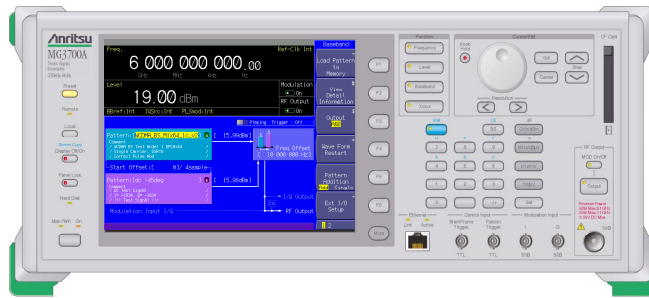**For MG3700A Vector Signal Generator**

MX370104A
Multi-Carrier IQproducer™
Product Introduction

V1.00

ANRITSU CORPORATION

Measurement Business Center Wireless Measurement Div.

Ordering Information

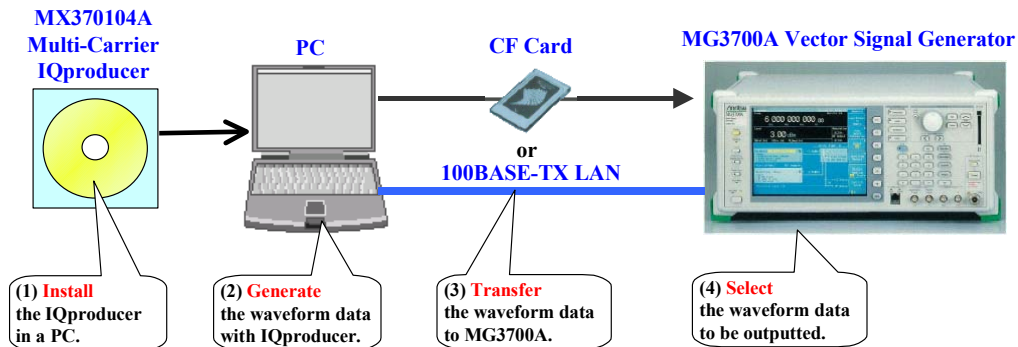|	Model/Order No.	Name	Remarks
	— Mainframe —		
Required	MG3700A	Vector Signal Generator	
	— Standard accessories —		
	J0017F	Power cord, 2.6 m	1 pc
	J1276	LAN Straight cable	1 pc, 10 cm, For U link connection on Rear panel
	P0020	Compact Flash 64 MB	1 pc
	J1254	Compact Flash Adapter	1 pc
	Z0742	MG3700A CD-ROM	1 pc, Main frame operation manual, IQproducer operation manual, Standard waveform operation manual, IQproducer software
	— Options —		
	MG3700A-001	Rubidium Reference Oscillator	Aging rate : ±1 × 10–10/Month
	MG3700A-002	Mechanical Attenuator	Standard Electron Attenuator is changed into Mechanical Attenuator.
	MG3700A-011	Upper Frequency 6 GHz	Standard "250 kHz to 3 GHz" is extended to "250 kHz to 6 GHz."
Recommended	MG3700A-021	ARB Memory Upgrade 512 M sample	Standard "128 M sample/channel × 2" is extended to "256 M sample/channel × 2."
	— Softwares (License Key for IQproducer system) —		
Required	MX370104A	Multi-carrier IQproducer	
	— Optional accessories —		
	W2495AE	MG3700A operation manual	
	W2496AE	MG3700A IQproducer operation manual	
	W2539AE	MG3700A standard waveform pattern operation manual	
	W2505AE	MX370104A Multi-carrier IQproducer operation manual	
Recommended	J1261D	Ethernet Cable (Shield Type)	Cross , 3 m

What is Multi-Carrier IQproducer?

MX370104A is PC software that can generate multicarrier waveform patterns using the modulation and tone signals of various communication systems.

