MX370106A
DVB-T/H IQproducer™
Operation Manual

Seventh Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the MG3700A Vector Signal Generator Operation Manual (Mainframe), or MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe). Please also refer to them before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Document No.: M-W2798AE-7.0

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This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MX370106A
DVB-T/H IQproducer™
Operation Manual

27 June 2006 (First Edition)
12 June 2026 (Seventh Edition)

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Revision History:

February 29th, 2020
December 17th, 2021
March 11th, 2024

Cautions Against Computer Virus Infection

- Copying files and data
  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
  All other required files should be transferred by means of USB flash drive or CompactFlash media after undergoing a thorough virus check.
- Adding software
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
  Ensure that the network has sufficient anti-virus security protection in place.
- Protection against malware (malicious software such as viruses).
  This equipment runs on Windows Operating System.
  To connect this equipment to network, the following is advised.
  - Activate Firewall.
  - Install important updates of Windows.
  - Use antivirus software.

Protection Against Computer Virus Infections

Prior to the software installation

Before installing this software or any other software recommended or approved by Anritsu, run a virus scan on your computer, including removable media (e.g. USB flash drive and CF memory card) you want to connect to your computer.

When using this software and connecting with the measuring instrument

- Copying files and data
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  - Files and data provided by Anritsu
  - Files created by this software
  - Files specified in this document

  Before copying these files and/or data, run a virus scan, including removable media (e.g. USB flash drive and CF memory card).
- Connecting to network
  Connect your computer to the network that provides adequate protection against computer viruses.
- Protection against malware (malicious software such as viruses).
  To connect your computer to network, the following is advised.
  - Activate Firewall.
  - Install important updates of Windows.
  - Use antivirus software.

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This software may not operate normally if any of the following operations are performed on your computer:

- Simultaneously running any software other than that recommended or approved by Anritsu
- Closing the lid (Laptop computer)
- Turning on the screen saver function
- Turning on the battery-power saving function (Laptop computer)

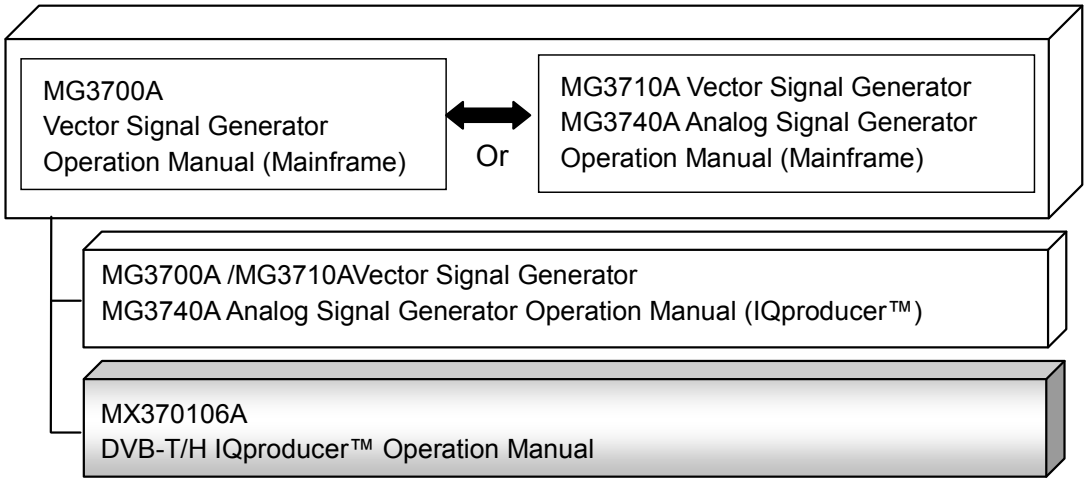
For how to turn off the functions, refer to the operation manual that came with your computer.

About This Manual

■Associated Documents

The operation manual configuration of the MX370106A DVB-T/H IQproducer™ is shown below.

■If using MG3700A or MG3710A:



- MG3700A Vector Signal Generator Operation Manual (Mainframe)

This describes basic operations, maintenance procedure, and remote functions of the MG3700A Vector Signal Generator.

Or

- MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

This describes basic operations, maintenance procedure, and remote functions of the MG3710A Vector Signal Generator and the MG3740A Analog Signal Generator.

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)

This describes the functions and how to use the IQproducer, which is Windows software for the Vector Signal Generator and the Analog Signal Generator..

- DVB-T/H IQproducer™ Operation Manual (This document)

This describes basic operations and functions of the DVB-T/H IQproducer™.

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IV.

Chapter 1 Overview

This chapter provides an overview of the MX370106A DVB-T/H IQproducer™

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1.1 Product overview

MX370106A DVB-T/H IQproducer™ (hereinafter referred to as "this software") is software used to generate waveform patterns conforming to the ETSI EN 300 744 V1.5.1 (2004-11) standard physical layers specifications.

This software requires either of the following environment:

- MG3710A Vector Signal Generator
- Personal computer (hereinafter, "PC")

This software generates waveform patterns that support the specifications of ETSI EN 300 744 V1.5.1 (2004-11) with various characteristics. This is made possible by the editing/customizing of parameters according to its use.

A waveform pattern created by this software can be output using an RF signal after being downloaded into the MG3700A Vector Signal Generator, or MG3710A Vector Signal Generator (collectively referred to as "mainframe", or "this equipment").

1.2 Product Composition

The following table lists the model name and specifications of this software according to the equipment.

Table 1.2-1 Restrictions

Mainframe / Restrictions	MG3700A	MG3710A
Software name	MX370106A	
Maximum Size of Waveform Patterns	256 M sample 512 M sample*1	64 M sample 128 M sample*3 256 M sample*4 512 M sample*5
Transmission method of Waveform Patterns	LAN, CompactFlash Card	External device such as LAN, USB memory*2
Installation of this software to this equipment	N/A	Possible

*1: The ARB memory expansion 512M sample (optional) must be installed into the MG3700A to use waveform patterns that exceed 256 M samples.

*2: Transferring waveform patterns is not required if the waveform patterns are created on the equipment using this software.

*3: The Combination of Baseband Signal (optional) must be installed into the MG3710A to use waveform patterns of maximum 128 M samples.

*4: The ARB memory expansion 256M sample (optional) must be installed into the MG3710A to use waveform patterns of maximum 256 M samples.

*5: To use waveform patterns of maximum 512 M samples, either of the following must be installed into MG3710A:

- ARB memory expansion 1024 M sample (optional)
- ARB memory expansion 256 M (optional) and Combination of Baseband Signal (optional)

■Notes on waveform pattern conversion

The waveform patterns generated with this software varies according to the main unit type. If using the waveform pattern to the different main unit, you need to convert the waveform pattern.

For details about how to convert a waveform pattern, see Section 4.5 “File Conversion on Convert Screen” in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).

Chapter 2 Preparation

This chapter describes the operating environment for the MX370106A.

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2.1 Operating Environment

The following environment is required for operating the MX370106A.

(1) PC that meets the following conditions

OS	Windows XP/Windows Vista/Windows 7/ Windows 10/Windows 11
CPU	Pentium III 1 GHz equivalent or faster
Memory	512 MB or more
Hard disk space	5 GB or more free space in the drive where this software is to be installed. The free hard disk space necessary to create waveform pattern varies depending on the waveform pattern size. The free disk space of 27 GB or greater is required to create four maximum (512 Msample) waveform patterns.

(2) If viewing on PC, displays with a resolution of 1024 × 768 pixels are best viewed using a small font setting.

2.2 Installation/Uninstallation

This software is included in the IQproducer™ installer. It is automatically installed by installing the IQproducer™ that is supplied with this equipment or this software. When using a waveform pattern created using this software in the equipment, the license file must be installed in advance.

■ Installing/Uninstalling IQproducer™

Refer to section 2 “Installation/Uninstallation” in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).

■ Installing/Uninstalling IQproducer™ license file

For how to install license file to MG3700A/MG3710A, refer to the following manual:

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  5.1 “Installing License File”

For how to uninstall license file from MG3700A/MG3710A, refer to each one of the following manuals:

- MG3700A Vector Signal Generator Operation Manual (Mainframe)
  3.10.10 “Install”
- MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)
  9.4.4 “Install”

2.3 Starting up and exiting the software

This section explains how to start and stop this software.

Note:

The following explanation assumes the use of Windows XP. The screen image may differ slightly if not using Windows XP.

2.3.1 Starting Software: When installed on PC

Start this software using the following procedure.
The example assumes that it is a PC operation.

<Procedure>

1. Click **Start** on the task bar, and point to **All Programs**. Next, point to **Anritsu Corporation**, point to **IQproducer**, and then click **IQproducer**.

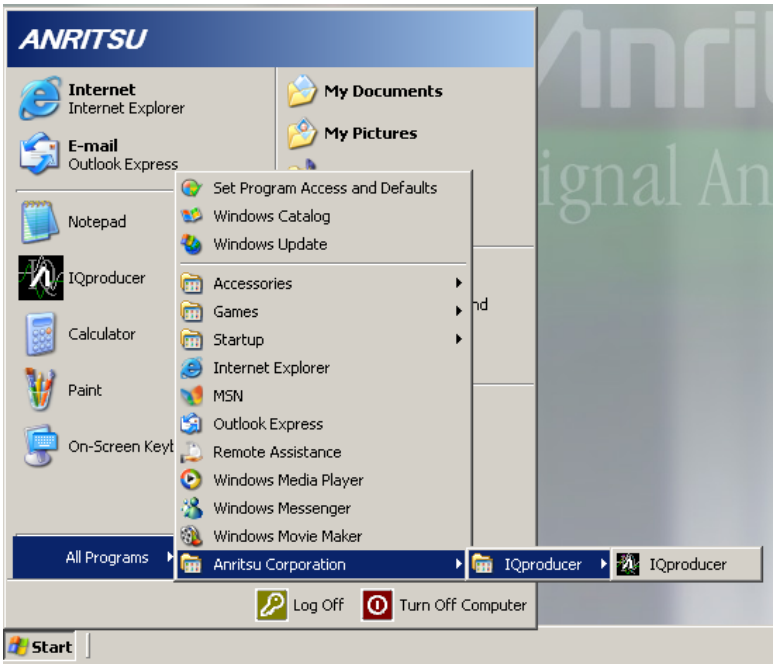

Figure 2.3.1-1 Program selection screen

2. When IQproducer™ starts, the **Select instrument** screen is displayed.

   This **Select instrument** screen is used to select either MG3700A, or MG3710A. This following explanation assumes that you have selected **MG3700**.

