MX370084A
ISDB-Tmm Waveform Pattern
Operation Manual

Third 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), MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe), or MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation) . Please also refer to this document before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

⚠ **DANGER**   This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

⚠ **WARNING**   This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

⚠ **CAUTION**   This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

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

These indicate that the marked part should be recycled.

MX370084A
ISDB-Tmm Waveform Pattern

1   October   2011 (First Edition)
3   October   2014 (Third Edition)

Equipment Certificate

Anritsu Corporation guarantees that this equipment was inspected at shipment and meets the published specifications.

Anritsu Warranty

- During the warranty period, Anritsu Corporation will repair or exchange this software free-of-charge if it proves defective when used as described in the operation manual.
- The warranty period is 6 months from the purchase date.
- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
- This warranty does not cover damage to this software caused by Acts of God, natural disasters, and misuse or mishandling by the customer.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Anritsu Corporation Contact

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    ii) If this Software is used in conjunction with other non-Anritsu-approved software.

    iii) Recovery of lost or damaged data.

    iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.

    v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.

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Anritsu affixes the CE conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking

$C \in$

1. Product Model

      Software: MX370084A ISDB-Tmm Waveform Pattern

2. Applied Directive and Standards

When the MX370084A ISDB-Tmm Waveform Pattern is installed in the MG3700A, MG3710A, or MS2690A/MS2691A/MS2692A, the applied directive and standards of this unit conform to those of the MG3700A, MG3710A, or MS2690A/MS2691A/MS2692A main frame.

PS: About main frame

      Please contact Anritsu for the latest information on the main frame types that MX370084A can be used with.

C-Tick Conformity Marking

Anritsu affixes the C-Tick mark on the following product(s) in accordance with the regulation to indicate that they conform to the EMC framework of Australia/New Zealand.

C-Tick marking

◖N274

1. Product Model

Software: MX370084A ISDB-Tmm Waveform Pattern

2. Applied Directive and Standards

When the MX370084A ISDB-Tmm Waveform Pattern is installed in the MG3700A, MG3710A, or MS2690A/MS2691A/MS2692A, the applied directive and standards of this unit conform to those of the MG3700A, MG3710A, or MS2690A/MS2691A/MS2692A main frame.
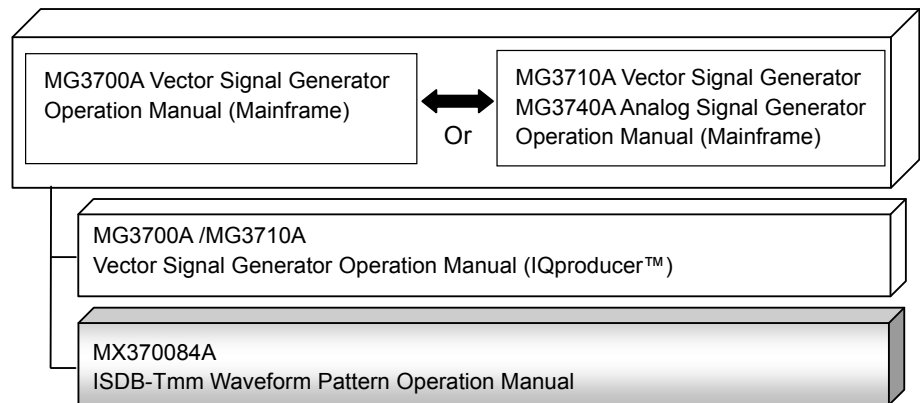
PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX370084A can be used with.

x

About This Manual

■Associated Documents

The operation manuals for the MX370084A ISDB-Tmm Waveform Pattern are comprised as shown in the figure below.

■If using MG3700A or MG3710A:

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┌─────────────────────────────────────────────────────────────────┐
│  ┌──────────────────────────┐        ┌──────────────────────────┐ │
│  │ MG3700A Vector Signal     │ ◄────► │ MG3710A Vector Signal     │ │
│  │ Generator                 │        │ Generator                 │ │
│  │ Operation Manual          │   Or   │ MG3740A Analog Signal     │ │
│  │ (Mainframe)               │        │ Generator                 │ │
│  │                           │        │ Operation Manual          │ │
│  │                           │        │ (Mainframe)               │ │
│  └──────────────────────────┘        └──────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
   ┌───────────────────────────────────────────────────────────────┐
   │ MG3700A /MG3710A                                                │
   │ Vector Signal Generator Operation Manual (IQproducer™)          │
   └───────────────────────────────────────────────────────────────┘
    ┌──────────────────────────────────────────────────────────────┐
    │ MX370084A                                                      │
    │ ISDB-Tmm Waveform Pattern Operation Manual                     │
    └──────────────────────────────────────────────────────────────┘
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● 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.
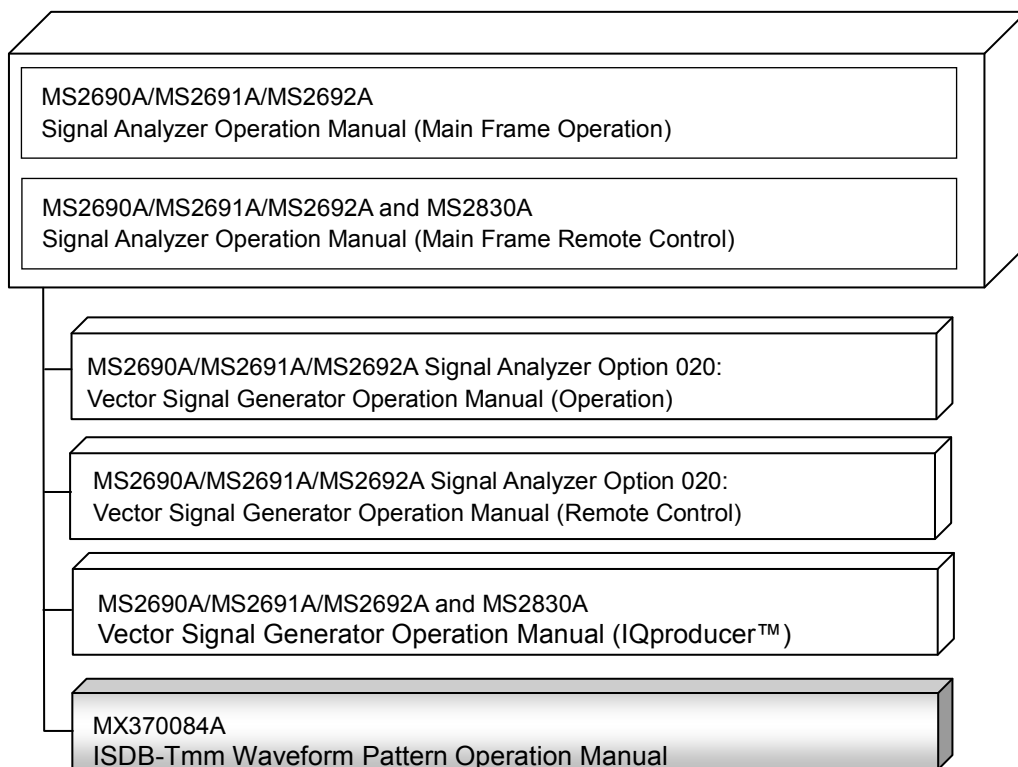
● MG3700A/MG3710A Vector Signal Generator Operation Manual (IQproducer™)

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

> ● MX370084A ISDB-Tmm Waveform Pattern Operation Manual <This document>
>
> This describes basic operations and functions of the ISDB-Tmm Waveform Pattern.

■For MS2690A/MS2691A/MS2692A:

MS2690A/MS2691A/MS2692A
Signal Analyzer Operation Manual (Main Frame Operation)

MS2690A/MS2691A/MS2692A and MS2830A
Signal Analyzer Operation Manual (Main Frame Remote Control)

MS2690A/MS2691A/MS2692A Signal Analyzer Option 020:
Vector Signal Generator Operation Manual (Operation)

MS2690A/MS2691A/MS2692A Signal Analyzer Option 020:
Vector Signal Generator Operation Manual (Remote Control)

MS2690A/MS2691A/MS2692A and MS2830A
Vector Signal Generator Operation Manual (IQproducer™)

MX370084A
ISDB-Tmm Waveform Pattern Operation Manual

- MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual
  (Mainframe, Operation)

This describes basic operations, maintenance procedure, and common
functions of MS2690A/MS2691A/MS2692A.

- MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation
  Manual (Mainframe, Remote Control)

These describe basic operations, maintenance procedure, common
functions and common remote functions of the
MS2690A/MS2691A/MS2692A or MS2830A.

- MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal
  Generator Operation Manual, Operation

This describes the functions and how to use the Vector Signal Generator
option.

- MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal
  Generator Operation Manual, Remote Control

This describes how to remotely control the Vector Signal Generator
option.

- MS2690A/MS2691A/MS2692A Signal Analyzer and MS2830A :
  Vector Signal Generator Operation Manual (IQproducer™)

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

- MX370084A ISDB-Tmm Waveform Patter Operation Manual <This document>

This describes basic operations and functions of the ISDB-Tmm Waveform Pattern.

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VI.

This chapter outlines the MX370084A ISDB-Tmm Waveform Pattern software.

1

Outline

1.1 Product Overview

The MX370084A ISDB-Tmm Waveform Pattern (this software hereafter) is a software option with a library of standard waveform patterns meeting the ARIB STD-B46 recommendations.

- ISDB-Tmm waveform patterns
- ISDB-T$_{SB}$ waveform patterns

Note:

      ISDB-T$_{SB}$ waveform patterns are available only in the MG3710A.

A waveform pattern created by this software can be output using an RF signal after being downloaded into the following. Hereafter, each Vector Signal Generator is collectively called "this equipment, or the mainframe".