With the MX370104A software installed in a PC, parameters are set freely and waveform patterns for up to 32 carriers are generated. The generated waveform patterns can be transferred to the mainframe of MG3700A via a Compact Flash card or a LAN, and the MG3700A mainframe can output the desired signals by selecting the appropriate waveform pattern.

MX370104A Multi-Carrier IQproducer **PC** **CF Card** **MG3700A Vector Signal Generator**

or
100BASE-TX LAN

(1) Install the IQproducer in a PC.

(2) Generate the waveform data with IQproducer.

(3) Transfer the waveform data to MG3700A.

(4) Select the waveform data to be outputted.

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What is Multi-Carrier IQproducer?

MX370104A Multi-Carrier IQproducer is PC software to create multicarrier waveform patterns of modulation signals for various telecommunication systems.

[Multi-Purpose Function]
- Waveforms that use tone signals and waveform patterns of various telecommunication systems
- Waveforms that mix two or more different telecommunication systems
- Waveforms with offsets that exceed the frequency offset range of the MG3700A Two-Signal Combine Function

[Adjust Rate Function]
- Waveforms that convert the Sampling Rates of two waveform patterns of different telecommunication systems into the same value   <Two waveforms of different telecommunication systems are output by the MG3700A "Two-Signal Combine Function". >

[W-CDMA (DL) function]

Multicarrier waveforms in which clipping is set for evaluating W-CDMA base station transmission amplifiers.

- Generation of waveform patterns by MX370101A/02A/03A/04A
=> The MG3700A mainframe requires a license.
The software runs on a PC without a license and a user can try generating waveform patterns. However, an unlicensed MG3700A mainframe cannot output signals because it does not recognize the waveform patterns.
- Generation of waveform patterns by EDA tools (e.g. C Language, MATLAB, Microwave Office)   => License free

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What is Multi-Carrier IQproducer?

[Multi-Purpose function]

The Multi-Purpose function performs multi-carrier conversion of existing waveform patterns and tone signals using the MG3700A. **Using this function, a signal with up to 32 carriers can be converted to a single waveform pattern.** (Sometimes it is not possible to set as many as 32 carriers depending on the combination of the frequency offset and waveform pattern. On the other hand, it is possible to create waveform patterns with more than 32 carriers by selecting waveform patterns already created previously using this function.)

### Example: cdma2000 "FWD and RVS" multicarrier signals

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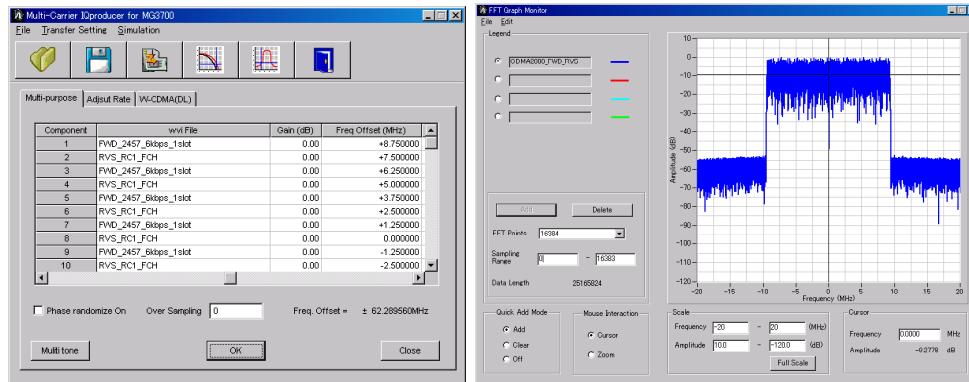
What is Multi-Carrier IQproducer?

[Adjust Rate Function]

The Adjust Rate function converts two waveform patterns with different sampling rates into two waveforms patterns with the same sampling rate.

