, the contour may be blurred. The anti-alias function may also improve this blurred contour.

Insert moving picture

The moving picture is composed of four frames. If you wish to insert a originally created moving picture, contact your nearest YOKOGAWA dealer.

Procedure**Step 4 Transmitting the TS**

1. Click [Next] to display the Transmission screen.
2. Select a desired transmission destination from the pull-down menu.
3. Before transmitting the data, always press the SEL/STOP key on the VT1200/VT1220 to stop the output. (At this time, "idle" is shown on the data rate indicator.)
If the data is transmitted while the data is being output, the error is shown and the data is not transmitted correctly.
4. Click [Transmit] to start the data transmission. The transmission time may vary depending on the personal computer and/or data length.
5. When the progress bar reaches the right end, the data transmission is completed. Click [Finish].

**Explanation****Transmission destination**

Memories 1 to 7 are provided and correspond to the data No. of the VT1200/VT1220. When the data is over-written to the same memory, the previous data is cleared. It is possible to cancel the data transmission while MPEG data is being created. However, it is not possible to cancel the data transmission while the data is being transmitted.

CAUTION

The data transmission cannot be started while the TS is being output. Additionally, do not disconnect any cable or turn OFF the power switch while the data is being transmitted. Doing so may cause the contents of the TS data memory (flash ROM) to be corrupted. If the data cannot be written using TSMaker for above reason, perform the operation steps stated in section 5.2, "Preinstalling Contents."

4.4 Setting the TS in Detail

The following TS detail setup files are created in the directory where TSMaker has been installed.

- vt_mpeg.rc
- vt_setup.rc

To set the TS in detail, change these files using a text editor.

After you have changed the files, start up TSMaker to make the contents valid.

Initial Values of vt_mpeg.rc

```
#BMP/PS Converter
#Video
Size ,720*480,544*480,1920*1080,1280*720,1440*1080
,704*480,640*480,480*480,720*576
Size_Default ,720*480
Video_format ,NTSC
Interlace ,OFF
DC_accuracy ,8
CCIR601 ,OFF
#GOP_structure
P_picture ,0
B_picture ,0
#Quantiser matrix
Matrix_0 ,8 ,16 ,19 ,22 ,26 ,27 ,29 ,34
Matrix_1 ,16 ,16 ,22 ,24 ,27 ,29 ,34 ,37
Matrix_2 ,19 ,22 ,26 ,27 ,29 ,34 ,34 ,38
Matrix_3 ,22 ,22 ,26 ,27 ,29 ,34 ,37 ,40
Matrix_4 ,22 ,26 ,27 ,29 ,32 ,35 ,40 ,48
Matrix_5 ,26 ,27 ,29 ,32 ,35 ,40 ,48 ,58
Matrix_6 ,26 ,27 ,29 ,34 ,38 ,46 ,56 ,69
Matrix_7 ,27 ,29 ,35 ,38 ,46 ,56 ,69 ,83
#Audio
AudioSet, "MPEG1 Layer2",2,"MPEGAudio.dat"
#PS/TS Converter
#PID
PID_PMT ,0030H
PID_PCR ,0031H
PID_Video ,0031H
PID_Audio ,0034H
PCR_Offset ,0
PTS_DTS_Offset ,0
PTS_PCR_Gap ,0.1
#PAT
Transport_stream_id ,40F1H
Program_number ,0003H
```

Note

- The file format is CSV, in which data is separated by “,” and “CR”.
- “#” shows comments.
- If a part of the above contents is not described, the initial values are selected.
- In the current version, there are items, which cannot be changed to values other than initial values. (This ensures the expandability for the future.)

Explanation**Size**

Select a desired screen size from nine kinds of sizes, 1920×1080, 1440×1080, 1280×720, 720×576, 720×480, 704×480, 640×480, 544×480, and 480×480. Only these sizes are shown in the screen size pull-down menu of TSMaker. If you write only a desired screen size, you can prevent improper operation.