- MG3700A Vector Signal Generator
- MG3710A Vector Signal Generator
- MS2690A/MS2691A/MS2692A Signal Analyzer with Vector Signal Generator option mounted

1.2 Product Configuration

At unpacking, check that all items listed in Table 1.2-1 are included. If any item is missing, contact your Anritsu sales representative immediately.

Table 1.2-1   Product Composition

Items	Model/ Symbol	Product Name	Q'ty	Remarks
Main unit	MX370084A	ISDB-Tmm Waveform Pattern	1	License file and manual on accessory DVD

■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, refer to each one of the following manuals.

- *MG3700A/3710A Vector Signal Generator Operation Manual* (IQproducer™)
  4.5 "File Conversion on Convert Screen"
- *MS2690A/MS2691A/MS2692A and MS2830A Vector Signal Generator Operation Manual (IQproducer™)*
  4.5 "File Conversion on Convert Screen"

In order to output ISDB-Tmm waveform pattern from the mainframe, the following operations are required:

- 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.

2

Using Waveform Pattern

2.1 For MG3700A or MG3710A

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

2.1.1 Installing waveform license

To load the waveform pattern to the memory, the license file corresponding to each pattern must be installed. Refer to the following for installation of the license file.

For MG3700A
- *MG3700A Vector Signal Generator Operation Manual (Mainframe)* 3.10.10 "Install"

For MG3710A
- *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)* 9.4.4 "Install", "Adding/deleting waveform licenses: Waveform Licenses"

2.1.2 Transferring waveform pattern to internal hard disk

The generated waveform pattern can be transferred to the mainframe's internal hard disk in the following ways:

Note:

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

For MG3700A
- LAN
- CompactFlash Card

For MG3710A
- LAN
- External device such as USB Memory

■ Transferring from PC to MG3700A via LAN (MG3700A, MG3710A)

Two IQproducer™ tools can be used to transfer a waveform pattern to the MG3700A 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 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 Vector 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 mainframe to the root directory of a CF card.

Insert the CF card into the card slot on the front panel of the mainframe, 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 how to transfer a waveform pattern to the internal hard disk of the mainframe, refer to "Copying external waveform pattern: Copy" in Section 7.3.6 of the *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*.

2

Using Waveform Pattern

2.1.3 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 2.1.2 "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 MG3700A/MG3710A
A waveform pattern can be loaded into the waveform memory by using the instruction panel of the mainframe or by using a remote command.

For operation using the front panel, refer below:

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

For operation using remote commands, refer below:

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

■ 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 Operation Manual (IQproducer™)*.

2.1.4 Selecting waveform pattern

Select a waveform pattern to use for modulation from the waveform patterns loaded into the waveform memory of the mainframe according to Section 2.1.3 "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:

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

For operation using remote commands, refer below:

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

■ Using Transfer & Setting Panel of IQproducer^{TM}

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 Operation Manual (IQproducer™)*.

2.2 For MS2690A/MS2691A/MS2692A

This section describes how to download a waveform pattern created for the MS2690A/MS2691A/MS2692A to the hard disk of the MS2690A/MS2691A/MS2692A and output the pattern.

2.2.1 Installing waveform license

To load the waveform pattern to the memory, the license file corresponding to each pattern must be installed. Refer to the following for installation of the license file.

- For details, refer to the 3.8 "Installing and Uninstalling" in *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual.*

2.2.2 Transferring waveform pattern to internal hard disk

The generated waveform pattern can be transferred to the mainframe's internal hard disk in the following ways:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Operation)*
  Section 2.4.4 "Copying waveform file(s) to hard disk"

Note:

> Transferring waveform patterns is not required if the patterns are created using this software on the MS2690A/MS2691A/MS2692A.

2.2.3　Loading to waveform memory

In order to output a modulated signal using the waveform pattern, it is necessary to load the waveform patterns stored in the MS2690A-020/MS2691A-020/MS2692A-020 internal hard disk to the waveform memory.

In order to output a modulated signal using the waveform pattern, it is necessary to load the waveform patterns stored in the MS2690A-020/MS2691A-020/MS2692A-020 internal hard disk to the waveform memory.

■　Loading to Waveform Memory

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

For operation using the front panel, refer below:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Operation)*
  Section 2.4.1 "Loading waveform file in memory"

For operation using remote commands, refer below:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Remote Control)*

2

Using Waveform Pattern

2.2.4   Selecting waveform pattern

Select waveform patterns to be used for modulation from those loaded in the waveform memory of the MS2690A/MS2691A/MS2692A as described in Section 2.2.1 "Transferring waveform pattern to internal hard disk" above.

■ Selecting waveform pattern

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:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Operation)*
  Section 2.4.2 "Selecting waveform pattern"

For operation using remote commands, refer below:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Remote Control)*

Chapter 3　Waveform Pattern Details

This chapter explains the details of the MX370084A ISDB-Tmm Waveform Pattern software.

3

Waveform Pattern Details

3.1 Waveform Pattern

This waveform pattern contains the following ISDB-Tmm waveform patterns and ISDB-T$_{SB}$ waveform patterns in accordance with the ARIB STD-B46 standards.