Figure 2.3.1-2 Select Instrument Screen

Notes:

- This software does not support MS269xA, MS2830A, and MG3740A.
- To hide this screen and to start with the selected mainframe's screen from the next time, select the **Don't show this window next time** check box.

3. The common platform screen is displayed when **OK** is clicked in the **Select instrument** screen.

   The common platform screen is a screen used to select each function of the IQproducer™.

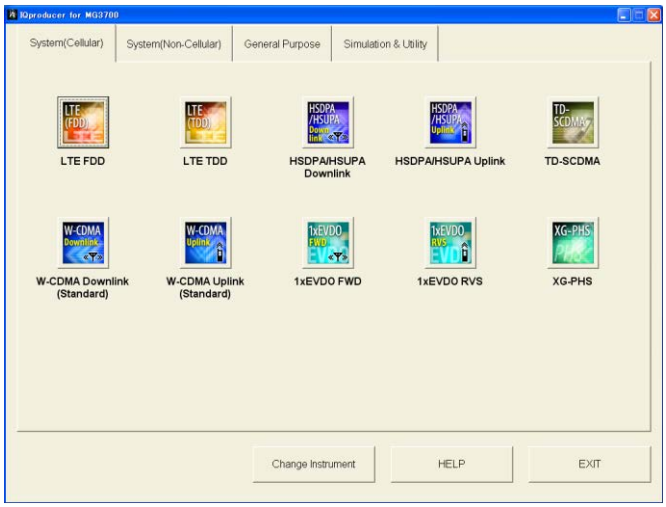

Figure 2.3.1-3 Common Platform Screen

4. Click the **System (Non-Cellular)** tab on the common platform screen, to show the **System (Non-Cellular)** selection screen that supports each telecommunication system.

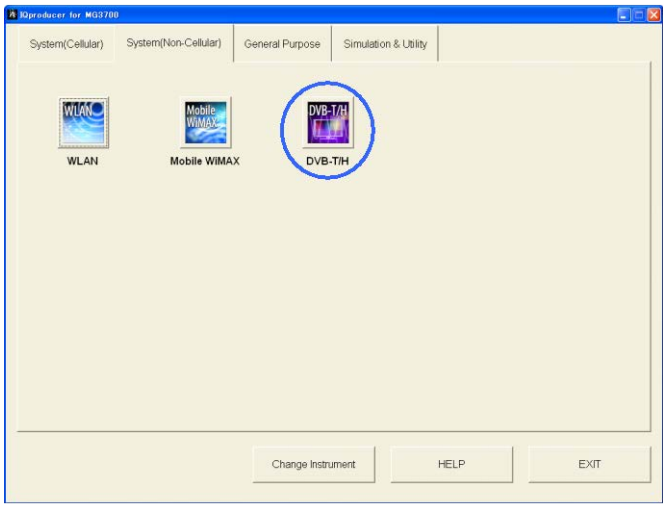

Figure 2.3.1-4 System (Non-Cellular) Selection Screen

5. Click **DVB-T/H** to display the main screen. For details of the main screen, refer to Chapter 3 "Detailed Description of Functions".

Note:

If **Change Instrument** is clicked, the **Select instrument** screen will appear each time the software is loaded.

2.3.2 Starting Software: When installed on MG3710A

Start this software using the following procedure.

<Procedure>

1. Press IQpro on the MG3710A front panel to display the common platform screen.

   The common platform screen is a screen used to select each function of the IQproducer™.

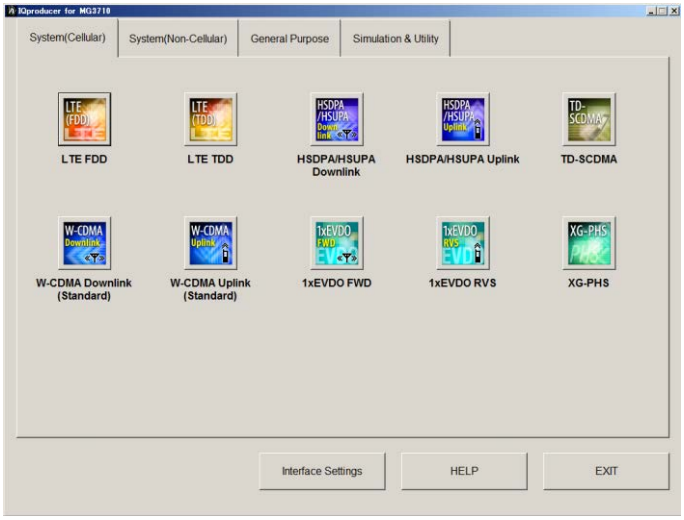

Figure 2.3.2-1 Common Platform Screen

2. Click the **System (Non-Cellular)** tab on the common platform screen, to show the **System (Non-Cellular)** selection screen that supports each telecommunication system.

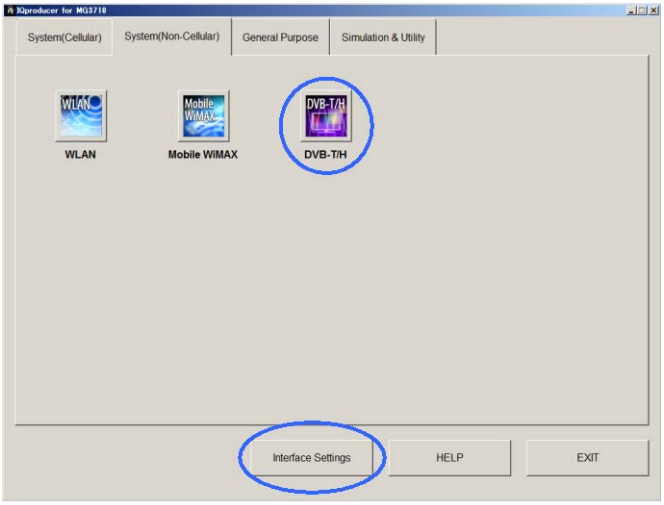

Figure 2.3.2-2 System (Non-Cellular) Selection Screen

3. Click **DVB-T/H** to display the main screen. For details of the main screen, refer to Chapter 3 “Detailed Description of Functions”.

Note:

When this software is installed on MG3710A, **Change Instrument** displays instead of **Interface Settings**. Clicking **Interface Settings** displays the Interface Setting dialog box.

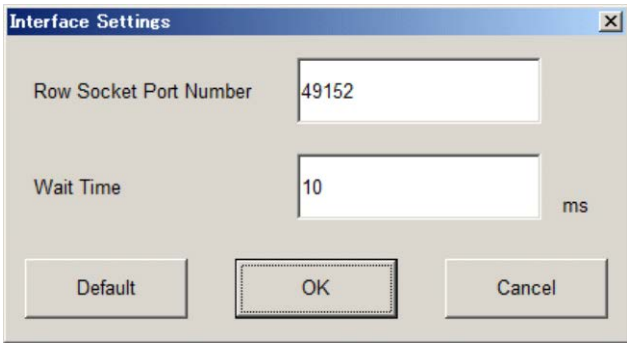

Figure 2.3.2-3 Interface Settings Dialog Box

Here, you can configure interface-related settings of IQproducer and MG3710A. To return to factory defaults, click **Default**.

- Row Socket Port Number

  Sets Row Socket port number. Set the same value as that for MG3710A.

- Wait Time

  Sets the wait time between commands.

2.3.3 Exiting Software

Stop this software using the following procedure.

■ When exiting only this software

To exit only this software without closing the Common Platform screen, or other IQproducer™ tools, do one of these below:

- Click the Exit button ( ) on the tool bar.
- Select Exit from the File menu.
- Click the button on the upper right screen.

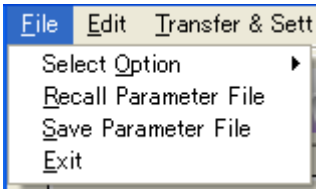

Figure 2.3.3-1 Exiting Software

The operation of the three screen buttons is explained below.

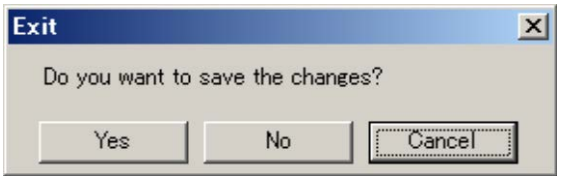

Figure 2.3.3-2 Exit Confirmation Window

- **Yes** Saves current parameters to file and stops this software.
- **No** Stops this software without saving current parameters to file.
- **Cancel** or Cancels the process and returns to the main screen.

When stopping this software using the **Yes** button, the saved parameters are read at the next start and reset for each parameter.

■ When exiting entire IQproducer™ application

To exit all tools of IQproducer™ that are running, select **Exit** on the Common Platform Screen. In this case, a dialog is displayed to confirm stopping of each running tool.

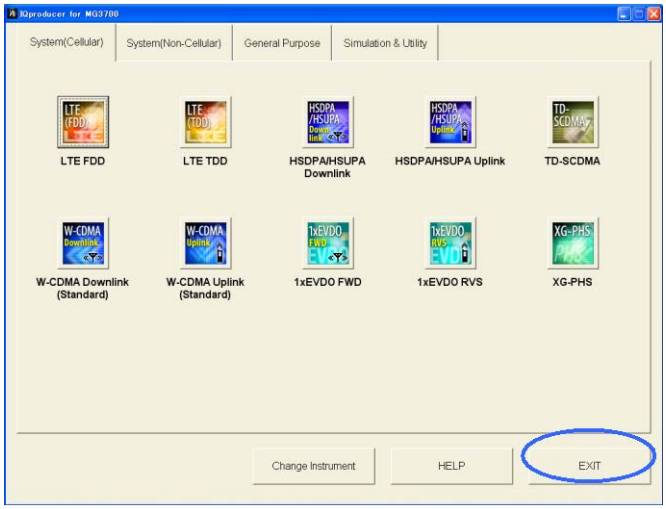

Figure 2.3.3-3 Exiting IQproducer™

Chapter 3 Detailed Description of Functions

This chapter provides detailed descriptions of this software.