Size_Default

This setting specifies the default screen size of the pull-down menu.

Video_format

NTSC, PAL, or SECAM is selected. This setting may affect the contents of Video_format, a sequence display extension of the MPEG2 Video.

Interlace

OFF or ON is selected. This setting may affect Video_format, a sequence extension of the MPEG2 Video. Since the source picture data uses a still picture, either setting does not affect the picture coding.

If this setting is not OFF for the 720P or 480P standard, some decoders may not display correctly.

CCIR601

ON or OFF is selected. When this setting is set at ON, it is possible to correct the levels of all pictures, characters, and moving pictures to the specified values of ITU-R601. However, if the level correction is performed with color bar 1 or color bar 2 selected for the picture, the color of the color bar may be beyond the standard value.

P_picture

This setting specifies the number of P pictures within one GOP.

B_picture

This setting specifies the B picture surrounded by the I or B picture. The VT1200/VT1220 is basically applicable to creation of MPEG data containing only I pictures. The GOP including P and/or B pictures may not be replayed depending on the type of decoder. Additionally, the audio data is inserted between two GOPs, the GOP structure including P and B may not replay the audio data correctly.

When P_picture and B_picture are set to 2 and 1, respectively, one GOP consists of IBPBP.

When P_picture and B_picture are set to 0, one GOP consists of only I pictures.

When P_picture is set to 0, B_picture cannot be set to a value other than 0. The maximum number of pictures of one GOP is 31.

Matrix_0 to 7

This setting specifies the quantization matrix value in a range of 1 to 255. The initial value is the MPEG standard value. As this value is made smaller, the compression ratio is lowered.

AudioSet

"MPEG1 Layer2", 2, "MPEGAudio.dat" is described.

PID_PMT

PID of PMT is specified by 13-bit data.

PID_PCR

PID of PCR is specified by 13-bit data.

4.4 Setting the TS in Detail

PID_Video

PID of Video is specified by 13-bit data.

PID_Audio

PID of Audio is specified by 13-bit data.

PCR_Offset

This setting is set to 0.

PTS_DTS_Offset

A time difference between PTS (DTS) of Video and PCR and that between PTS (DTS) of Video and PTS of Audio are specified. PCR and PTS of Audio must be located before PTS.

The setting range is 1 to 4398046511103 (42 bits).

The unit is $\text{PTS_DTS_Offset} \times 1/27 \text{ Ms}$.

PTS_PCR_Gap

A time difference between PTS (DTS) of Video and PTS (DTS) of Audio and that between PTS (DTS) of Video and PCR are specified. The PCR becomes the reference. Additionally, the setting range is $\pm 10 \text{ s}$ and the resolution is 0.001 s.

Transport_stream_id

Transport_stream_id of PAT is specified by 16-bit data.

Program_number

Program_number of PAT and program_number of PMT are specified by 16-bit data.

Initial Values of vt_setup.rc

```
#Hardware Config
LOOP_CONTROL           ,enable
NULL_CONTROL           ,enable
PCR_PTS_SEAMLESS      ,enable
CONT_COUNT_SEAMLESS   ,enable
DVB_EDGE               ,fall
ASI_MODE               ,packet
CONT_COUNT_ERROR       ,check
SYNC_BYTE_ERROR       ,check
PAT_ERROR              ,check
TRANSPORT_ERROR       ,check
EXT_CLOCK              ,OFF
ALARM_HOLD_TIME       ,0
PAT_INTERVAL           ,0.5
```

LOOP_CONTROL

This setting is set to “enable”.

NULL_CONTROL

This setting is set to “enable”.

PCR_PTS_SEAMLESS

This setting is set to “enable”.