With the MG3700A two-signal combining function, combining waveform patterns with different sampling rates causes the bandwidth to change because the waveform pattern in memory B is output at the sampling rate of the waveform pattern in memory A. Using the Adjust Rate function, it is possible to combine the Wanted Signal and Interference Signal for various communication systems with the same sampling rate. **By matching the sampling rates of the two waveform patterns using this function, it is even possible to output a signal for different communication systems by using the Two Signals Combining function.**

Example: The sampling rate of "WLAN and Bluetooth" is adjusted.
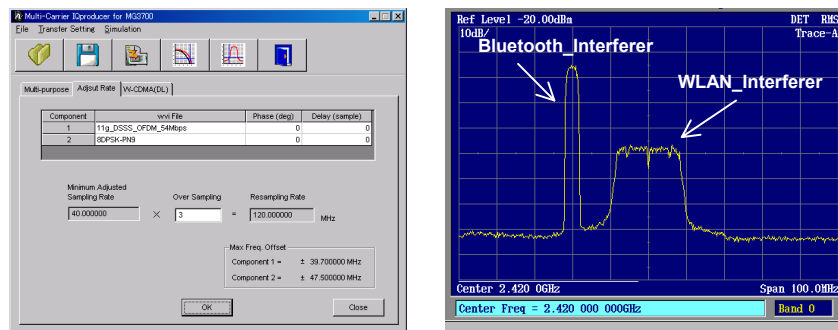
**Multi-carrier setting screen**   **FFT analysis screen**

What is Multi-Carrier IQproducer?

[W-CDMA (DL) function]

This function is used to create a waveform pattern by setting any of the 4 or 5 carriers of the W-CDMA Downlink ON/OFF, as well as by setting the Clipping Method, Clipping Reference Level, and Clipping Ratio.

- **Clipping Method:**
    Non, Vector (pre-filter), Vector (post-filter), Scalar (pre-filter),
    Scalar (post-filter)
- **Clipping Reference : Peak Power, RMS Power**

Example: W-CDMA clipping and multicarrier
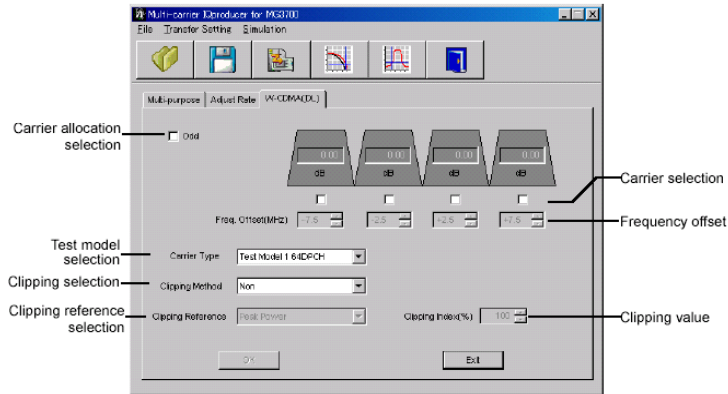
Operating
Examples

4

Connections

A PC and the MG3700A Vector Signal Generator are connected as in the diagram below.

The MX370104A Multi-Carrier IQproducer must be installed in the PC.

MX370104A
Multi-Carrier
IQproducer

MG3700A Vector Signal Generator
+ MX370104A License

Spectrum Analyzer

100BASE-TX LAN
Cross cable

IQproducer^{TM} operating environment

CPU	Pentium III, 1GHz or faster
Memory size	512 Mbytes or more
HDD	5 Gbytes or more
Display	1024 x 768 pixels or more
OS	Windows2000 Professional, Windows XP

* Refer to the appendix [IQproducer Upgrade Procedure] for the installation method of IQproducer.