Notes:

- The examples and screens used throughout this chapter are based on the assumption that the IQproducer™ is activated with the MG3700A.
- The MG3710A functions are described as notes in each item.

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3.1 Composition of Setting Dialog Box

On common platform screen, select the **System (Non-Cellular)** tab, and then select **DVB-T/H** to display the setting dialog box.

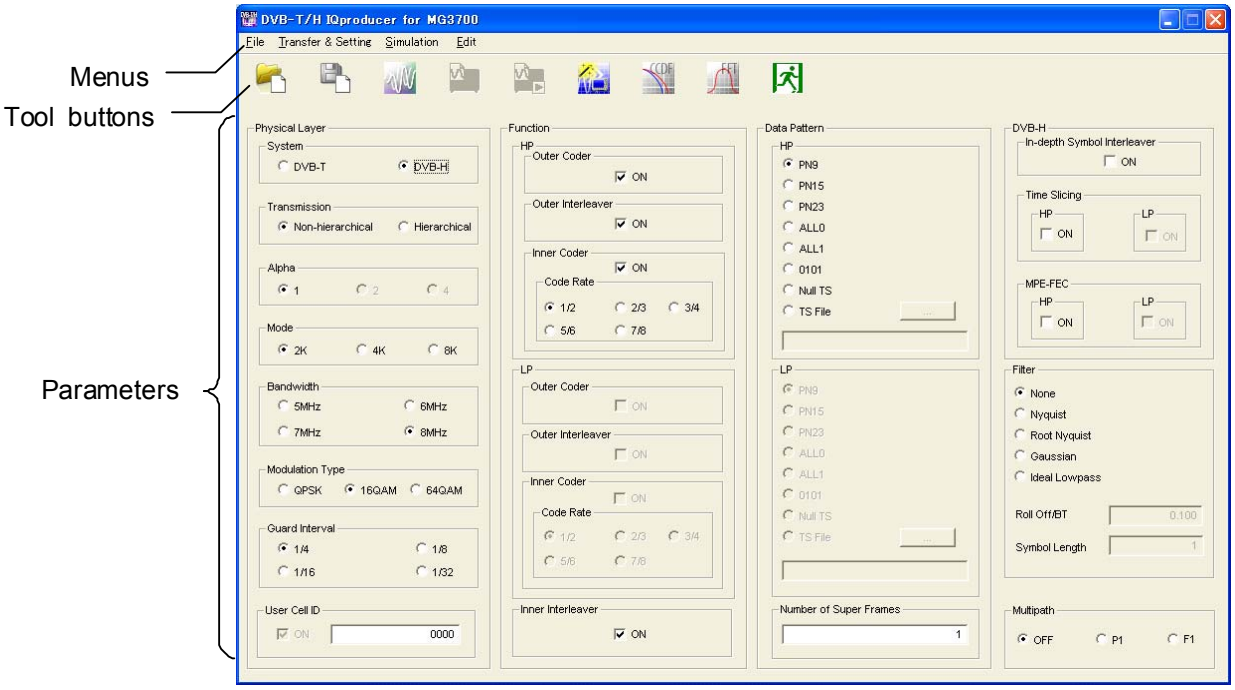

Figure 3.1-1 DVB-T/H setting dialog box

3.1.1 Menus and tool buttons

The menus and tool buttons on the DVB-T/H setting dialog box are described in detail below.

■ The **[File]** menu contains the following menu items.

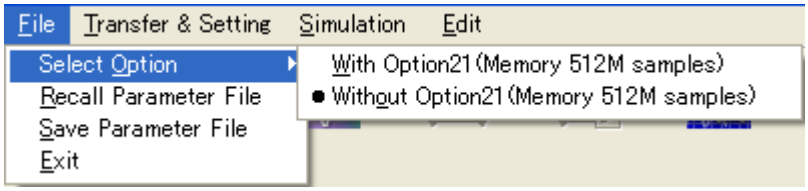

Figure 3.1.1-1 Menu items in File menu

- **Select Option**

■ When using MG3700A

Select whether the ARB memory expansion option 256Msamples is installed. Selecting **With Option21 (Memory 512M samples)** supports creation of larger waveform patterns. If the ARB memory expansion option is not installed, the generated waveform pattern may not be able to be used. Waveform patterns cannot be created with a size greater than 256Msamples when **Without Option21 (Memory 512M samples)** is selected. Select either according to the presence of ARB memory expansion option.

Table 3.1.1-1 Available Options for MG3700A

Items	ARB Memory Expansion
With Option21 (Memory 512M samples)	1 GB x 2 memory
Without Option21 (Memory 512M samples):	512 MB × 2 Memories

■ When using MG3710A

The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable.

Set the combination of installed options based on the following setting items.

Table 3.1.1-2 Available Options for MG3710A

Items	Combinations of Options
Memory 64M samples	None
Memory 64M samples × 2	Option48 and Option 78
Memory 256M samples	Option45 or Option 75
Memory 256M samples × 2	Option 45 and Option 48 or Option 75 and Option 78
Memory 1024M samples	Option46 or Option 76
Memory 1024M samples × 2	Option 46 and Option 48 or Option 76 and Option 78

The maximum size of the generated waveform pattern for each of the setting items is shown below.

Table 3.1.1-3 Waveform Pattern Maximum Size

Items	Maximum Size
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option48, 78)	512M samples
Memory 1024M samples	512M samples
Memory 1024M samples × 2 (With Option48, 78)	512M samples

- **Recall Parameter File**

  Loads the parameter files saved by the **[Save Parameter File]** menu. Loading and using a parameter file facilitates parameter setting.

- **Save Parameter File**

  Saves setting parameters to a file.

- **Exit**

  Exits from this software.

■ The **[Transfer &Setting]** menu contains the following menu item.

Figure 3.1.1-2 Menu item in Transfer Setting menu

- **Transfer & Setting Wizard**
  Displays the Transfer & Setting Wizard window. In this window, a series of operations, including connection between a PC and the MG3700A/MG3710A, waveform pattern transfer to the MG3700A/MG3710A internal hard disk, and waveform pattern loading from the hard disk to an arbitrary waveform memory are performed.

■ The **[Simulation]** menu contains the following menu items.

Figure 3.1.1-3 Menu items in Simulation menu

- **CCDF**
  Displays the CCDF Graph Monitor window. In this window, the CCDF of a generated waveform pattern is displayed in a graph.

- **FFT**
  Displays the FFT Graph Monitor window. In this window, the FFT-processed spectrum of a generated waveform pattern is displayed in a graph.

■ The **[Edit]** menu contains the following menu item.

Figure 3.1.1-4 Menu items in Edit menu

- **Calculation**

  Generates a waveform pattern after parameters are set.

- **Calculation & Load**

  Note:

  This function is available only when this software is used on MG3710A.

  After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.

- **Calculation & Play**

  Note:

  This function is available only when this software is used on MG3710A.

  After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.

- The Tool buttons contains the following menu item.

  Note:

  Calculation & Load and Calculation & Play are available only when this software is used on MG3710A.

Recall Parameter File

Save Parameter File

Calculation

Calculation & Load

Calculation & Play

Transfer & Setting Wizard

CCDF

FFT

Exit

Clicking a tool button operates the same as the corresponding commands in the menu.

3.1.2 Parameter details

The parameters on the DVB-T/H setting dialog box are described in detail below.

System

[Function] Sets the system.

[Default] DVB-H

[Setting range] DVB-T, DVB-H

[Remarks] Parameter setting is restricted as follows when DVB-T is selected.

Mode:	4K cannot be set.
Bandwidth:	5 MHz cannot be set.
In-depth Symbol Interleaver:	Disabled (fixed to OFF).
MPE-FEC:	Disabled (fixed to OFF).
Time Slicing:	Disabled (fixed to OFF).

Parameter setting is restricted as follows when DVB-H is selected.

User Cell ID:	Fixed to ON.

Transmission

[Function] Sets the hierarchy setting.

[Default] Non-hierarchical

[Setting range] Non-hierarchical, Hierarchical

[Remarks] Parameter settings are restricted as follows when Non-hierarchical is selected.

Alpha:	Disabled for 2, 4 (fixed to 1).
Data Pattern:	Disabled for LP.
Outer Coder:	Disabled for LP.
Outer Interleaver:	Disabled for LP.
Inner Coder:	Disabled for LP.
Code Rate:	Disabled for LP.
Time Slicing:	Disabled for LP.
MPE-FEC:	Disabled for LP.

Parameter setting is restricted as follows when Hierarchical is selected.

Modulation Type:	Cannot be set to QPSK.

Alpha

[Function] Sets the value of α.

[Default] 1

[Setting range] 1, 2, 4

[Remarks]

Mode

[Function] Sets the number of OFDM subcarriers.

[Default] 2K

[Setting range] 2K, 4K, 8K

[Remarks] Parameter setting is restricted as follows when 8 K is set.
In-depth Symbol Interleaver: Disabled (fixed to OFF).

Bandwidth

[Function] Sets the bandwidth.

[Default] 8MHz

[Setting range] 5MHz, 6MHz, 7MHz, 8MHz

[Remarks]

Modulation Type

[Function] Selects the modulation type.

[Default] 16QAM

[Setting range] QPSK, 16QAM, 64QAM

[Remarks]

Guard Interval

[Function] Selects the guard interval.

[Default] 1/4

[Setting range] 1/4, 1/8, 1/16, 1/32

[Remarks]

User Cell ID

[Function] Sets the cell ID.

[Default] ON (0000)

[Setting range] ON (0000 to FFFF), OFF

[Remarks] Set the cell ID in hexadecimal format.

