MX180000A-x01
Pre-Code
MX180000A-x02
De-Code
Operation Manual

Second Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided in the MP1800A Signal Quality Analyzer Installation Guide and the MT1810A 4 Slot Chassis Installation Guide. Please also refer to one of these documents before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Document No.: M-W3176AE-2.0

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.

MX180000A-x01 Pre-Code
MX180000A-x02 De-Code
Operation Manual

11 March 2009 (First Edition)
16 December 2011 (Second 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

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

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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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c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase

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If Anritsu suffers any loss, financial or otherwise, due to your violation of the terms of this EULA, Anritsu shall have the right to seek proportional damages from you.

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If matters of dispute or items not covered by this EULA arise, they shall be resolved by negotiations in good faith between you and Anritsu.

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This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.

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 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.

CE Conformity Marking

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

1. Product Model

Software: MX180000A-x01 Pre-Code
MX180000A-x02 De-Code

2. Applied Directive and Standards

When the MX180000A-x01 Pre-Code or MX180000A-x02 De-Code is installed in the MP1800A or MT1810A, the applied directive and standards of this software conform to those of the MP1800A or MT1810A main frame.

PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX180000A-x01/x02 can be used with.

C-tick Conformity Marking

Anritsu affixes the C-tick marking 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

1. Product Model

Plug-in Units: MX180000A-x01 Pre-Code
MX180000A-x02 De-Code

2. Applied Directive and Standards

When the MX180000A-x01 Pre-Code or MX180000A-x02 De-Code is installed in the MP1800A or MT1810A, the applied directive and standards of this software conform to those of the MP1800A or MT1810A main frame.

PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX180000A-x01/x02 can be used with.

About This Manual

A testing system combining the MP1800A Signal Quality Analyzer or MT1810A 4-Slot Chassis mainframe, module(s), and control software is called a Signal Quality Analyzer Series. The operation manuals of the Signal Quality Analyzer Series consist of separate documents for the installation guide, the mainframe, remote control operation, module(s), control software, and extended application as shown below.