3.1.1 ISDB-Tmm waveform patterns

Table 3.1.1-1   ISDB-Tmm Waveform Pattern List

Waveform Pattern Name	Parameter
QPSK_1_2_TI0_A, QPSK_1_2_TI0_A_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=0 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=0 Super segment 2 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=1/2, TI=0 Super segment 3 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=0 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=0
QPSK_2_3_TI0_A, QPSK_2_3_TI0_A_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=0 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=0 Super segment 2 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=2/3, TI=0 Super segment 3 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=0 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=0

Table 3.1.1-1   ISDB-Tmm Waveform Pattern List (cont'd)

Waveform Pattern Name	Parameter
16QAM_1_2_TI0_A, 16QAM_1_2_TI0_A_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=0 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=0 Super segment 2 No. of concatenated segments: 7 A layer: 1seg, Mod=16 QAM, CR=1/2, TI=0 Super segment 3 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=0 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=0
QPSK_1_2_TI4_A, QPSK_1_2_TI4_A_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 Super segment 3 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4
QPSK_2_3_TI4_A, QPSK_2_3_TI4_A_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 Super segment 3 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4

3

Waveform Pattern Details

Table 3.1.1-1   ISDB-Tmm Waveform Pattern List (cont'd)

Waveform Pattern Name	Parameter
16QAM_1_2_TI4_A, 16QAM_1_2_TI4_A_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 No. of concatenated segments: 7 A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4
QPSK_1_2_TI4_C, QPSK_1_2_TI4_C_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=1/2, TI=4
QPSK_2_3_TI4_C, QPSK_2_3_TI4_C_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=2/3, TI=4

Table 3.1.1-1   ISDB-Tmm Waveform Pattern List (cont'd)

Waveform Pattern Name	Parameter
16QAM_1_2_TI4_C, 16QAM_1_2_TI4_C_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 No. of concatenated segments: 7 A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4
QPSK_1_2_TI4_C, QPSK_1_2_TI4_C_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=1/2, TI=4
QPSK_2_3_TI4_C, QPSK_2_3_TI4_C_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 Partial reception: ON A layer: 1seg, Mod=QPSK, CR=2/3, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 No. of concatenated segments: 7 A layer: 1seg, Mod=QPSK, CR=2/3, TI=4

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Waveform Pattern Details

Table 3.1.1-1   ISDB-Tmm Waveform Pattern List (cont'd)

Waveform Pattern Name	Parameter
16QAM _1_2_TI4_C, 16QAM_1_2_TI4_C_8M	Mode: 3, GI: 1/4 Super segment 1 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 2 Partial reception: ON A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4 B layer: 12seg, Mod=16 QAM, CR=1/2, TI=4 Super segment 3 No. of concatenated segments: 7 A layer: 1seg, Mod=16 QAM, CR=1/2, TI=4

Note:

A super segment is arranged in the sequence 1, 2, and 3 from the low-frequency side. In addition, the super segment 2 sub-channel number is arranged in the sequence 1, 4, 7, 10, 13, 16, 19 from the low-frequency side.

Since a waveform pattern with the name XXXX_8M has an 8 MHz offset from the XXXX waveform pattern, the TMCC and segment arrangement parameters for the two waveform patterns are the same.

3.1.2 ISDB-T$_{SB}$ waveform patterns

Note:

ISDB-T$_{SB}$ waveform patterns are available only in the MG3710A.

Table 3.1.2-1   ISDB-T$_{SB}$ Waveform Pattern List

Waveform Pattern Name	Parameter
A-1_16QAM_1_2_TI0	Mode: 3, GI: 1/4 3 segment format Partial reception: ON A layer: Mod=16 QAM, CR=1/2, TI=0 B layer: Mod=16 QAM, CR=1/2, TI=0 1 segment format No. of concatenated segments: 3 M Mod=16 QAM, CR=1/2, TI=0
A-1_QPSK_1_2_TI0	Mode: 3, GI: 1/4 3 segment format Partial reception: ON A layer: Mod=QPSK, CR=1/2, TI=0 B layer: Mod=QPSK, CR=1/2, TI=0 1 segment format No. of concatenated segments: 3 Mod=QPSK, CR=1/2, TI=0
A-1_QPSK_2_3_TI0	Mode: 3, GI: 1/4 3 segment format Partial reception: ON A layer: Mod=QPSK, CR=2/3, TI=0 B layer: Mod=QPSK, CR=2/3, TI=0 1 segment format No. of concatenated segments: 3 Mod=QPSK, CR=2/3, TI=0

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Waveform Pattern Details

Table 3.1.2-1   ISDB-T$_{SB}$ Waveform Pattern List (cont'd)

Waveform Pattern Name	Parameter
B_16QAM_1_2_TI0	Mode: 3, GI: 1/4 3 segment format Partial reception: ON A layer: Mod=16 QAM, CR=1/2, TI=0 B layer: Mod=16 QAM, CR=1/2, TI=0
B_QPSK_1_2_TI0	Mode: 3, GI: 1/4 3 segment format Partial reception: ON A layer: Mod=QPSK, CR=1/2, TI=0 B layer: Mod=QPSK, CR=1/2, TI=0
B_QPSK_2_3_TI0	Mode: 3, GI: 1/4 3 segment format Partial reception: ON A layer: Mod=QPSK, CR=2/3, TI=0 B layer: Mod=QPSK, CR=2/3, TI=0

Note:

> The sub-channel number of each segment is arranged in the sequence 1, 4, 7, 10, 13, 16, 19, 22, and 25 from the low-frequency side.