* Refer to the appendix [Connection to LAN] for the LAN connection between a PC and the MG3700A.
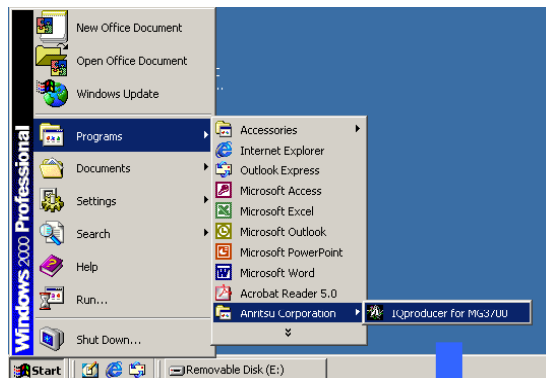
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MX370104A-E-I-1

Starting IQproducer

IQproducer is started.

Start > Program > Anritsu Corporation > IQproducer for MG3700A

New Office Document
Open Office Document
Windows Update
Programs
 Accessories
 Internet Explorer
 Outlook Express
 Microsoft Access
 Microsoft Excel
 Microsoft Outlook
 Microsoft PowerPoint
 Microsoft Word
 Acrobat Reader 5.0
 Anritsu Corporation   IQproducer for MG3700
Documents
Settings
Search
Help
Run...
Shut Down...
Start   Removable Disk (E:)

Start

Main screen

IQproducer for MG3700

File System Transfer & Setting Simulation File Gen. Help

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MX370104A-E-I-1
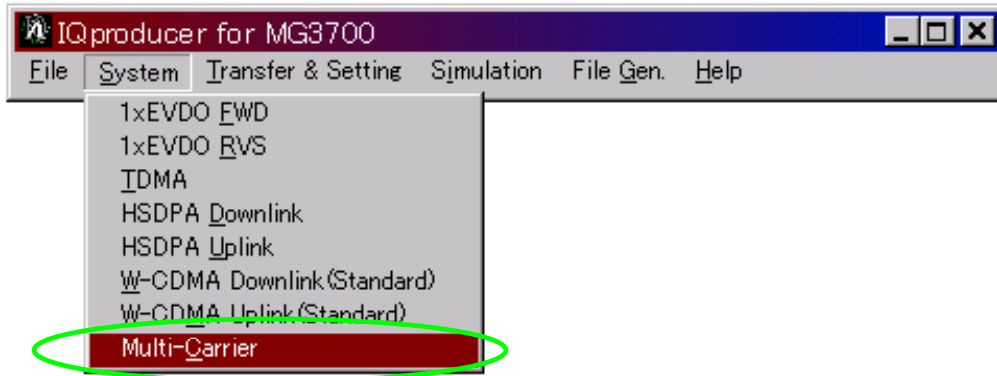
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IQproducer Main screen

Starting the IQproducer software displays the following screen.

Multi-carrier can be chosen from the [System] menu.

Workflow Example

Shown below is a workflow depicting actual waveform data generation by IQproducer.

1. Parameter edit
    Edit the Multi-carrier [Multi-carrier/Adjust Rate/W-CDMA(DL)] parameter on the parameter setting screens.

2. Waveform generation
    Generate the MG3700A waveform patterns.

Completion of waveform data

3. Transfer waveform patterns to signal generator
    Transfer the generated waveform pattern to the MG3700A mainframe via a LAN.

4. Output waveform pattern
    Extract the target waveform pattern to memory from the HDD of MG3700A. The desired modulation signal is outputted by selecting the waveform pattern in the memory.