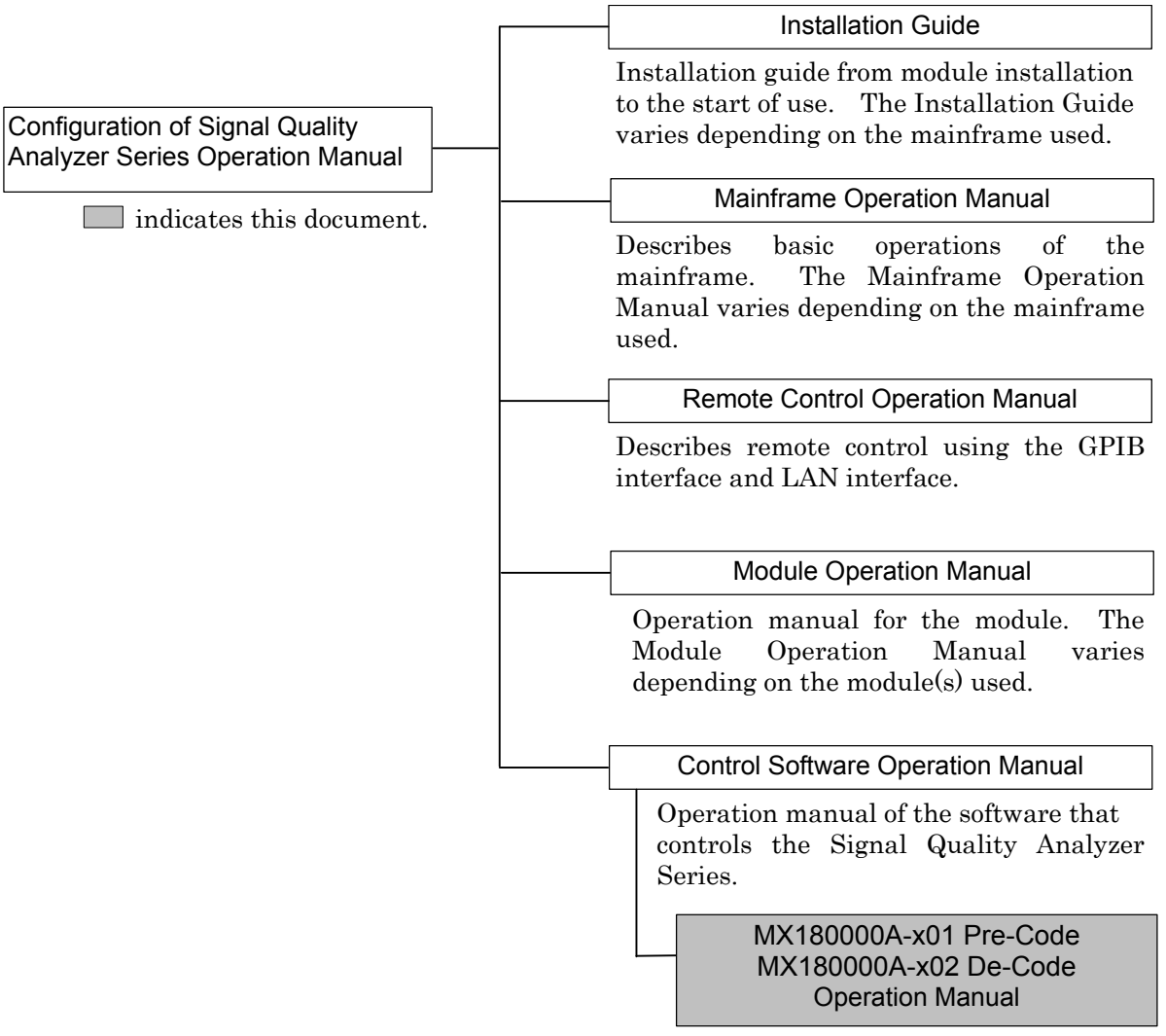


Table of Contents

Chapter 1 Overview

This chapter provides an overview of the MX180000A-x01 Pre-Code and the MX180000A-x02 De-Code (hereafter "this option").

1.1 Features

This option is a software package for the MX180000A Control Software for the MP1800A Signal Quality Analyzer (hereafter, MP1810A) and MT1810A 4 Slot Chassis (hereafter, MT1810A).

It has the following features:

- Precoding functions for 40G DQPSK, DPSK, DB optical modulation methods (MX180000A-x01)
  Decoding functions for 40G DQPSK, DPSK, DB optical modulation methods (MX180000A-x02)
- Added to options by purchase of option license key

1.2 Configuration

1.2.1 Standard configuration

Table 1.2.1-1 shows the standard configuration of this option.

Table 1.2.1-1 Standard configuration

Model Name/Symbol	Product Name	Q'ty	Remarks
MX180000A-x01	Pre-Code	1	Issues Option Key License Certificate
MX180000A-x02	De-Code	1	Issues Option Key License Certificate
Z0897A	MP1800A Manual CD	1	CD-ROM Supplied with purchased option
Z0918A	MX180000A Software CD	1	CD-ROM Supplied with purchased option

1.2.2 Peripheral device

Table 1.2.2-1 lists the peripheral devices of this option.

Table 1.2.2-1 Peripheral devices

Model Name/Symbol	Product Name	Q'ty	Remarks
MP1800A	SIGNAL QUALITY ANALYZER	1	
MT1810A	4 Slot Chassis	1	
MU181020A	12.5 Gbit/s PPG	1	
MU181020B	14 Gbit/s PPG	1	
MU181040A	12.5 Gbit/s ED	1	
MU181040B	14 Gbit/s ED	1	
MU182020A	25 Gbit/s 1ch MUX	1	
MU182021A	25 Gbit/s 2ch MUX	1	
MU182040A	25 Gbit/s 1ch DEMUX	1	
MU182041A	25 Gbit/s 2ch DEMUX	1	

1.2.3 Applicable parts

Table 1.2.3-1 lists the applicable parts of this option.