3.2 Waveform Pattern Format

The format and setting details for ISDB-Tmm waveform patterns are described below.

3.2.1 ISDB-Tmm waveform patterns

■OFDM segment

This software incorporates a library of A and C type patters based on the super segment arrangement standardized in ARIB STD-B46 Part 1 Annex 2.4.

The ISDB-Tmm waveform pattern is composed of three super segments. The super segments are arranged in the sequence super segment 1, super segment 2, and super segment 3 from the low frequency side. Figure 3.2.1-1 and 3.2.1-2 show the spectrum.

In A-type waveform patterns, super segments 1 and 3 are type A super segments and super segment 2 is a type B super segment.

In C-type waveforms, super segments 1 and 2 are type A super segments. Super segment 3 is a type B super segment. The type B super segment is composed of seven concatenated segments. In addition, this super segment sub channel number is arranged in the sequence 1,4,7,10,13,16,19 from the low-frequency side.
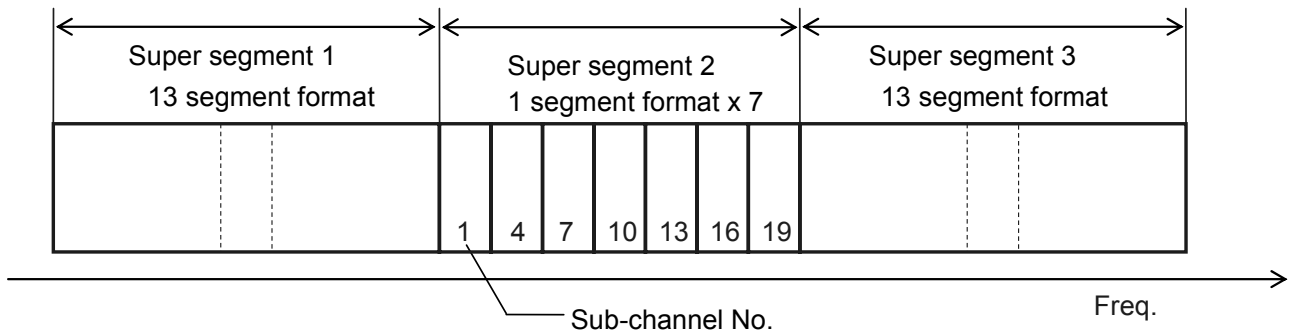
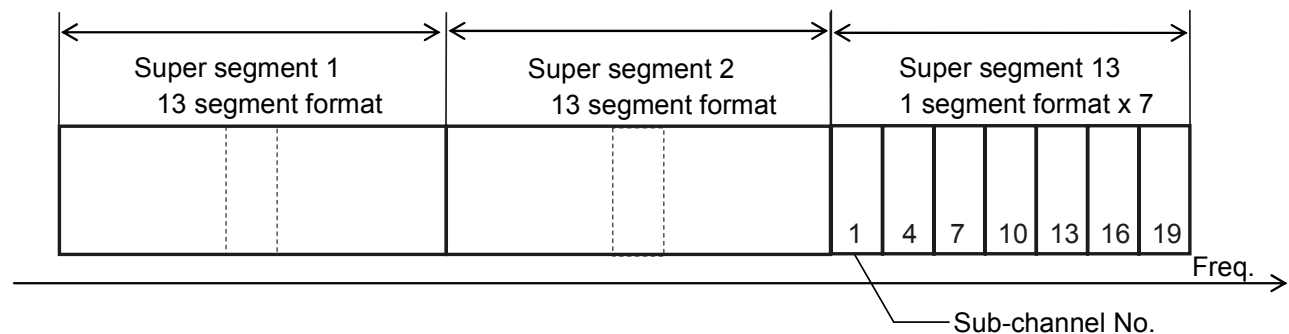**Figure 3.2.1-1   Type A ISDB-Tmm Spectrum Image**