Parameter edit: Main screen

When Multi-carrier is selected from the System menu, the main screen is displayed where three functions can be selected: Multi-purpose, Adjust Rate, and W-CDMA(DL).
All parameters can be set from the screen by selecting any function.
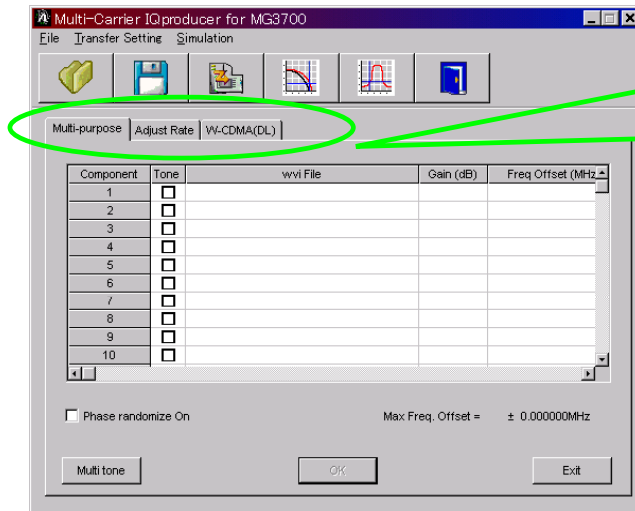
Any of three functions is selected (click).
- Multi-carrier
- Adjust Rate
- W-CDMA (DL)

MX370104A-E-I-1

Parameter edit: Multi-purpose 1/2

First, perform settings for the Tone or wvi File parameters for each component.
Check the corresponding Tone checkbox to select Tone.
Next, parameters of Gain, Freq. Offset, Delay, and Phase are set.
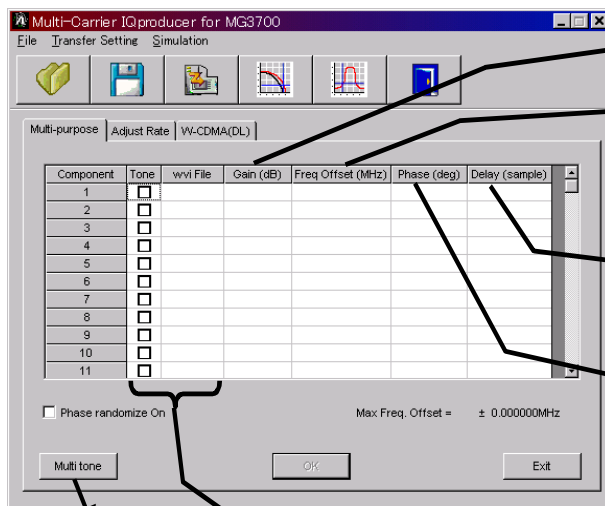
Gain:
0.00 to 80.00 dB, resolution:0.01 dB

Freq.Offset:
-0.4 x Fs + 0.5 x BW
to 0.4 x Fs - 0.5 x BW
(Fs : sampling frequency)
(BW: all band)

Delay:
0 to N-1
(N: Data Points of the source wvi file)

Phase:
0 to 359 degree,
resolution: 1 degree

Next page   Tone, wvi File: Perform settings for the Tone or wvi File parameters.

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Parameter edit: Multi-purpose 2/2

The Multi-tone function generates Tone signals at the specified frequency interval.
This function is enabled when a component is selected to set the specified number of Tone signals starting from the selected component No. If a wvi file is already selected for the corresponding component, then the setting is replaced by the Tone signal setting.

Multi-tone setup

Carrier Spacing   1.000000   MHz

Carrier Number   1

Power Step   0.00   dB

Apply   Close

Carrier Spacing:
0.000001 to 120 MHz
resolution: 1 Hz

Carrier Number:
1 to 32
(The number of Tone signals that can be set varies depending on the set value for Carrier Spacing.)

Power step:
0.00 to 80.00 dB

Parameter edit: Adjust Rate

Parameters of wvi File, Phase, and Delay are set.

Multi-Carrier IQproducer for MG3700
File Transfer Setting Simulation

Multi-purpose Adjust Rate W-CDMA(DL)

Component	wvi File	Phase (deg)	Delay (sample)
1			
2			

Minimum Adjusted Sampling Rate   Over Sampling   Resampling Rate

[-]   ×   1   =   [-]

Max Freq. Offset (SG)
Component 1 =   -
Component 2 =   -

OK   Exit

wvi File:
Waveform pattern used by two-wave combine function is selected.