Outer Coder

[Function] Sets the Outer Coder.

[Default] ON (for HP), OFF (for LP)

[Setting range] ON, OFF

[Remarks] This parameter is always set to OFF when Outer Interleaver is set to OFF.
When Transmission is set to Hierarchical, the Outer Coder setting for HP applies to that for LP, and vice versa.

Outer Interleaver

[Function] Sets the Outer Interleaver.

[Default] ON (for HP), OFF (for LP)

[Setting range] ON, OFF

[Remarks] This parameter is always set to OFF when Inner Interleaver is set to OFF.
This parameter is always set to ON when Outer Coder is set to ON.
When Transmission is set to Hierarchical, the Outer Interleaver setting for HP applies to that for LP, and vice versa.

Inner Coder

[Function] Sets the Inner Coder.

[Default] ON (for HP), OFF (for LP)

[Setting range] ON, OFF

[Remarks] This parameter is always set to OFF when Inner Interleaver is set to OFF.
This parameter is always set to ON when Outer Interleaver is set to ON.
When Transmission is set to Hierarchical, the Inner Coder setting for HP applies to that for LP, and vice versa.
Code Rate is disabled when this parameter is set to OFF.

Code Rate

[Function] Selects the encoding ratio.

[Default] 1/2 (for both HP and LP)

[Setting range] 1/2, 2/3, 3/4, 5/6, 7/8

[Remarks]

Inner Interleaver

[Function] Sets the Inner Interleaver.

[Default] ON

[Setting range] ON, OFF

[Remarks] This parameter is always set to ON when Inner Coder is set to ON.
The following restriction applies when set to OFF:
In-depth Symbol Interleaver is disabled (fixed to OFF).

Data Pattern

[Function] Selects the data pattern.

[Default] PN9 (for both HP and LP)

[Setting range] PN9, PN15, PN23, ALL0, ALL1, 0101, Null TS, TS File

[Remarks] When this parameter is set to Null TS or TS File for HP or LP, be sure to apply the same setting for the other (LP or HP).
When setting a pattern other than Null TS and TS File (PN9, PN15, PN23, ALL0, ALL1, and 0101), any combination can be set between HP and LP.
When TS File is selected, a created TS (Transport Stream: binary data in which image data and voice data are multiplexed) data file can be loaded. Click the Browse button on the right of the TS File radio button to select a file to be loaded.
TS data consists of two or more packets (1 packet = 188 bytes). The first byte of each packet is the Sync Byte, and is always 47 (hexadecimal). If a file that does not satisfy this TS data format is selected and the Calculation button ( ) is clicked, an error message will be displayed.
The Sync Byte is also added to PN9, PN15, PN23, ALL0, ALL1, and 0101 data patterns when Outer Coder, Outer Interleaver, Inner Coder, and Inner Interleaver are all set to ON. At this time, the last data in a packet and the data following the Sync Byte in the next packet are continuous as shown in Figure 3.1.2-1 below.

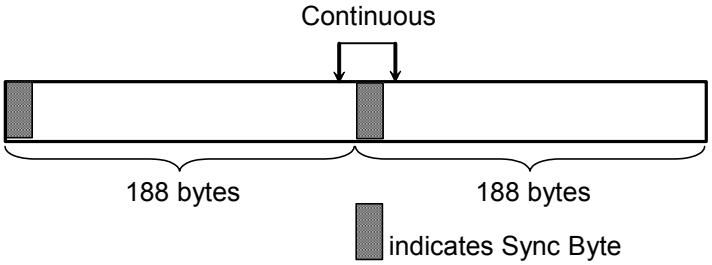

Figure 3.1.2-1 Continuity between packets

Number of Super Frames

[Function] Sets the number of super frames.

[Default] 1

[Setting range] 1 to 384

[Remarks] The setting range varies depending on the Select Option and Mode settings, as shown in the table below.

Table 3.1.2-1 Maximum Number of Super Frames for MG3700A

Select Option	Mode	Maximum Number of Super Frames
With Option21 (Memory 512Msamples)	2K	384
	4K	192
	8K	96
Without Option21 (Memory 512Msamples)	2K	192
	4K	96
	8K	48

Table 3.1.2-2 Maximum Number of Super Frames for MG3710A

Select Option	Mode	Maximum Number of Super Frames
Memory 64M samples	2K	48
	4K	24
	8K	12
Memory 64M samples x2 (With Option48,78)	2K	96
	4K	48
	8K	24
Memory 256M samples	2K	192
	4K	96
	8K	48
Memory 256M samples x2 (With Option48,78)	2K	385
	4K	192
	8K	96
Memory 1024M samples	2K	385
	4K	192
	8K	96
Memory 1024M samples x2 (With Option48,78)	2K	385
	4K	192
	8K	96

The length of data selected by Data Pattern is adjusted to the number of super frames set by this parameter.
When TS File is selected for Data Pattern, the data processing method varies depending on the set TS File data size and the set number of super frames.
When the TS File data size is greater than the data size equivalent to the set number of super frames, the TS File data loading is canceled midstream.
On the other hand, when the TS File data size is smaller, the same TS File data is loaded again from the beginning.

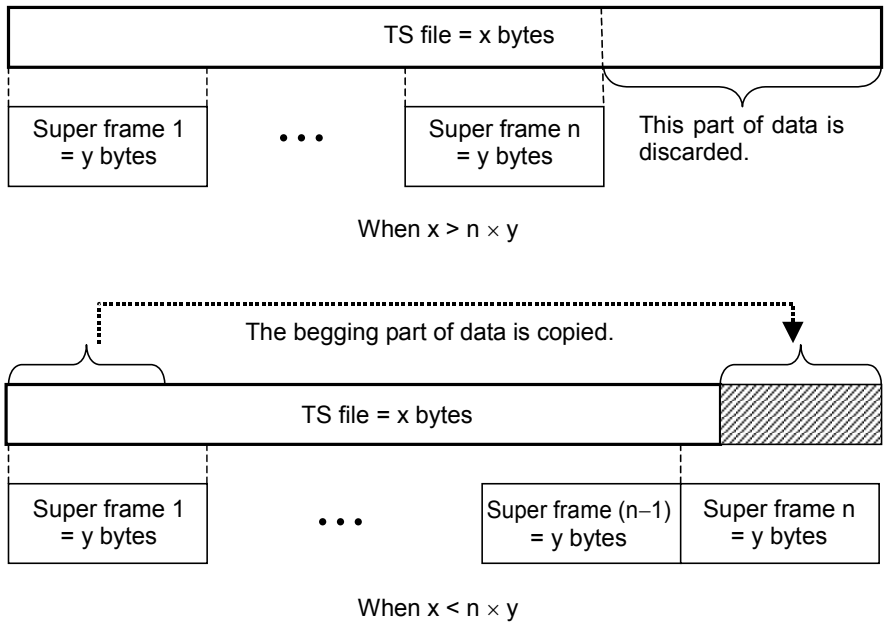

Figure 3.1.2-2 TS file loading

In-depth Symbol Interleaver

[Function] Sets the In-depth Symbol Interleaver.
[Default] OFF
[Setting range] ON, OFF
[Remarks]

Time Slicing

[Function] Sets the time slicing.
[Default] OFF (for both HP and LP)
[Setting range] ON, OFF
[Remarks] The 49th bit of the TPS data is set to 1 when this parameter is set to ON.
When TS File is selected for Data Pattern, be sure to select a TS file for which Time Slicing has been processed.

MPE-FEC

[Function] Sets the MPE-FEC.
[Default] OFF (for both HP and LP)
[Setting range] ON, OFF
[Remarks] The 50th bit of the TPS data is set to 1 when this parameter is set to ON.
When TS File is selected for Data Pattern, be sure to select a TS file for which MPE-FEC has been processed.

Filter

[Function] Selects the filter type.
[Default] None
[Setting range] None, Nyquist, Root Nyquist, Gaussian, Ideal Lowpass
[Remarks] The settings of RollOff/BT and Symbol Length are invalid when None or Ideal Lowpass is selected.
If the set filter greatly reduces the signal band, the obtained output level may be lower than the level set for the MG3700A/MG3710A.

Roll Off/BT

[Function] Sets the roll off rate and BT product.
[Default] 0.100
[Setting range] 0.100 to 1.000
[Remarks] Set this parameter when Nyquist, Root Nyquist, or Gaussian is selected for Filter.

Symbol Length

[Function] Sets the filter length of the filter coefficient.

[Default] 1

[Setting range] 1 to 1023

[Remarks] Set this parameter when Nyquist, Root Nyquist, or Gaussian is selected for Filter.
This parameter is fixed to 1 when None is selected for Filter, and fixed to 1023 when Ideal Lowpass is selected.

Multipath

[Function] Sets the multipath.

[Default] OFF

[Setting range] OFF, P1, F1

[Remarks]

3.1.3 Exporting waveform pattern

How to export a waveform pattern is described below.

When the required parameters are set, select **[Calculation]** from the **[Edit]** menu or click the tool button to display the Export File dialog box shown in Figure 3.1.3-1.

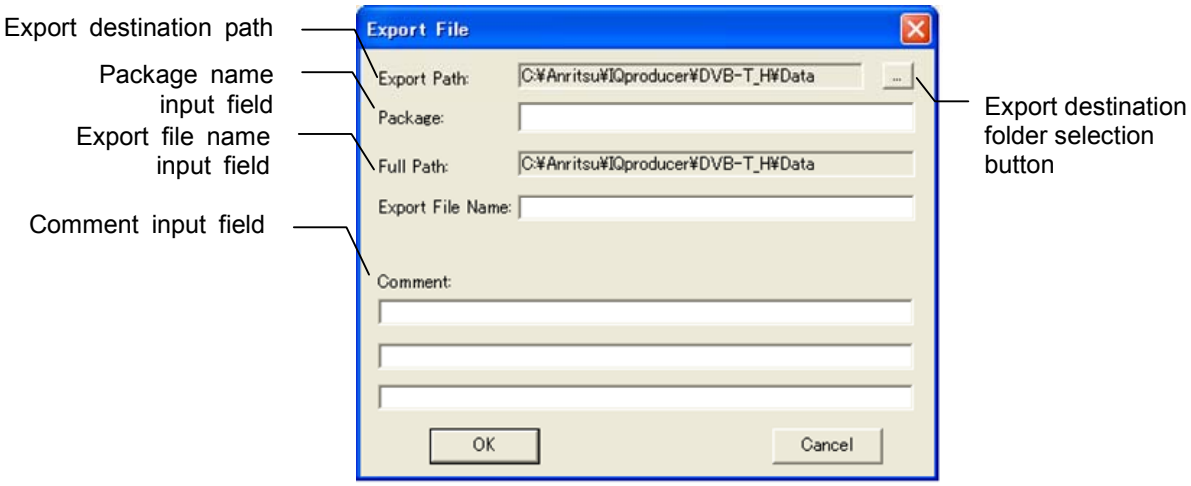

Figure 3.1.3-1 Export File dialog box

Clicking the export destination folder selection button displays the Browse for Folder dialog box shown in Figure 3.1.3-2. The export destination folder can be selected from this screen.