Table 1.2.3-1 Applicable parts

Model Name/Symbol	Product Name	Q'ty	Remarks
W3176AE	MX180000A-x01 Pre-Code MX180000A-x02 De-Code Operation Manual	1	Printed version

1.3 Operating Environment

Use a PC with at least the performance shown below.

Table 1.3-1 Windows XP Operating System

Item	Specifications
Device type	*IBM-PC or compatible PC*
CPU	Pentium4 processor, 1.6-GHz or faster
OS	Windows XP Version 2002 Service Pack 2
Memory	At least 512 MB
Monitor resolution	At least 800 × 600 dots
Display colors	At least 256 colors
CD-ROM drive	Required for installation
Hard disk	At least 200 MB disk space for full installation
Remote Interface	10 BASE-T or 100 BASE-TX

Table 1.3-2 Windows 7 Operating System

Item	Specifications
Device type	IBM-PC or compatible PC
CPU	1 GHz or faster 32- (x86) or 64-bit (x64) processor
OS	Windows 7
Memory	32-bit: At least 1 GB RAM 64-bit: At least 2 GB RAM
Monitor resolution	At least 800 × 600 dots
Display colors	At least 256 colors
CD-ROM drive	Required for installation
Hard disk	At least 200 MB disk space for full installation
Remote Interface	10 BASE-T or 100 BASE-TX

CAUTION ⚠

Operation failure may arise if any of the following occurs on the PC when the MX180000A is operating:

- **Simultaneous execution with another application**
- **Closing the display (for laptop PCs)**
- **Screensaver activation**
- **Battery saving function activation (for laptop PCs)**

Refer to the operation manual of the PC used for how to turn off each function.

1.4 Specifications

Table 1.4-1 and Table 1.4-2 show the specifications for this option.

Table 1.4-1 Specifications for MX180000A-x01

Item	Specification
Supported peripherals	Refer to section 1.2.2
Installation	Must be installed in MP1800A or in PC controller in which Version 5.02.04 or later MX180000A Control Software installed. The MX180000A Ver.6.02.00 or later must be installed when the control PC is the Windows 7 operation system.
Operation bit rate	0.1 to 12.5 Gbit/s
Pre-Code Function ON/OFF Type Initial Data	 Sets Pre-Code function ON and OFF Sets Pre-Code modulation method 4ch Combination (Pre-Code): Choose DPSK or DB. 25Gx2ch Combination (Pre-Code):DQPSK Sets Pre-Code defaults Choose 0 or 1.

Table 1.4-2 Specifications for MX180000A-x02

Item	Specification
Supported peripherals	Refer to section 1.2.2
Installation	Must be installed in MP1800A or in PC controller in which Version 5.02.04 or later MX180000A Control Software installed. The MX180000A Ver.6.02.00 or later must be installed when the control PC is the Windows 7 operation system.
Operation bit rate	0.1 to 12.5 Gbit/s
De-Code Function ON/OFF Type Initial Data Measurement Selection	The De-Code ON setting is disabled when: Sync control is Frame OFF Sync control is Quick Test Pattern is Data and Pattern length is less than 512 bits Test Pattern is Zero Substitution and Pattern length is 2^7, 2^7-1, 2^9-1 Sets De-Code function ON and OFF Sets De-Code modulation method 4ch Combination (De-Code):hoose DPSK or DB. 25Gx2ch Combination (De-Code):DQPSK Sets De-Code defaults Choose 0 or 1. Selects De-Code setting method Manual Setting: Modulation data logic and sequence set manually Search Setting: Modulation data logic and sequence set automatically

Table 1.4-2 Specifications for MX180000A-x02 (Cont'd)