Figure 3.2.1-2   Type C ISDB-Tmm Spectrum Image

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Waveform Pattern Details

■Frame composition

Figure 3.2.1-3 shows the frame composition. First, transmission path encoding is performed for each super frame. Next, the type-B super frame is a concatenated frame of seven segments. In addition, the three super frames are composed of re-concatenated frames. IFFT is performed and the whole is topped up with a guard interval to create the OFDM symbol.
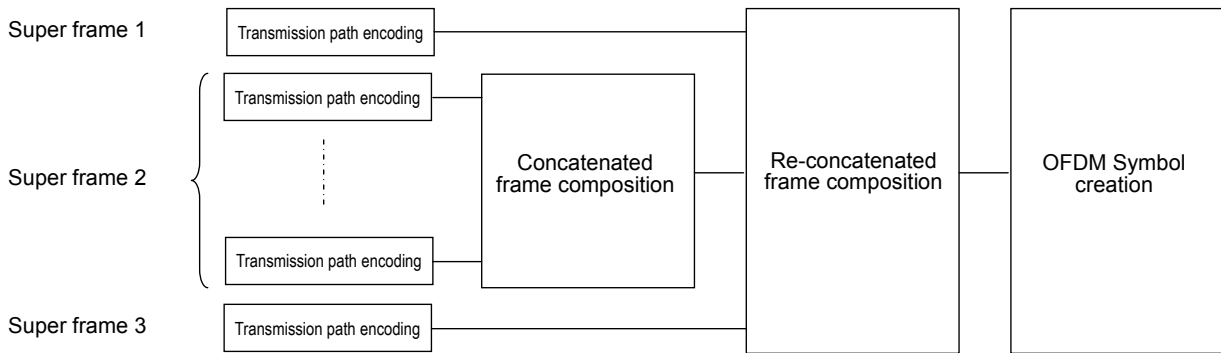

Figure 3.2.1-3   ISDB-Tmm Frame Composition

3.2.2 ISDB-T$_{SB}$ waveform patterns

Note:

ISDB-T$_{SB}$ waveform patterns are available only in the MG3710A.

■OFDM segment

This software incorporates a library of A-1 and B type patterns based on the segment arrangement standardized in ARIB STD-B46 Part 2 Annex 2.4.

A-1 type ISDB-T$_{SB}$ waveform pattern consists of two 3 segment formats and three 1 segment formats in connection.

B type ISDB-T$_{SB}$ waveform pattern consist of three 3 segment formats. Figure 3.2.2-1 and 3.2.2-2 show the spectrum.

The sub-channel number of each segment is arranged in the sequence 1, 4, 7, 10, 13, 16, 19, 22, and 25 from the low-frequency side.
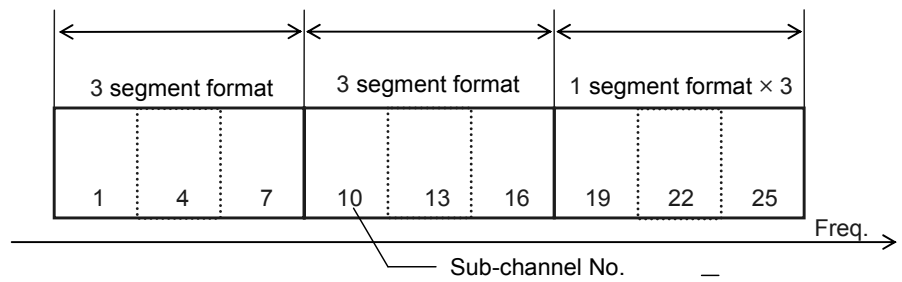
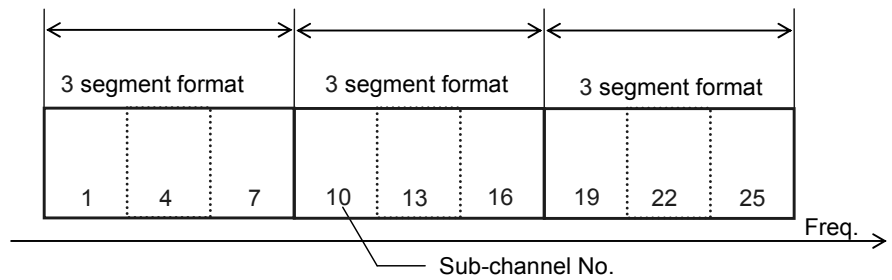

Figure 3.2.2-1　A-1 type ISDB-T$_{SB}$ Spectrum Image

Figure 3.2.2-2　B type ISDB-T$_{SB}$ Spectrum Image

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Waveform Pattern Details

■Frame composition

Figure 3.2.2-3 shows the frame composition. First, transmission path encoding is performed for every 3 segment format and 1 segment format. Next, these are composed of re-concatenated frames. IFFT is performed and the whole is topped up with a guard interval to create the OFDM symbol.
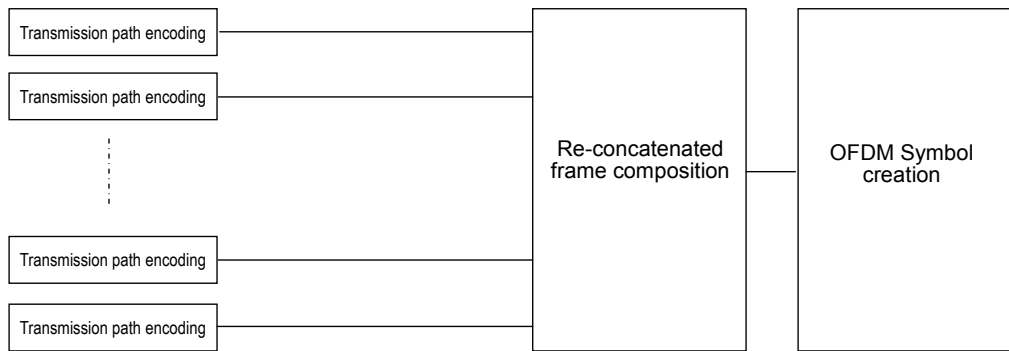

Figure 3.2.2-3   ISDB-T$_{SB}$ Frame Composition

Appendix A   ISDB Waveform Generation Software

This chapter explains functional details of the ISDB Waveform Generation Software (this sample software hereafter).