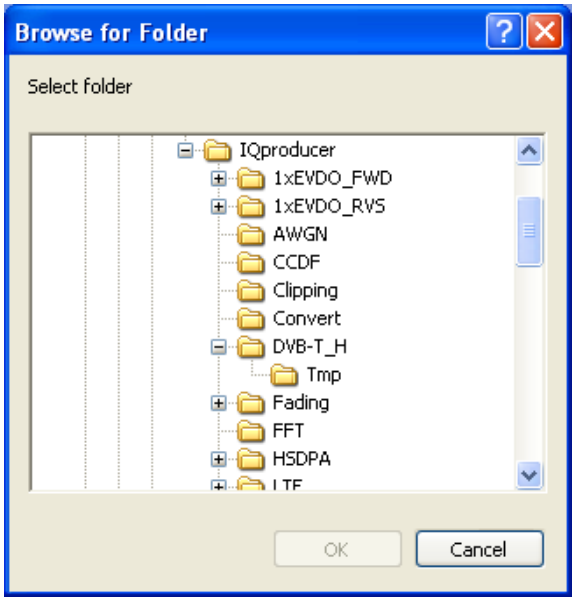

Figure 3.1.3-2 Browse for Folder dialog box

When the export destination folder is not specified, waveform pattern files are saved in the following directory:
X:\IQproducer\DVB-T_H\Data
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)

Only 1-byte alphanumeric characters and the following symbols can be used for package names and file names.
! % & ( ) + = ' { } _ - ^ @ [ ]

The text input in the comment input field will be displayed in the Comment field on the MG3700A/MG3710A window. The comment input field can also be left blank.

All the parameters except for comments are mandatory. Confirm that all the necessary parameters are set, and then click the **[OK]** button to start waveform pattern generation.

3.1.4 Calculation screen

Clicking **Calculation & Load**, **Calculation & Play**, or the **OK** button on the Export File dialog box will start the waveform generation.

The Calculation screen is displayed while a waveform pattern is being generated. On this screen, the progress bar is displayed indicating the generation process of the waveform pattern and the progress of the waveform pattern generation. The generation of the waveform pattern can be stopped by clicking Cancel. When cancelled, it returns to the main screen.

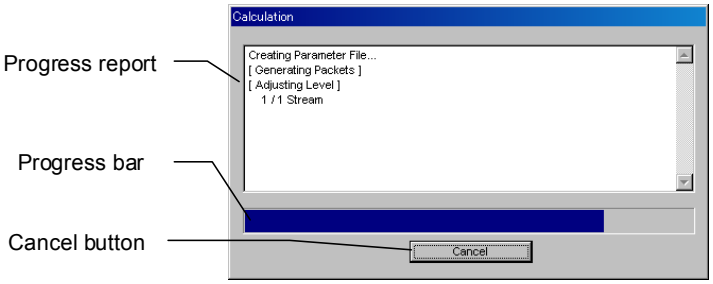

Figure 3.1.4-1 Calculation Screen (In Progress)

After waveform pattern generation is finished, the message "Calculation Completed." is displayed in the progress window and the **Cancel** button changes to the **OK** button.

When the generation is complete, you can return to the setting screen by clicking the **OK** button. After waveform generation, two files with .wvi and .wvd extension are output.

If the data exceeds the maximum waveform amplitude value (8191), the excess data is clipped. If this happens, the message "Clipping was done." is shown at the completion of calculation.

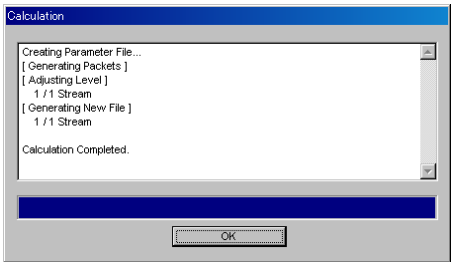

Figure 3.1.4-2 Calculation Screen (Completed)

Note:

When using this software on MG3710A, and selecting **Calculation & Load** or **Calculation & Play**, the waveform generation ends without displaying the above screen.

3.1.5 Calculation & Load

Note:

This function is available only when this software is used on MG3710A.

When **Calculation & Load** is selected, the Load Setting screen will display after waveform generation.

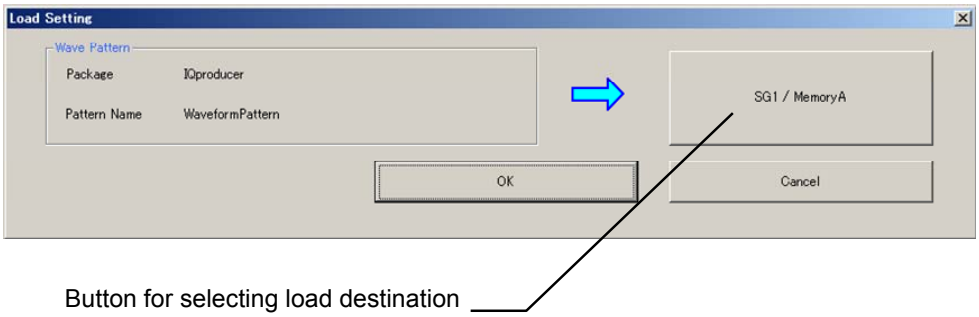

Figure 3.1.5-1 Load Setting Screen

The Select Memory screen will display after clicking the load destination in the Load Setting screen.

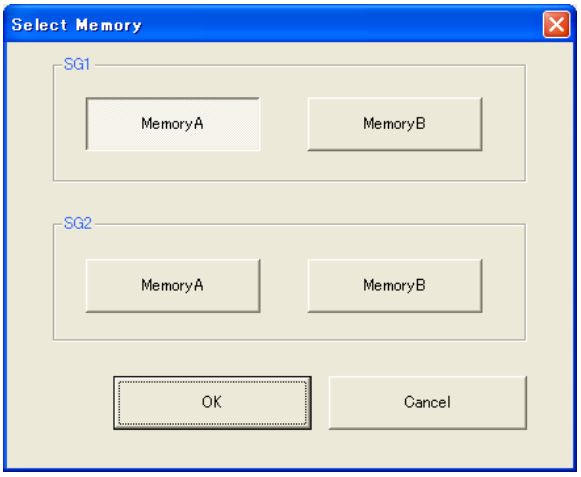

Figure 3.1.5-2 Select Memory Screen

After selecting the load destination of generated waveform in the Select Memory screen and clicking the **OK** button, the Load Setting screen will be shown again. Click the **OK** button in the Load Setting screen, and then the loading of waveform starts.

Note:

To exit this screen without loading the waveform pattern, click the **Cancel** button in the Load Setting screen.

3.1.6 Calculation & Play

Note:

This function is available only when this software is used on MG3710A.

When **Calculation & Play** is selected, after waveform creation is completed, the created waveform is loaded into memory, selected and output.

When the 2nd Vector Signal Generator (option) is installed, the Select SG screen is displayed before the start of waveform generation. This screen is used to select the signal generator for outputting the created waveform pattern.

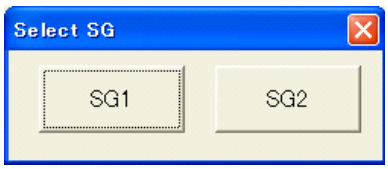

Figure 3.1.6-1 Select SG Screen

3.1.7 Saving/loading parameters

Numeric values and settings for parameters can be saved into a parameter file by using this software.

Saving a parameter file

When running on PC

1. Select **[Save Parameter File]** from the **[File]** menu or click the tool button to display the Save As dialog box.

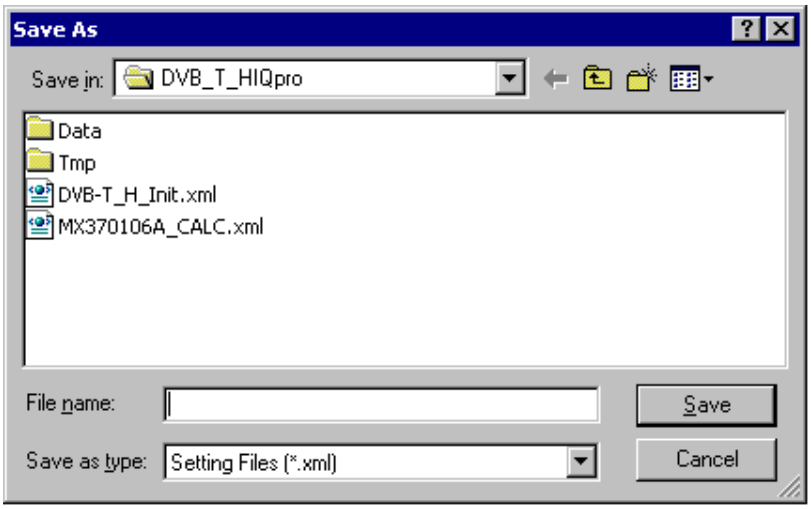

Figure 3.1.7-1 Parameter file save dialog box (Save As)

2. Specify the file saving destination folder in the **[Save in]** field and enter a file name into the **[File name]** text box. Next, click the **[Save]** button to save the parameter file.