Item	Specification
Order Setting	Manual setting of modulation data logic and sequence Enabled when Measurement Selection set to Manual Setting Following modulation methods can be set: DQPSK Arm Setting: Sets I/Q data swap status. Select IQ or QI. I-Logic: Sets I data logic. Select I or /I. Q-Logic: Sets Q data logic. Select Q or /Q. DPSK/ODB Logic: Sets modulation data logic; select D or /D.
Search Start	Enabled when Measurement Selection set to Search Setting Starts auto-detection of modulation data swap and logic status
Search Stop	Forcibly stops above Search
Search Result	Displays measurement results when Search completed according to set modulation method as follows: DQPSK Order:I Q, /I Q, I /Q, /I /Q, Q I, /Q I, Q /I, /Q /I ------(Defaults or at Alarm) Error rate: 0.0000E-16 to 1.0000E00 ------(Defaults or at Alarm) DPSK/ODB Order:D, /D ------(Defaults or at Alarm) Error rate:0.0000E-16 to 1.0000E00 ------(Defaults or at Alarm)
Logic	Logic setting (POS/NEG) disabled at De-Code ON (enabled at OFF)
Capture	Capture function is disabled when 4ch Combination (De-Code) or 25Gx2ch Combination (De-Code) is selected.
Block Window	Block Window function is disabled when 4ch Combination (De-Code) or 25Gx2ch Combination (De-Code) is selected.

1.5 Restrictions

This section explains the restrictions when using this option.
This function is enabled by switching the operation of the target module at the [Combination Setting] screen as explained in Chapter 3 Operation Method.

Shared Restrictions

Operation up to 12.5 Gbit/s is assured whether or not Pre-Code/De-Code is ON or OFF when [4ch Combination] (Pre-Code/De-Code) or [25Gx2ch Combination] (Pre-Code/De-Code) is selected at [Combination Setting].

MX180000A-x02 De-Code Restrictions

The following functions are disabled when [4ch Combination] (De-Code), or [25Gx2ch Combination] (De-Code) is selected at [Combination Setting].

- Block Window
- Capture

The following functions are disabled when [4ch Combination] (De-Code), or [25Gx2ch Combination] (De-Code) is selected at [Combination Setting] and De-Code is ON.

- Frame OFF and Quick sync
- Pattern length less than 512 bits
- Pattern logic

If the Pattern length is set to less than 512 bits when De-Code is ON, De-Code is set automatically to OFF. The following message dialog is displayed in this case.

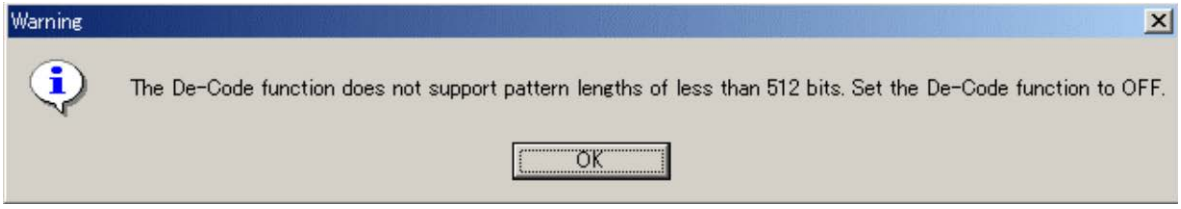


Figure 1.5-1 Warning Screen

In addition, when the pattern length is set to less than 512 bits using a remote command, De-Code is set automatically to OFF. In this case, note that no message dialog is displayed.

Chapter 2 Adding Options

This chapter describes how to add options.

2.1 Adding Options

When this option is purchased at the same time as the MP1800A/MT1810A, an Option Key License Certificate is appended. When purchasing this option some time after purchasing the MP1800A/MT1810A, the Option Key License Certificate is sent after informing Anritsu of the MP1800A/MT1810A serial number.

Use the following procedure to add this option.