Note:

This sample software is not on the DVD, but it is available on the Anritsu download site. Registration is required to use the website.

Appendix

Appendix A

A.1 Operating Environment

To run this sample software the operating environment must satisfy the following conditions.

(1) PC

Items	Condition
OS	Windows 2000 Professional/Windows XP
CPU	At least 1 GHz or faster Pentium III or equivalent
Memory	1 GB or more
Hard disk	5 GB or more free space in the drive where this sample software is to be installed. The free hard disk space necessary to create waveform pattern varies depending on the waveform pattern size.

(2) Displays with a resolution of 1024×768 pixels are best viewed using a small font setting.

Although this sample software can be installed and run in the MS2690A/MS2691A/MS2692A, the measurement functions of the MS2690A/MS2691A/MS2692A are not guaranteed while this software is running.

A.2 Preparation

This sample software is composed of an executable (.ECE) file and a parameter file. To use this sample software, these two files must be located in the same folder as shown in Figure A-2.1.
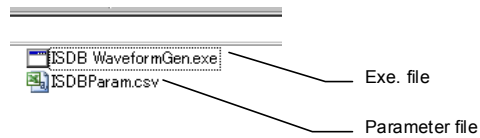

Figure A-2.1   Composition of Sample Software

A.3 List of Parameters

This section explains each of the items indicated in the parameter list. The parameter list lists each of the parameters required to generate the ISDB-Tmm waveform pattern.

Output File Name

Function	This sets the name of the created waveform pattern.
Setting options	On, Off
Remarks	Up to 20 characters can be set for the waveform pattern name; supported characters are English alphanumeric characters and the following special symbols.
	! % & ( ) + = ' { } _ - ^ @ [ ]

System

Function	This sets the system.
Setting options	0, 1, 2, 3
Remarks	Settings 0 to 3 correspond to ISDB-T, ISDB-Tmm, Area-Oneseg, and ISDB-T$_{SB}$ respectively.

Instrument

Function	This sets the supported instrument.
Setting options	0, 1, 3
Remarks	Settings 0, 1, 3 correspond to the MG3700A, MS269xA, and MG3710A respectively.

Frame Length

Function	This sets the frame length.
Setting range	2 to (Refer to the value in Table A.3-1.)
Remarks	The maximum value may change depending on the TI setting.

Table A.3-1   Maximum Frame Length Value

System	Guard Interval	2 GB Memory	1 GB Memory
ISDB-T	1/32	2492	1246
	1/16	2418	1208
	1/8	2284	1142
	1/4	2056	1028
ISDB-Tmm	1/32	154	76
	1/16	150	74
	1/8	142	70
	1/4	128	64
Area-Oneseg	1/32	78	38
	1/16	74	36
	1/8	70	34
	1/4	64	32

Over Sampling Ratio

Function	This sets the oversampling ratio.
Setting options	2, 4
Remarks	Settings 2 and 4 correspond to 2 and 4, respectively.

Frequency Offset

Function	This enables and disables the frequency offset.
Setting options	0, 1
Remarks	Settings 0 and 1 enable and disable the frequency offset respectively. When frequency offset is enabled and ISDB-T, ISDB-Tmm and Area-Oneseg is set at System, the frequency offset size is +8.0 MHz, +4.0 MHz, and +250 kHz, respectively.

Mode

Function	This sets the Mode.
Setting options	0, 1, 2
Remarks	Settings 0, 1 and 2 correspond to Mode1, Mode2, and Mode3, respectively.

Guard Interval

Function	This sets the guard interval.
Setting options	0, 1, 2, 3
Remarks	Settings 0, 1, 2 and 3 correspond to 1/4, 1/8, 1/16, and 1/32, respectively.

Appendix

Appendix A

Emergency Flag

Function   This sets the emergency flag operation.

Setting options 0, 1

Remarks   Settings 0 and 1 correspond to OFF and ON.

Mobile Receive

Function   This sets the Mobile Receive flag.

Setting options 0, 1

Remarks   Settings 0 and 1 correspond to OFF and ON. This is
                enabled for 13-segment format channels.
                When the Rx part flag is ON, set Number of segments for
                Layer A of the 13-segment format channel to 1.

Number of segments

Function   This sets the number of segments for each layer.