   When the file saving destination folder is not selected, the parameter file is named in the format *specified file name*.xml, and saved into the following folder.
   X:\IQproducer\DVB-T_H\
   "X:\IQproducer" indicates the folder where the IQproducer™ is installed.

When running on MG3710A

1. Click the **[Save Parameter File]** button in **[File]** menu or click the button to display the parameter file saving screen.

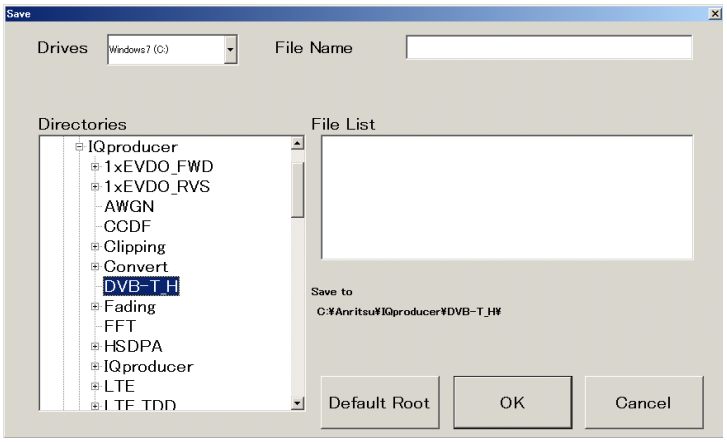

Figure 3.1.7-2 Parameter file save dialog box (Save As) (MG3710A)

2. Select the folder to store the file in the **[Directories]** field, and then enter the name of the file using the **[File Name]** box. Click **[OK]** to save the parameter file.
   To initialize the setting in the **[Directories]** field, click the **[Default Root]** button.

Loading a parameter file

When running on PC

1. Select **[Recall Parameter File]** from the **[File]** menu or click the tool button to display the Open dialog box.

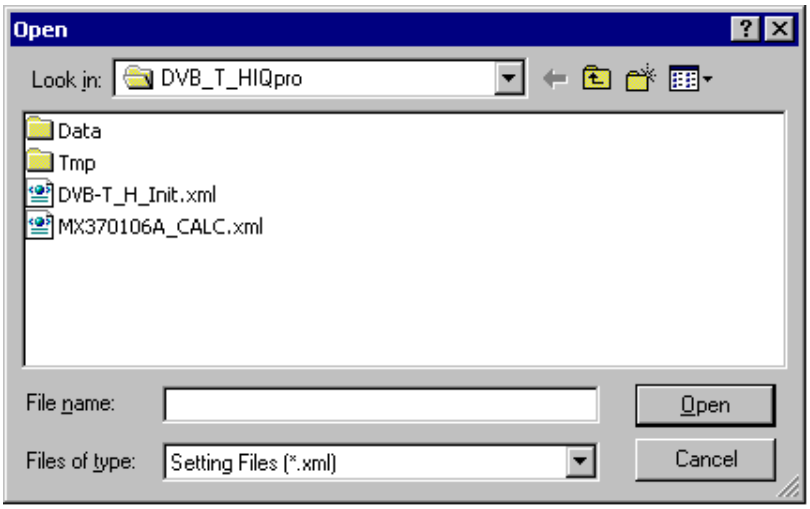

Figure 3.1.7-3 Parameter file loading dialog box (Open)

2. Click a parameter file to be loaded into the file list, and then click the **[Open]** button to load the selected parameter file.

When running on MG3710A

1. Select **[Recall Parameter File]** from the **[File]** menu or click the tool button to display the parameter file reading screen.

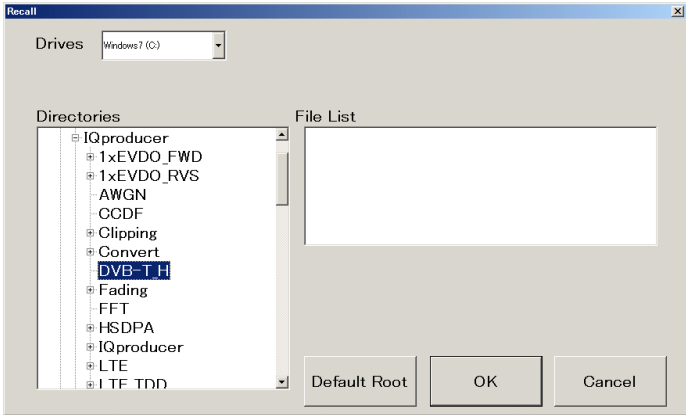

Figure 3.1.7-4 Parameter file loading dialog box (Open) (MG3710A)

2. Select the directory where the files to be loaded is stored in the **[Directories]** field. Click the desired file from the **[File List]**, and click **[OK]**. To initialize the setting in the **[Directories]** field, click the **[Default Root]** button.

3.1.8 Displaying graph

The generated waveform pattern can be displayed in a CCDF or FFT graph by using this software. Refer to Sections 4.3 “CCDF Graph Display” and 4.4 “FFT Graph Display” in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™) for details on the graph display.

Displaying the CCDF graph

1. Select **[Calculation]** from the **[Edit]** menu or click the tool button to generate a DVB-T/H waveform pattern.
2. Select **[CCDF]** from the **[Simulation]** menu or click the tool button. The CCDF Graph Monitor window shown in Figure 3.1.8-1 is displayed with the trace of the generated waveform pattern.

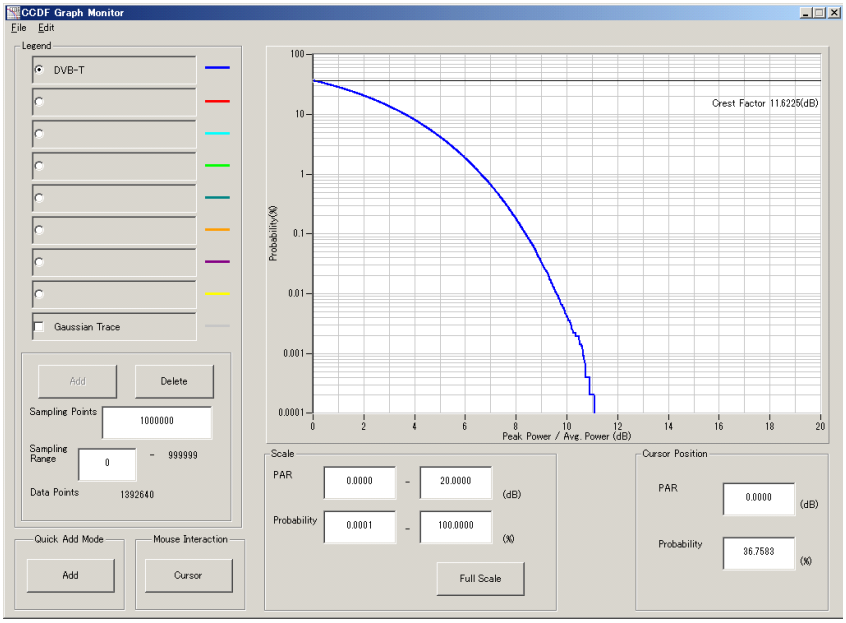

Figure 3.1.8-1 CCDF Graph Monitor window

When another waveform pattern is generated by changing parameters and executing “Calculation” while the previous traces are displayed in the CCDF Graph Monitor window, the trace of the waveform pattern newly generated can be displayed by either of the following two methods:

- Displaying the new trace in the same window together with the previous trace
- Deleting the previous traces to display the new trace

Note:

A CCDF graph and an FFT graph cannot be generated simultaneously. When displaying a CCDF graph while an FFT graph is displayed, execute the CCDF graph generation after FFT graph generation has completed.

■ When displaying a new trace in the same window with the previous traces:

1. Set **[Add]** for **[Quick Add Mode]** on the lower-left of the CCDF Graph Monitor window.
2. Select **[CCDF]** from the **[Simulation]** menu or click the tool button. The trace of the waveform pattern newly generated is additionally displayed in the CCDF Graph Monitor window.
   Up to eight traces can be displayed by repeating this procedure.

■ When deleting the previous traces to display a new trace:

1. Set **[Clear]** for **[Quick Add Mode]** on the lower-left of the CCDF Graph Monitor window.
2. Select **[CCDF]** from the **[Simulation]** menu or click the tool button. At this time, the confirmation message shown in Figure 3.1.8-2 appears:

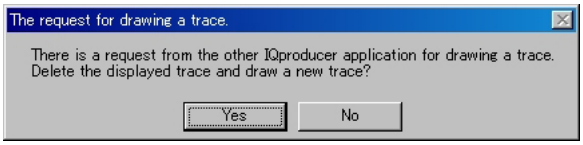

Figure 3.1.8-2 Confirmation message

Click the **[Yes]** button. The previous traces are then deleted from the CCDF Graph Monitor window, and the trace of the newly generated waveform pattern is displayed.

Displaying the FFT graph

1. Select **[Calculation]** from the **[Edit]** menu or click the tool button to generate a DVB-T/H waveform pattern.
2. Select **[FFT]** from the **[Simulation]** menu or click the tool button. The FFT Graph Monitor window shown in Figure 3.1.8-3 is displayed with the trace of the generated waveform pattern.