1. Select [Setup utility] at the Selector screen.

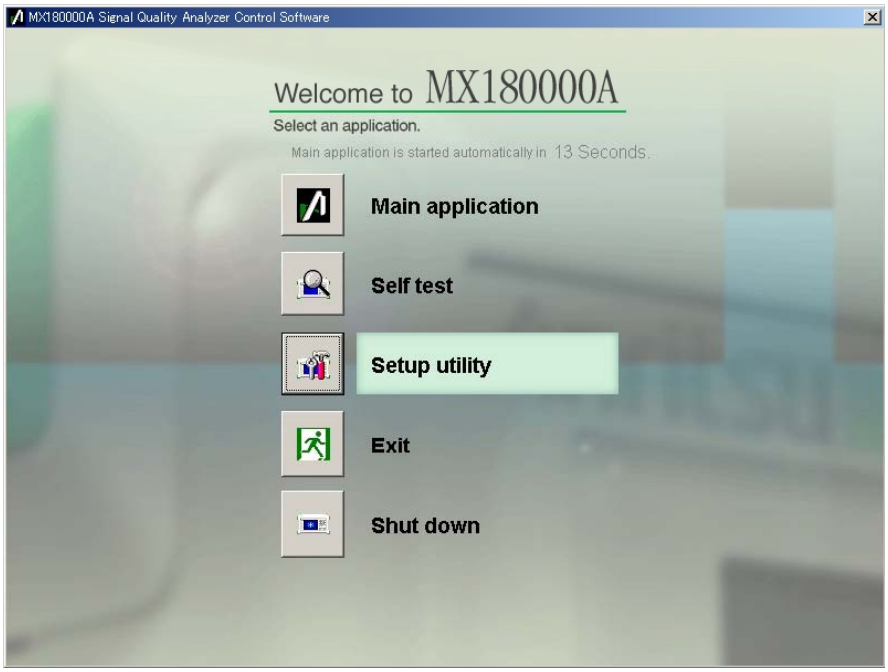


Figure 2.1-1 Selector screen

2. The Setup Utility login window is displayed. Select [Option] from the Login drop-down list to enable the Option Key input boxes.
Enter the key code provided in the "Option Key License Certificate" into the Option Key input boxes. Next, click [OK] to display the option addition screen.

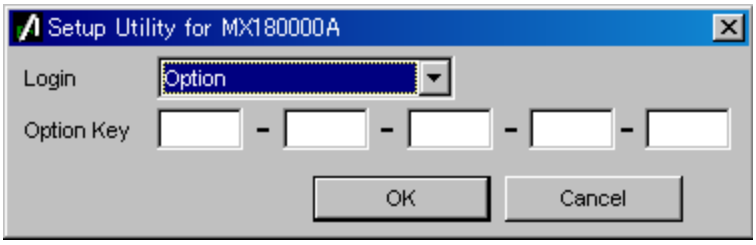
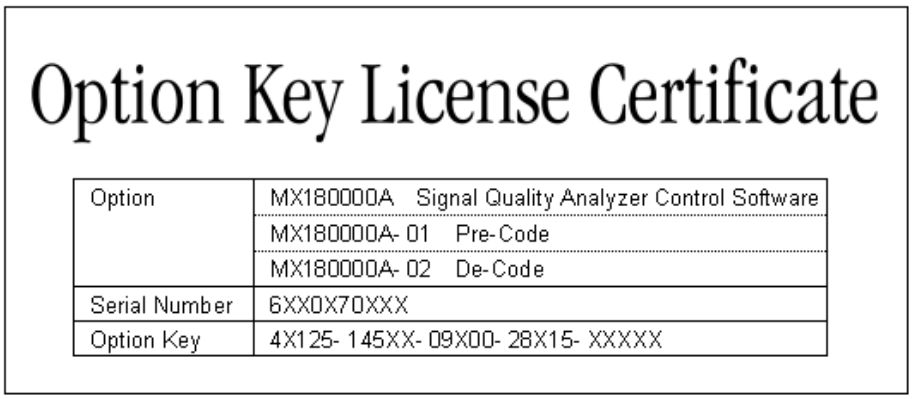