Setting range   1 to 13

Remarks   The setting range for each system is as follows:
                System = 0: 1 to 13 (However, the sum of the segments for
                each layer is 13. Moreover, the Number of segments for
                Layer A is 1 or more.)
                System = 1: 1 or 1 to 13 (However, the sum of the
                segments for each layer is either 1 or 13.)
                System=2: 1
                When the sum of the segments for each layer must be 1,
                set Number of segments for Layer A to 1.

Mod

Function   This sets the modulation method for each layer.

Setting options 1, 2, 3

Remarks   Settings 1, 2, and 3 correspond to QPSK, 16QAM, and
                64QAM, respectively. When System is set to 3, 64QAM is
                invalid.

CR

Function   This sets the encoding ratio for each layer.

Setting options 0, 1, 2, 3, 4

Remarks   Settings 0, 1, 2, 3, and 4 correspond to 1/2, 2/3, 3/4, 5/6,
                and 7/8, respectively.

TI

Function   This sets the time interleave for each layer.

Setting options 0, 1, 2, 3

Remarks   Settings 0, 1, 2, and 3 correspond to 0, 4, 8, and 16 in
                 Mode1, 0, 2, 4, and 8 in Mode 2, and 0, 1, 2 and 3 in
                 Mode3.

Subchannel Number

Function   This sets the subchannel number for each channel.

Setting range   0 to 41

Remarks   This is enabled only for channels for which the total of
                 segments for each layer is 1; it is disabled for other
                 settings.

Data Type

Function   This sets the transmission TSP data type.

Setting options 0, 1

Remarks   Settings 0, and 1, correspond to PN23fix, and User File,
                 respectively. The selected data transmission path is
                 encoded. PN23fix indicates that the PN23 data is
                 truncated at the length set at Frame Length and is not
                 cyclic.

User File Name

Function   This sets the name of the user file for transmission path
                 encoding.

Remarks   This is enabled only when 1 is set at Data Type. The User
                 File requires a Sync Byte (0x47) every 204 bytes.

A.4 Waveform Pattern Generation

This section explains the procedure for creating waveform patterns using this sample software.

1.   Open the parameter file using spreadsheet or text editor software, and set the parameter file.

2.   Save and close the parameter file.

3.   Double-click the .exe file.

A.5 PN23 Data Default

When PN23fix is selected at Data Type of the parameter file, transmission path encoding of the PN23 data is performed.

The defaults for the PN23 data when creating a waveform for ISDB-Tmm is as follows:

0x7FFFFF, 0x50FFFF, 0x51FFFF, 0x52FFFF, 0x53FFFF, 0x54FFFF, 0x55FFFF, 0x56FFFF, 0x57FFFF, 0x58FFFF, 0x59FFFF, 0x5AFFFF, 0x5BFFFF, 0x5CFFFF, 0x5DFFFF, 0x5EFFFF, 0x5FFFFF, 0x60FFFF, 0x61FFFF, 0x62FFFF, 0x63FFFF, 0x64FFFF, 0x65FFFF, 0x66FFFF, 0x67FFFF, 0x68FFFF, 0x69FFFF, 0x6AFFFF, 0x6BFFFF, 0x6CFFFF, 0x6DFFFF, 0x6EFFFF, 0x6FFFFF

The PN23 data default values are arranged with the header value at super segment 1, the second value at super segment 2, and the next value at the next super segment, sequentially, etc.

However, the contiguous super segment with segment 1 uses the default for the PN23 data from the low-frequency side segment.

For example, in the example in Figure A.5-1, the default value for the PN23 data of super segment 1 is 0x7FFFFF. The default values for the PN23 data of super segment 2 are 0x50FFFF, 0x51FFFF, and 0x52FFFF sequentially from segment 1 of the subchannel number. The default value for the PN23 data of super segment 3 is 0x57FFFF.

The same defaults are used at each layer at layer 2 and above transmissions.

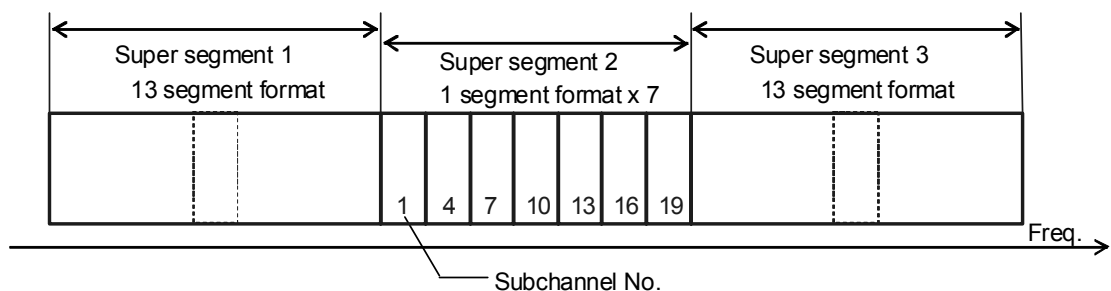The defaults for PN23 data when creating waveform patterns for ISDB-T and Area-Oneseg are 0x7FFFFF.

Figure A.5-1   Segment Arrangement

References are to page numbers.

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