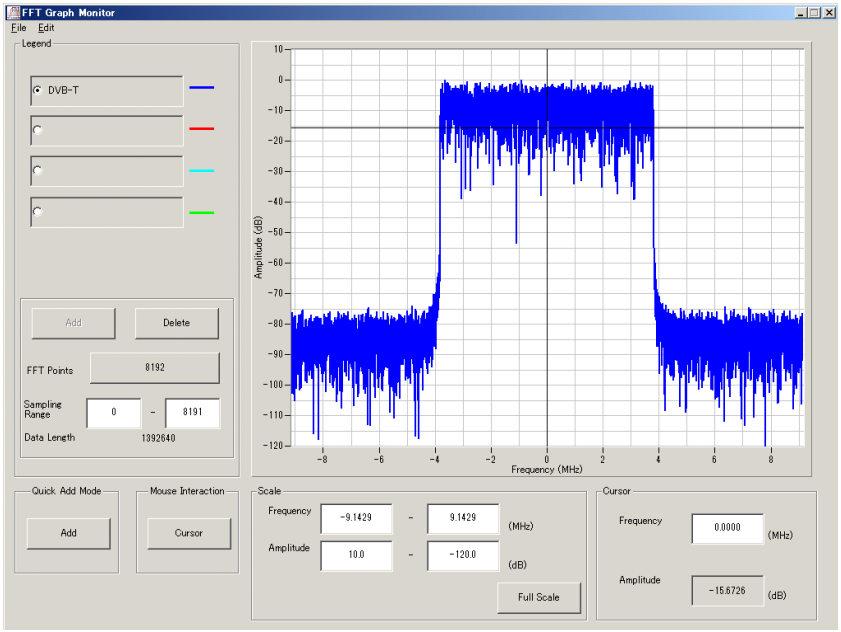

Figure 3.1.8-3 FFT Graph Monitor window

When another waveform pattern is generated by changing parameters and executing "Calculation" while the previous traces are displayed in the FFT Graph Monitor window, the trace of the waveform pattern newly generated can be displayed by either of the following two methods:

- Displaying the new trace in the same window together with the previous traces
- Deleting the previous traces to display the new trace

Note:

An FFT graph and a CCDF graph cannot be generated simultaneously. When displaying an FFT graph while a CCDF graph is displayed, execute the FFT graph generation after CCDF graph generation has completed.

■ When displaying a new trace in the same window with the previous traces:

1. Set **[Add]** for **[Quick Add Mode]** on the lower-left of the FFT Graph Monitor window.
2. Select **[FFT]** from the **[Simulation]** menu or click the tool button. The trace of the waveform pattern newly generated is additionally displayed in the FFT Graph Monitor window.
   Up to four traces can be displayed by repeating this procedure.

■ When deleting the previous traces to display a new trace:

1. Set **[Clear]** for **[Quick Add Mode]** on the lower-left of the FFT Graph Monitor window.
2. Select **[FFT]** from the **[Simulation]** menu or click the tool button. At this time, the confirmation message shown in Figure 3.1.8-4 appears:

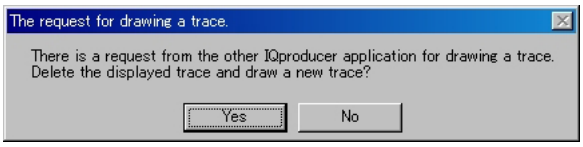

Figure 3.1.8-4 Confirmation message

Click the **[Yes]** button. The previous traces are then deleted from the FFT Graph Monitor window, and the trace of the newly generated waveform pattern is displayed.

3.1.9 Outputting auxiliary signal

When a waveform pattern generated by this software is selected by the MG3700A/MG3710A, markers synchronizing with the RF signal are output from the the MG3700A/MG3710A, as an auxiliary signal.

- Super Frame Clock
  A pulse synchronizing with the first symbol of the super frame is output. The signal polarity can be changed by changing the polarity for Marker 1.

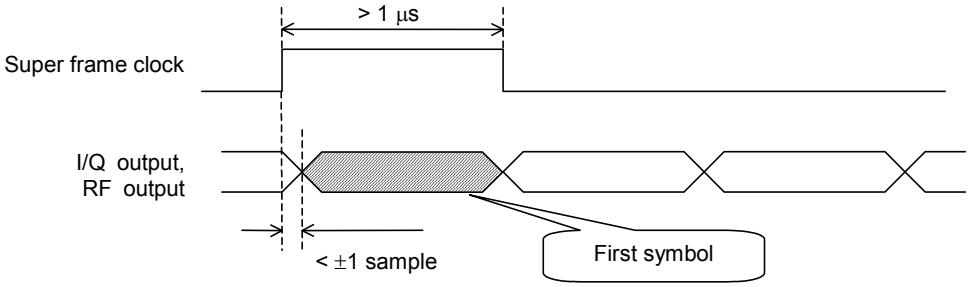

Figure 3.1.9-1 Super frame clock output timing

The following connectors output marker signal.

■ MG3700A
Marker signal is output from the rear panel connector(s).

Table 3.1.9-1 MG3700A Marker Signal

Marker Signal	Connector
Super Frame Clock	Connector1

■ MG3710A
Marker signal is output from the rear panel connector(s).
Output signal changes according to the MG3710A setting as below.

Table 3.1.9-2 MG3710A Marker Signal

Marker Signal	Output SG	Waveform memory	Signal name
Super Frame Clock	SG1	Memory A	SG1 Marker1 A
		Memory B	SG1 Marker1 B
	SG2	Memory A	SG2 Marker1 A
		Memory B	SG2 Marker1 B

For how to configure marker signal and connector, refer to 7.4.2 “Route Output Connectors” in MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe).

3.2 Waveform Pattern Generating Procedure

The waveform pattern generation procedure is provided below, taking a DVB-H waveform pattern as an example.

<Procedure>

1. Start up the DVB-T/H IQproducer™.
2. Set the parameters according to the following table.

Parameter	Setting
System	DVB-H
Transmission	Non-hierarchical
Alpha	1 (fixed)
Mode	4K
Bandwidth	7MHz
Modulation Type	16QAM
Guard Interval	1/32
User Cell ID	ON (fixed), FFFF
Outer Coder	ON (HP)
Outer Interleaver	ON (HP)
Inner Coder	ON (HP)
Code Rate	7/8 (HP)
Inner Interleaver	ON
Data Pattern	Null TS (HP)
Number of Super Frames	10
In-depth Symbol Interleaver	ON
Time Slicing	ON (HP)
MPE-FEC	ON (HP)
Filter	None
Multipath	OFF

3. Select **[Calculation]** from the **[Edit]** menu or click the tool button to display the Export File dialog box.
4. Specify the file export destination folder, package name, and file name in the Export File dialog box. Next, click the **[OK]** button to start the waveform pattern generation.
5. The Calculation window is then displayed. When “Calculation Completed” is displayed, click the **[OK]** button to close the Calculation window.
6. Confirm that a waveform pattern file with the specified name and the extension “wvi” or “wvd” is generated in the folder specified in Step 4.

3.3 Functional Block for Generating DVB Signals

This software processes DVB-T/H physical layers as shown in Figure 3.3-1 "Signal generation block diagram" below.
The data selected by Data Pattern is input to MPEG-TS in Figure 3.3-1 when Outer Coder, Outer Interleaver, Inner Coder, and Inner Interleaver are all set to ON.
When Outer Coder, Outer Interleaver, Inner Coder, or Inner Interleaver is set to OFF, the parameters prior to that are automatically set to OFF. In this event, the data selected by Data Pattern is input to the corresponding position in Figure 3.3-1 as follows, according to the parameter set to OFF.

- When Outer Coder is set to OFF: A
- When Outer Interleaver is set to OFF: B
- When Inner Coder is set to OFF: C
- When Inner Interleaver is set to OFF: D

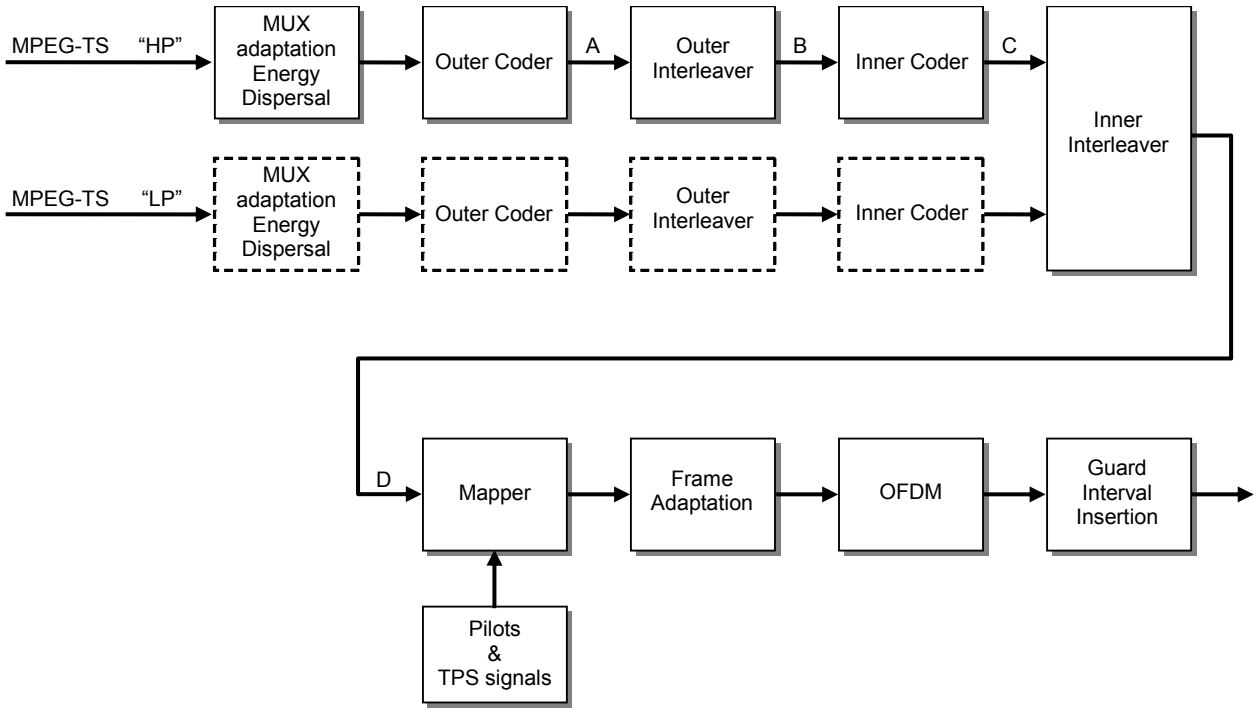

Figure 3.3-1 Signal generation block diagram

Chapter 4 How to Use Waveform Patterns

The following operations are required to output a modulated signal from this equipment using the waveform pattern generated by this software:

- Transferring waveform pattern to internal hard disk
- Loading waveform patterns from the hard disk to the waveform memory
- Selecting a waveform pattern to be output from this equipment

This chapter explains the details of these operations.