Figure 2.1-2 Entering option key



Option Key License Certificate

Option	MX180000A Signal Quality Analyzer Control Software
	MX180000A-01 Pre-Code
	MX180000A-02 De-Code
Serial Number	6XX0X70XXX
Option Key	4X125-145XX-09X00-28X15-XXXXX

Figure 2.1-3 Sample Option Key License Certificate

3. A list of options that can be added by the entered key code is displayed. Select the checkbox corresponding to the option to be added, and then click [Apply]. The selected option is then added. To check if the option has been added, use the [Version] tab on the Setup Utility screen.

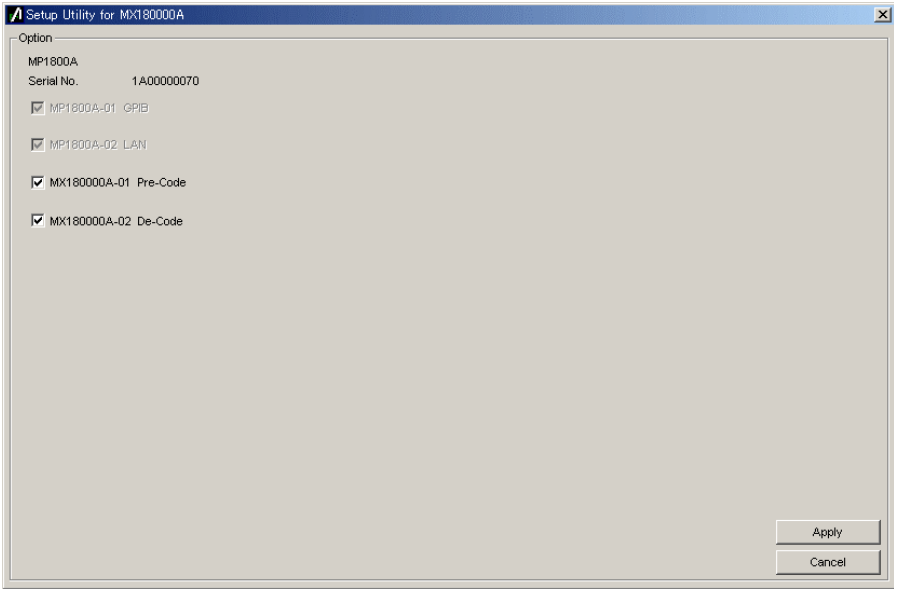


Figure 2.1-4 Option Addition Screen

Notes:

1. When adding this option to the MP1800A, the option key can only be used for the main frame with the serial number shown in the Option Key License Certificate.

2. When multiple options are purchased at the same time or separately, only one Option Key License Certificate for one of the main frame with the serial number is issued.

3. The Option Key of the Option Key License Certificate includes data on the purchased options. When two options are purchased at the same time, although only one Option Key is issued, it includes data for the two purchased options.

4. When this option is purchased at the same time as the MP1800A, the option is installed in the MP1800A at shipment. Although the Option Key License Certificate is issued at the same time, the above procedure for adding options is needed.

5. Keep the Option Key License Certificate for future support.

Chapter 3 Operation Method

This chapter explains the option screens and functions.

3.1 Selecting Pre-Code/De-Code

The Pre-Code/De-Code functions are selected at the [Combination Setting] screen.