CONT_COUNT_SEAMLESS

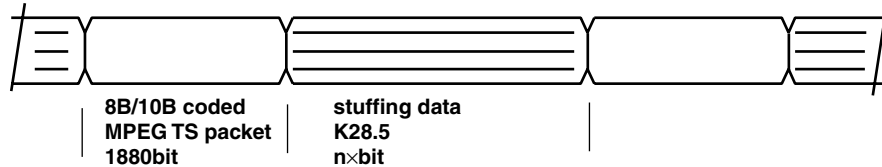
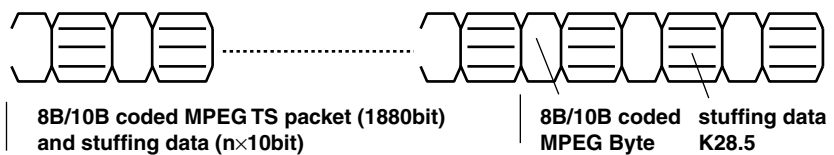
This setting is set to “enable”.

DVB_EDGE

“rise” or “fall” is described. DVB (SPI) data is output by the clock of this edge.

ASI_MODE

“packet” or “burst” is described. “packet” and “burst” are output with the layout shown in the following Fig.

Type Packet**Type brst****CONT_COUNT_ERROR**

“check” or “ignore” is described. When “check” is described, the OTHER LED on the front panel flashes for approximately 1 sec. or 1-pin and 2-pin of the CONTROL terminal are short-circuited if CONT_COUNT_ERROR occurs.

CONT_COUNT_ERROR occurs if discontinuity occurs in Continuity_counter of PAT (PID=0).

SYNC_BYTE_ERROR

“check” or “ignore” is described. When “check” is described, the SYNC_BYTE_ERROR LED on the front panel flashes for approximately 1 sec. or 1-pin and 2-pin of the CONTROL terminal are short-circuited if SYNC_BYTE_ERROR occurs.

SYNC_BYTE_ERROR occurs if the synchronization byte of the header of the TS is not “0x47”.

PAT_ERROR

PAT_ERROR occurs if any of the following three conditions arises.

- Packet with PID = “0x00” does not appear in the period set by PAT_INTERVAL.
- Table_id of the packet with PID = “0x00” is not “0x00”.
- Packet with PID = “0x00” is sent with it encrypted (Scrambling_control_field is not “00”).

TRANSPORT_ERROR

“check” or “ignore” is described. When “check” is described, the OTHER LED on the front panel flashes for approximately 1 sec. or 1-pin and 2-pin of the CONTROL terminal are short-circuited if TRANSPORT_ERROR occurs.

TRANSPORT_ERROR occurs if Transport_error_indicator of the packet is 1.

EXT_CLOCK

ON or OFF is described. When ON is described, the instrument is operated by the external clock.

In the VT1200/1220, the clock frequency input by the external clock becomes the data rate in units of bytes. The unit of the data rate displayed on the VT1200 becomes bbs (bit/s).

Therefore, when a frequency, which is 1/8 of the display, is input, this becomes equivalent to the display.

In the VT1200, it is necessary to input a value larger than the data rate. Normally, since the data rate becomes the standard value, a frequency of the external clock is determined, a value smaller than this value is set using TSMaker, and it is transmitted to the VT1200.

ALARM_HOLD_TIME

A contact output short-circuit time is specified. 0 or 1 to 255 is described. When 0 is described, the contact output is turned OFF. When 1 to 255 is selected, the contact is short-circuited for a period of ALARM_HOLD_TIME x 255 (ms).

PAT_INTERVAL

A period of PAT_ERROR is specified. The setting range is 0.002 to 8 and the resolution is 0.002 (s).

5.1 Error Messages

Error Message

If the message, "Failed to transmit the data.", appears while transmitting the TS created using TSMaker to the VT1200/VT1220, take the following actions.

If the trouble is not solved even after the following actions have been taken, please contact your nearest YOKOGAWA dealer.