4.1 For MG3700A or MG3710A 4-2
4.1.1 Transferring waveform pattern to internal hard disk 4-2
4.1.2 Loading to Waveform Memory 4-4
4.1.3 Selecting Waveform Pattern 4-5

4.1 For MG3700A or MG3710A

This section describes how to download a waveform pattern created for the MG3700A/MG3710A to the hard disk of the MG3700A/MG3710A and output the pattern.

4.1.1 Transferring waveform pattern to internal hard disk

The waveform pattern created with this software can be transferred to the internal hard disk in the following ways:

Note:

This operation is not necessary if you are using MG3710A and have generated waveform patterns on MG3710A.

For MG3700A

- LAN
- CompactFlash Card

For MG3710A

- LAN
- External device such as USB Memory

■Transferring from PC via LAN (MG3700A, MG3710A)

Two IQproducer™ tools can be used to transfer a waveform pattern to the MG3700A/MG3710A via a LAN.

- Transfer & Setting Wizard
  Start this wizard by clicking the **Transfer & Setting Wizard** button of this software or by selecting **Simulation & Utility** tab → **Transfer & Setting Wizard** from the IQproducer™ after creating a waveform pattern. For details, refer to Section 4.7 "File Transfer and Loading to Memory Using Transfer & Setting Wizard" in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).
  Transferring a waveform pattern to the internal hard disk of the MG3700A/MG3710A, loading the waveform from the hard disk to the waveform memory, and then outputting the waveform pattern can be done using this wizard.

- Transfer & Setting Panel
  This function is loaded by selecting **Transfer & Setting Panel** in the **Simulation & Utility** tab of the IQproducer™. For details, refer to Section 5.2 "Transferring Waveform Pattern" in the MG3700A/MG3710A MG3740A Analog Signal Generator Operation Manual IQproducer™.
  Specify the folder that contains the waveform pattern to transfer to the MG3700A/MG3710A in the PC-side tree of **Transfer & Setting Panel**.

■Transferring using a CF card (MG3700A)

Copy the waveform pattern (***.wvi and ***.wvd files) to be downloaded to the MG3700A to the root directory of a CF card.

Insert the CF card into the card slot on the front panel of the MG3700A, and then copy the file to the hard disk. For details about how to use a CF card to transfer a waveform pattern, refer to (1) Loading waveform file in memory in Section 3.5.2 of the MG3700A Vector Signal Generator Operation Manual (Mainframe).

■Transferring via external device such as USB memory (MG3710A)

For details about how to transfer a waveform pattern created using this software to the hard disk of the MG3710A, refer to Section 7.3.6 "Copying external waveform pattern: Copy" in the "MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)".

4.1.2 Loading to Waveform Memory

To output a modulated signal using a waveform pattern, it is necessary to load the waveform pattern that was transferred to the internal hard disk of the MG3700A/MG3710A (described in Section 4.1.1 "Transferring waveform pattern to internal hard disk") to the waveform memory. A waveform pattern can be loaded into the waveform memory in the following two ways.

■Configuring using the mainframe

A waveform pattern can be loaded into the waveform memory by using the instruction panel of the MG3700A/MG3710A or by using a remote command.

For operation using the front panel, refer below:

- Section 3.5.2 (1) "Loading waveform file in memory" in the MG3700A Vector Signal Generator Operation Manual (Mainframe)
- Section 7.3.4 "Loading waveform pattern: Load" in the MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

For operation using remote commands, refer below:

- Chapter 4 "Remote Control" in the MG3700A Vector Signal Generator Operation Manual (Mainframe)
- Section 7.3.4 "Loading waveform pattern: Load" in the MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

■Using Transfer & Setting Panel of IQproducer™

A waveform pattern can be loaded from the LAN-connected PC to the memory by using **Transfer & Setting Panel**, which can be opened from the **Simulation & Utility** tab. For details, refer to Section 4.6 "File Transfer and Loading to Memory Using Transfer & Setting Panel" in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).

4.1.3 Selecting Waveform Pattern

Select a waveform pattern to use for modulation from the waveform patterns loaded into the waveform memory of the MG3700A/MG3710A according to Section 4.1.2 "Loading to waveform memory". A waveform pattern can be selected in the following two ways.

■Configuring using the MG3700A/MG3710A

Waveform patterns to be used for modulation can be selected by operating the equipment panel or by using a remote command.

For operation using the front panel, refer below:

- Section 3.5.2 (4) "Outputting pattern loaded in Memory A for modulation in Edit mode" in the MG3700A Vector Signal Generator Operation Manual (Mainframe)
- Section 7.3.5 "Selecting output waveform pattern: Select" in the MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

For operation using remote commands, refer below:

- Chapter 4 "Remote Control" in the MG3700A Vector Signal Generator Operation Manual (Mainframe)
- Section 7.3.5 "Selecting output waveform pattern: Select" in the MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

■ Using Transfer & Setting Panel of IQproducer™

A waveform pattern can be loaded from the LAN-connected PC to the memory, and also selected for modulation. This is done by using **Transfer & Setting Panel**, which can be opened from the **Simulation & Utility** tab. For details, refer to Section 4.6 "File Transfer and Loading to Memory Using Transfer & Setting Panel" in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).

Appendix

Appendix A Error Messages..... A-1
Appendix B Parameter List..... B-1

Appendix A Error Messages

A list of error messages is shown below.

Table A-1 Error messages

Error Message	Description
The Setting value is out of range.("Number of Super Frames = xxx (1 to N)")	The set number of super frames exceeds the setting range (1 to N).
The Setting value is out of range.("Roll Off/BT = xxx (0.100 to 1.000)")	The set roll off rate/BT product exceeds the setting range (0.100 to 1.000).
The Setting value is out of range.("Symbol Length = xxx (1 to 1023)")	The set symbol length exceeds the setting range (1 to 1023).
Input Package Name	Enter the package name.
Input Export File Name	Enter the export file name.
Incongruency : Data Pattern HP and LP Data Pattern are both Null TS or both TS File or combinations of the rest of Data Pattern.	The set combination of data patterns is incongruent. Allowable set combinations of data pattern settings for HP and LP are both Null TS, both TS File, or any data patterns other than Null TS or TS File.
Format Error : TS File	The set TS file format is improper.
Blank : HP/LP TS File	No TS file is selected.
Not found : TS File	The specified TS file cannot be found.
Cannot Open File	The file cannot be opened.
Cannot Read File	The file cannot be read.
Cannot Write File	Data cannot be written to the file.
Setting Value is Invalid.	An invalid value is set.

A list of warning messages is shown below.

Table A-2 Warning messages

Warning Message	Description
A Transfer wizard is already running.	The transfer wizard is already running.
Clipping was done.	Clipping was executed.

Appendix B Parameter List

A list of parameters is shown below.

Table B-1 Parameter list

Parameter	Setting Range	Restriction
System	DVB-T, DVB-H	
Transmission	Non-hierarchical, Hierarchical	
Alpha	1, 2, 4	Cannot be set to 2 or 4 when Transmission is set to Non-hierarchical.
Mode	2K, 4K, 8K	Cannot be set to 4K when System is set to DVB-T.
Bandwidth	5MHz, 6MHz, 7MHz, 8MHz	Cannot be set to 5MHz when System is set to DVB-T.
Modulation Type	QPSK, 16QAM, 64QAM	Cannot be set to QPSK when Transmission is set to Hierarchical.
Guard Interval	1/4, 1/8, 1/16, 1/32	
User Cell ID	ON (0000 to FFFF), OFF	Fixed to ON when System is set to DVB-H.
Outer Coder	ON, OFF	Cannot be set for LP when Transmission is set to Non-hierarchical. Fixed to OFF when Outer Interleaver is set to OFF.
Outer Interleaver	ON, OFF	Cannot be set for LP when Transmission is set to Non-hierarchical. Fixed to ON when Outer Coder is set to ON. Fixed to OFF when Inner Coder is set to OFF.
Inner Coder	ON, OFF	Cannot be set for LP when Transmission is set to Non-hierarchical. Fixed to ON when Outer Interleaver is set to ON. Fixed to OFF when Inner Interleaver is set to OFF.
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	Cannot be set for LP when Transmission is set to Non-hierarchical. Disabled when Inner Coder is set to OFF.
Inner Interleaver	ON, OFF	Fixed to ON when Inner Coder is set to ON.
Data Pattern	PN9, PN15, PN23, ALL0, ALL1, 0101, Null TS, TS File	Cannot be set for LP when Transmission is set to Non-hierarchical. When Null TS or TS File is set for HP or LP, the same setting must be applied to the other one (LP or HP). When data patterns other than Null TS or TS File are set, any set combinations including those other tan Null TS and/or TS File are available for HP and LP.

(Cont'd)

Parameter	Setting Range	Restriction
Number of Super Frames	1 to 384	The upper setting limit varies depending on the Select Option and Mode settings. (Refer to the description about Number of Super Frames in Section 5.1.2 "Parameter details".)
In-depth Symbol Interleaver	ON, OFF	Fixed to OFF when System is set to DVB-T, Mode is set to 8K, or Inner Interleaver is set to OFF.
Time Slicing	ON, OFF	Fixed to OFF when System is set to DVB-T. Cannot be set for LP when Transmission is set to Non-hierarchical.
MPE-FEC	ON, OFF	Fixed to OFF when System is set to DVB-T. Cannot be set for LP when Transmission is set to Non-hierarchical.
Filter	None, Nyquist, Root Nyquist, Gaussian, Ideal Lowpass	
Roll Off/BT	0.100 to 1.000	Disabled when Filter is set to None or Ideal Lowpass.
Symbol Length	1 to 1023	Disabled when Filter is set to None or Ideal Lowpass. Fixed to 1 when Filter is set to None. Fixed to 1023 when Filter is set to Ideal Lowpass.
Multipath	OFF, P1, F1	

References are to page numbers.

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1

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4

4K B-1

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