Delay:
0 to N-1
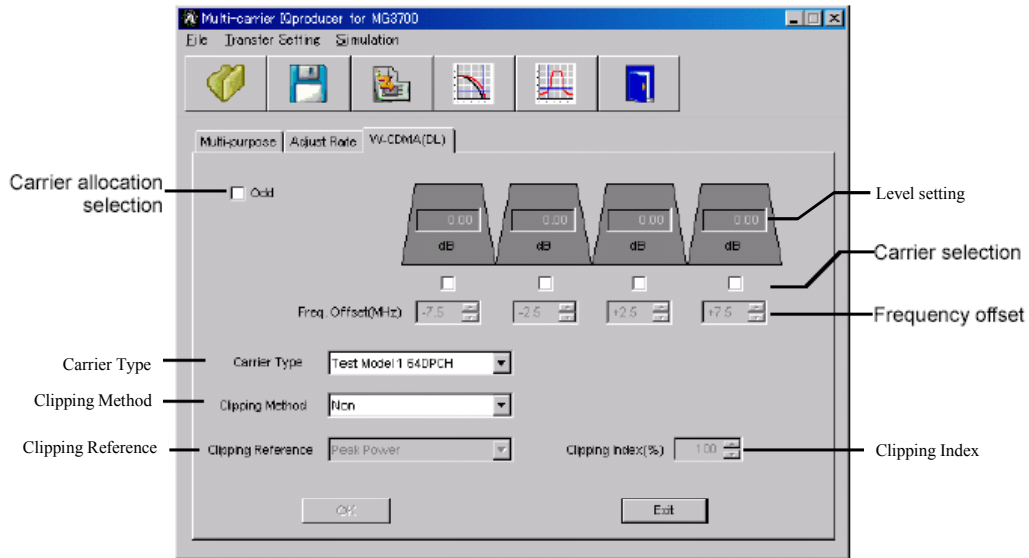**(N: Data Points of the source wvi file)**

Phase:
0 to 359 degrees,
resolution: 1 degree

[Note] Depending on to the combination of the wvi file set in Component 1, 2 and setting values of Over Sampling, it might take several ten minutes to several hours at calculation time.

Parameter edit: W-CDMA (DL) 1/2

The following parameters are set.

Parameter edit: W-CDMA (DL) 2/2

Details on W-CDMA (DL) parameters

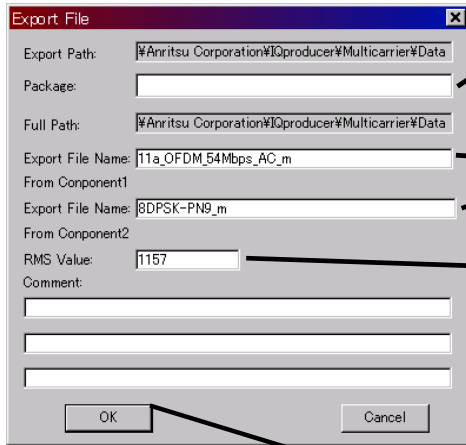| Item	Outlone	Setting range
Carrier allocation selection	Select the carrier allocation.	Selected/not selected
Carrier selection	Select the carrier to be output. Check the checkbox to enable the corresponding carrier.	Enabled/disabled
Level setting	Set the level for each carrier. This can only be set for the enabled carriers.	0.00 to –80.00 dB, resolution: 0.01 dB
Frequency offset setting	Set the frequency offset for each carrier using the step keys. This can only be set for the enabled carriers.	Frequency offset for each carrier ±1.0 MHz, resolution:0.1 MHz
Carrier Type selection	Select the W-CDMA test model.	Test Model1 16DPCH, Test Model1 32DPCH, Test Model1 64DPCH, Test Model5 2HS-PDSCH, Test Model5 4HS-PDSCH, Test Model5 8HS-PDSCH
Clipping Method selection	Select the clipping method for the clipping function.	Non, Vector(pre-filter), Vector(post-filter), Scalar(pre-filter), Scalar(post-filter)
Clipping Reference selection	Set the reference value of the clipping ratio for each carrier.	Peak Power, RMS Power
Clipping Index setting	When Peak Power is selected, set the ratio to the maximum peak of the waveform being used in % units. When RMS Power is selected, set the ratio to the RMS Power of the waveform being used in dB unit.	0 to 100%, resolution: 1% (When Clipping Reference is set to Peak Power:) 0.00 to 17.00 dB, resolution: 0.05 dB (When Clipping Reference is set to RMS Power)