1. Check that the output from the VT1200/VT1220 is stopped during data transmission.
If the output is stopped, "idle" is shown on the indicator.
2. Check that the PC PARALLEL IN terminal and the parallel port on the personal computer are connected properly.
3. If the external control terminal may be either connected or disconnected, make sure that SELECT_ is set to open.
4. If none of the conditions above apply, refer to section 5.2, "Preinstalling the Control Data" to set the defaults for the VT1200/VT1220.

Note

When performing preinstallation, the contents you have registered are cleared and the same TS as that installed when you have purchased is written.

5.2 Preinstalling Contents

In the VT1200/VT1220, the TS is written to the flash ROM to make outputting of the user's original contents possible. Not only the TS data, but also the control data are stored together into this flash ROM. If the power is turned OFF for some reason or any cable is disconnected while the data is being written into the flash ROM using TSMaker, this may cause the user's data and the control data to be corrupted, resulting in a malfunction. (When the data is written successfully and the instrument is operated as a generator, such trouble does not happen.)

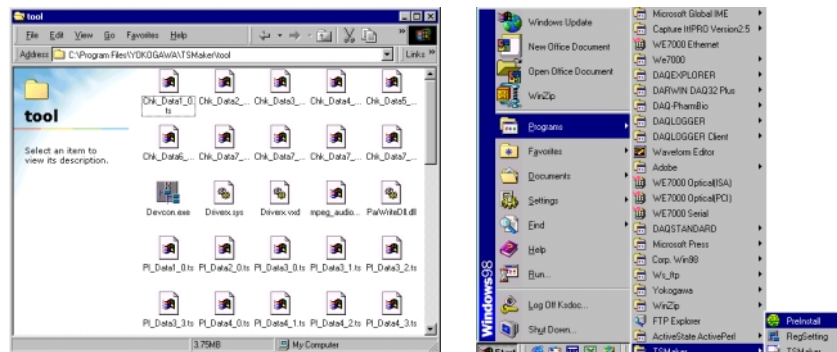
If the control data becomes incorrect, it is necessary to overwrite the control data by preinstalling the data.

Note

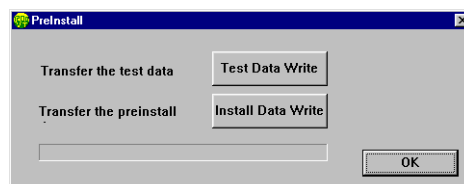
- When performing preinstallation, the contents you have registered are cleared and the same TS as that installed when you have purchased is written.
- If the instrument does not function correctly even after the above actions have been taken, please contact your nearest YOKOGAWA dealer.

Procedure

1. Connect the PC PARALLEL IN terminal and the parallel port on the computer using the Dsub-25pin cable.
2. From the directory where TSMaker has been installed (default directory is "c:\ProgramFiles\yokogawa\TSMaker\tool"), double-click "PreInstall.exe". It is also possible to select "Programs\TSMaker\PreInstall" from the Start menu.



3. Click [Install Data Write].
4. When the progress bar reaches the right end, the data transmission is completed. Click [OK].



Note

- TSMaker does not operate while something is connected to the external control terminal. You can either disconnect the terminal, or set Select_ to open.
- The Dsub-25pin cable used to connect PC PARALLEL IN terminal on the VT1200/VT2200 to the PC's parallel port is to be used for a straight connection.

5.3 Replacing the Power Fuse

WARNING

- To prevent a fire trouble, use a fuse with the specified rating (current, voltage, or type).
- Replace the fuse after the power switch has been turned OFF and the power cord has been disconnected.
- Do not make the fuse holder short-circuited.

Specified Ratings

The following shows the ratings of the power fuse used for this instrument.

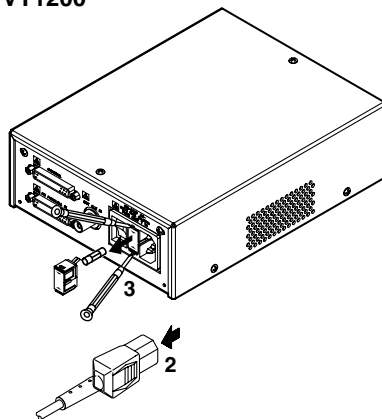
- Maximum rated voltage: 250V
- Maximum rated current: 1A
- Type: Time-lag fuse
- Standards: VDE/SEMKO/UL/CSA/SEV certification
- Part No.: A1347EF

Replacement Procedure

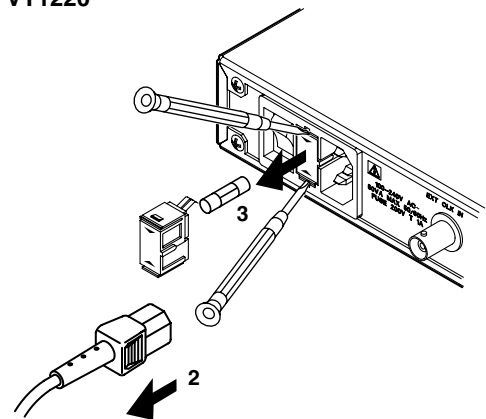
Follow the steps to replace the fuse.

1. Turn OFF the main power switch on the rear panel.
2. Disconnect the power cord from the power connector.
3. Put a slotted screwdriver on the concave part of the fuse holder on the rear panel. Raise the screwdriver with it held pressed to remove the fuse holder.
4. Remove the blown-up fuse from the top of the fuse holder.
5. Attach a new fuse to the fuse holder and mount it at the previous position.

VT1200



VT1220



6.1 Specifications

Output Signal

Item	Specifications
Output signal specification	Complied with ISO/IEC-13818-1
Data rate	Maximum 80 Mbps. (Set resolution: 1 Hz, 4-digit display)
Packet length	188/204 bytes
Number of patterns to be registered	Up to 7 patterns
Audio insertion	MPEG 1 Audio Layer 2, Sampling speed: 48 ksps., Data rate: 256 kbps., Stereo, 1 kHz Sin-wave

Signal Input/Output Format

Item	Specifications																																																								
Parallel output	Specification: Complied with DVB-SPI Output level: LVDS (DVB-A010) Connector: Dsub-25pin Pin connect: See the pin layout diagram.																																																								
ASI serial output	Specification: Complied with DVB-ASI (BS EN5083-) Mode: Packet/Burst Number of output terminals: 3 (Same TS is distributed and output.) Level: 800 mVp-p Connector: BNC (75 Ω)																																																								
ASI serial input	Specification: Complied with DVB-ASI (BS EN5083-) Mode: Packet/Burst Number of output terminals: 1 Level: 800 mVp-p Connector: BNC (75 Ω)																																																								
Through-output	Output is changed to the ASI input or built-in contents. Parallel output pin assignments <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Pin No.</th> <th>Signal name</th> <th>Pin No.</th> <th>Signal name</th> </tr> </thead> <tbody> <tr><td>1</td><td>CLKA</td><td>14</td><td>CLKB</td></tr> <tr><td>2</td><td>SYS GND</td><td>15</td><td>SYS GND</td></tr> <tr><td>3</td><td>DATA7 A</td><td>16</td><td>DATA7 B</td></tr> <tr><td>4</td><td>DATA6 A</td><td>17</td><td>DATA6 B</td></tr> <tr><td>5</td><td>DATA5 A</td><td>18</td><td>DATA5 B</td></tr> <tr><td>6</td><td>DATA4 A</td><td>19</td><td>DATA4 B</td></tr> <tr><td>7</td><td>DATA3 A</td><td>20</td><td>DATA3 B</td></tr> <tr><td>8</td><td>DATA2 A</td><td>21</td><td>DATA2 B</td></tr> <tr><td>9</td><td>DATA1 A</td><td>22</td><td>DATA1 B</td></tr> <tr><td>10</td><td>DATA0 A</td><td>23</td><td>DATA0 B</td></tr> <tr><td>11</td><td>DATA VALID A</td><td>24</td><td>DATA VALID B</td></tr> <tr><td>12</td><td>SYNC A</td><td>25</td><td>SYNC B</td></tr> <tr><td>13</td><td>NC</td><td></td><td></td></tr> </tbody> </table>	Pin No.	Signal name	Pin No.	Signal name	1	CLKA	14	CLKB	2	SYS GND	15	SYS GND	3	DATA7 A	16	DATA7 B	4	DATA6 A	17	DATA6 B	5	DATA5 A	18	DATA5 B	6	DATA4 A	19	DATA4 B	7	DATA3 A	20	DATA3 B	8	DATA2 A	21	DATA2 B	9	DATA1 A	22	DATA1 B	10	DATA0 A	23	DATA0 B	11	DATA VALID A	24	DATA VALID B	12	SYNC A	25	SYNC B	13	NC		
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Input TS Monitor