Waveform generation: Calculation 1/2

The "OK" button starts the creation of a waveform pattern after parameters are set.
The setup screen for file export is displayed (below) .

Package:
Click the [Package] box to input the package name to be stored when the waveform pattern is transferred to the MG3700A.
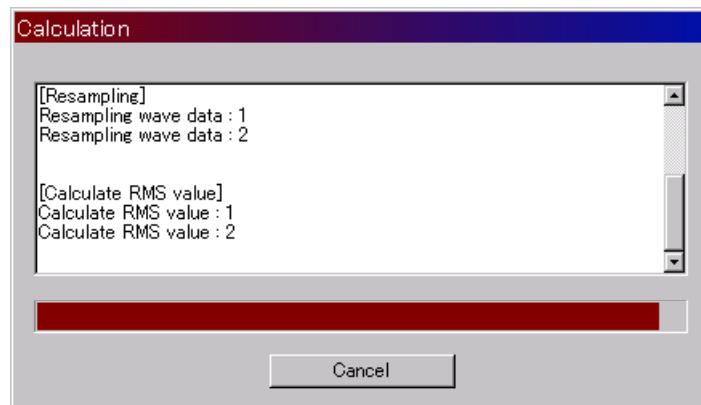
Export File Name:
Click the [Export File Name] box to specify the file name to be output.

RMS Value:
Click the [RMS Value] box to input the RMS value of the waveform after conversion that is used in the MG3700A from the keyboard. The setting range is from 651 to 1634 (setting range of the MG3700A).

When "OK" is clicked, the generation of a waveform pattern is begun. --> Next page

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Waveform generation: Calculation 2/2

The [Calculation] screen below is displayed while a file is created.

A signal is outputted by <u>transferring xxx.wvi and xxx.wvd for the generated file to MG3700A</u> and selecting the waveform pattern file "xxx" in the MG3700A.
The file is created in the folder below.
          C:¥Program Files¥Anritsu Corporation¥IQproducer¥MultiCarrier¥Data

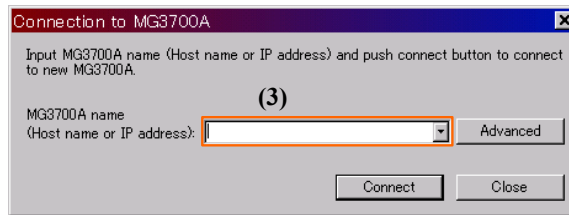# Waveform pattern transfer

The MG3700A and a PC are connected via a LAN.
(1) Select **Transfer & Setting** > Transfer & Setting Panel from "IQproducer".
(2) Select **Connection** > Connect from "Transfer & Setting Panel".
(3) Enter the **Host name or IP address** of the MG3700A that is connected.

(1)

(2)

**(3)**

* **Refer to the appendix [Connection to LAN] for detail.**

Waveform pattern transfer

(1)Narrow down the files to Waveform Pattern File.

(3)Click the transfer button.

(4)A folder is created automatically when a waveform is first transferred. From the next time, waveforms are automatically stored in the "Multi-carrier IQproducer" folder.