Item	Specifications
Monitor item	SyncOK Sync Byte Error PAT Error Continuity Counter Error
Display	LED display
Monitor output	Contact output

6.1 Specifications

External Interface

Item	Specifications
Contents setting	Centronics parallel
External control input	Contact input (SELECT/STOP, PLAT, or pattern selection)
Monitor output	Contact output (SyncOK or Error)
Display	LED display

General Specifications

Item	Specifications	
Basic operation	Ambient temperature	23±5°C
	Ambient humidity	55±10% RH
	Power voltage/frequency	1% of rating
	Warm-up	30 min. or longer
Storage environment	Temperature	-20 to 60°C
	Humidity	20 to 85% RH * No condensation allowed.
Operating environment	Temperature	5 to 40°C
	Humidity	20 to 85% RH * No condensation allowed.
Rated power voltage	100 to 120 VAC, 200 to 240 VAC (automatic switching)	
Allowable range of power voltage variation	90 to 264 VAC	
Rated power voltage frequency	50 or 60 Hz	
Allowable range of power frequency variation	48 to 63 Hz	
Maximum power consumption	50 VA	
Withstanding voltage	1.5 kVAC, for 1 min.	
Insulation resistance	500 VDC, 10 MΩ or more	
Outside dimensions	VT1200	Approximately 163 (W) × 67 (H) × 218 (D) mm
	VT1220	Approximately 430 (W) × 44 (H) × 250 (D) mm
Weight	VT1200	Approximately 2.0 kg
	VT1220	Approximately 3.0 kg

Index

A

ALARM_HOLD_TIME	4-16
ASI_MODE	4-15
Aspect ratio	4-8
Audio format	4-8
AudioSet	4-13

B

B_picture	4-13
-----------------	------

C

CCIR601	4-13
CONT_COUNT_ERROR	4-15
CONT_COUNT_SEAMLESS	4-14

D

DVB_EDGE	4-15
Data rate	4-8

E

EXT_CLOCK	4-16
External Clock	3-5
External Control Terminal	3-8

F

Frame rate	4-8
------------------	-----

G

General Handling Precautions	2-1
------------------------------------	-----

I

Installation Condition	2-2
Installing TSMaker	4-2
Interlace	4-13

L

LOOP_CONTROL	4-14
--------------------	------

M

Matrix_0 to 7	4-13
---------------------	------

N

NULL_CONTROL	4-14
--------------------	------

P

PAT_ERROR	4-15
PAT_INTERVAL	4-16
PCR_Offset	4-14
PCR_PTS_SEAMLESS	4-14
PID_Audio	4-14
PID_PCR	4-13
PID_PMT	4-13
PID_Video	4-14
PTS_DTS_Offset	4-14
PTS_PCR_Gap	4-14
P_picture	4-13
Program_number	4-14

R

Required PC System	4-1
--------------------------	-----

S

SYNC_BYTE_ERROR	4-15
Safety Precautions	2-1
Screen size	4-8
Size	4-13
Size_Default	4-13