(2) The folder with the Multi-carrier data is selected. Open a folder that includes the generated waveform and select the file to be transferred.
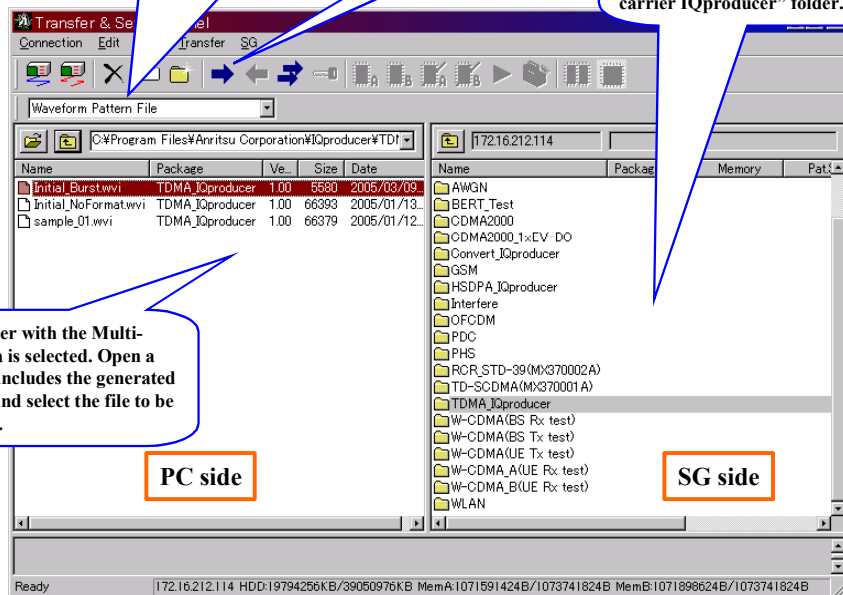
PC side

SG side

Waveform pattern output

[Extract a waveform pattern to memory from the HDD]

(1) Baseband

(2) F1: Load Pattern to Memory

(3) F1: Select Package
>   Open the Multi-carrier IQproducer. Select "ALL load" or a waveform and
>   press [Set].

(4) F6: Return

[Select and output a waveform pattern from the memory]

(1) Point the cursor to Memory A or Memory B and press [Set].

(2) F1: Select Package
>   Open the Multi-carrier IQproducer.

(3) Select the waveform pattern to be outputted and press [Set].

(4) Set the frequency and level.

(5) Output is started by setting "RF Output = On" and "Modulation = On".

> *** Refer to the appendix [Output of Modulation Signal] for detail.**

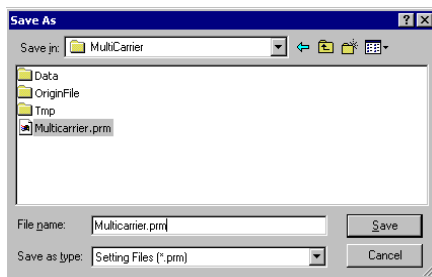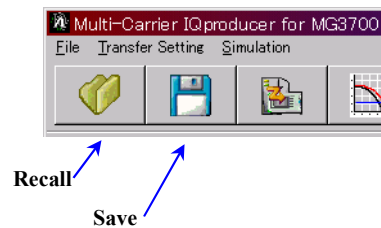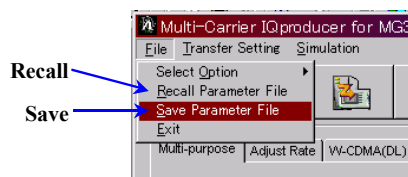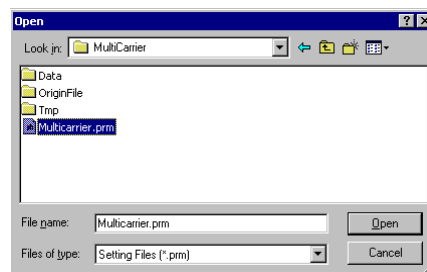Discover What's Possible™   *Slide* 23   **Anritsu**

MX370104A-E-I-1

Others: Parameter save/recall

The numerical value and the setting of each item can be saved as a parameter file, and can be recalled.

File save screen   **File recall screen**

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