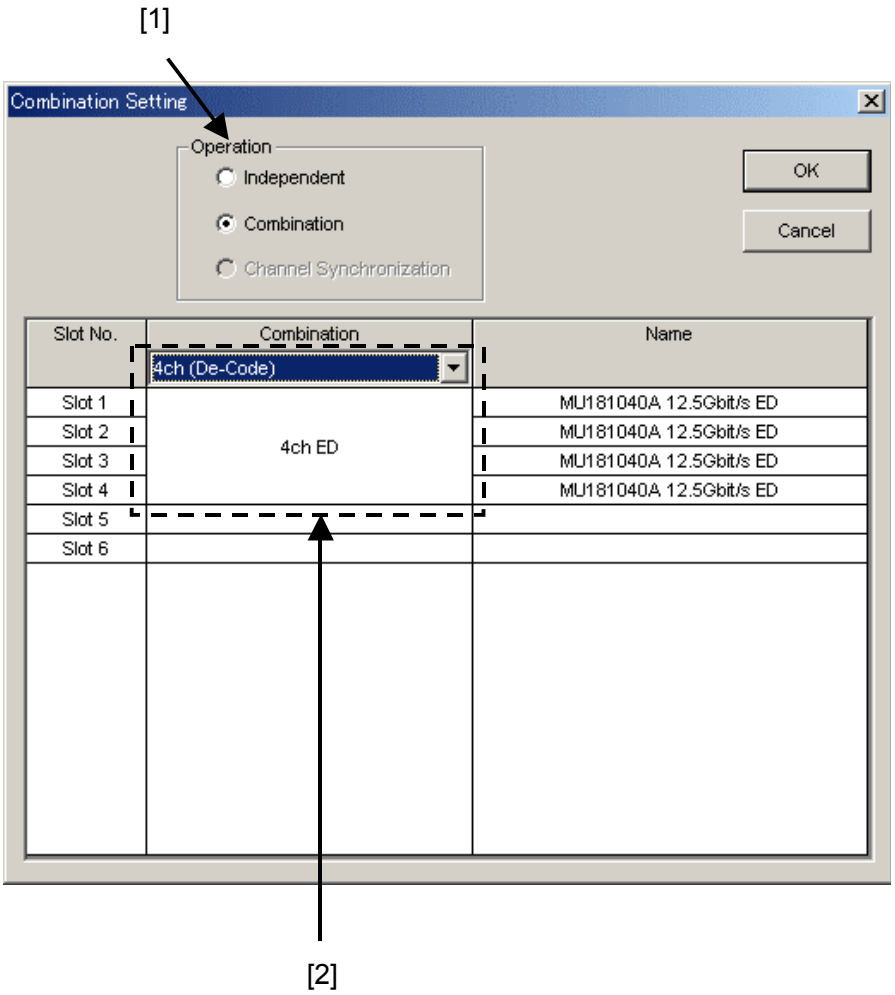


Figure 3.1-1 Combination Setting Dialog Box

Table 3.1-1 Combination Setting Screen Operation Items

No.	Item	Description
[1]	Operation	Select [Combination] to enable the Pre-Code/De-Code function.

Table 3.1-1 Combination Setting Screen Operation Items (Cont'd)

No.	Item	Description
[2]	4ch Combination (Pre-Code) 4ch Combination (De-Code) 25Gx2ch Combination (Pre-Code) 25Gx2ch Combination (De-Code)	4ch Combination(Pre-Code): The DPSK/DB Pre-Code function can be used when the [Pre-Code] tab is enabled. This can be set only when the MX180000A-x01 is installed and the installed PPG is set to [4ch Combination]. 4ch Combination(De-Code): The DPSK/DB De-Code function can be used when the [De-Code] tab is enabled. This can be set only when the MX180000A-x02 is installed and the installed ED is set to [4ch Combination]. 25Gx2ch Combination(Pre-Code): The DQPSK Pre-Code function can be used when the [Pre-Code] tab is enabled. This can be set only when the MX180000A-x01 is installed and the installed PPG is set to [25Gx2ch Combination]. 25Gx2ch Combination(De-Code): The DQPSK De-Code function can be used when the [De-Code] tab is enabled. This can be set only when the MX180000A-x02 is installed and the installed ED is set to [25Gx2ch Combination].

3.2 Setting Pre-Code Function

To set the Pre-Code function, select the [Pre-Code] tab.

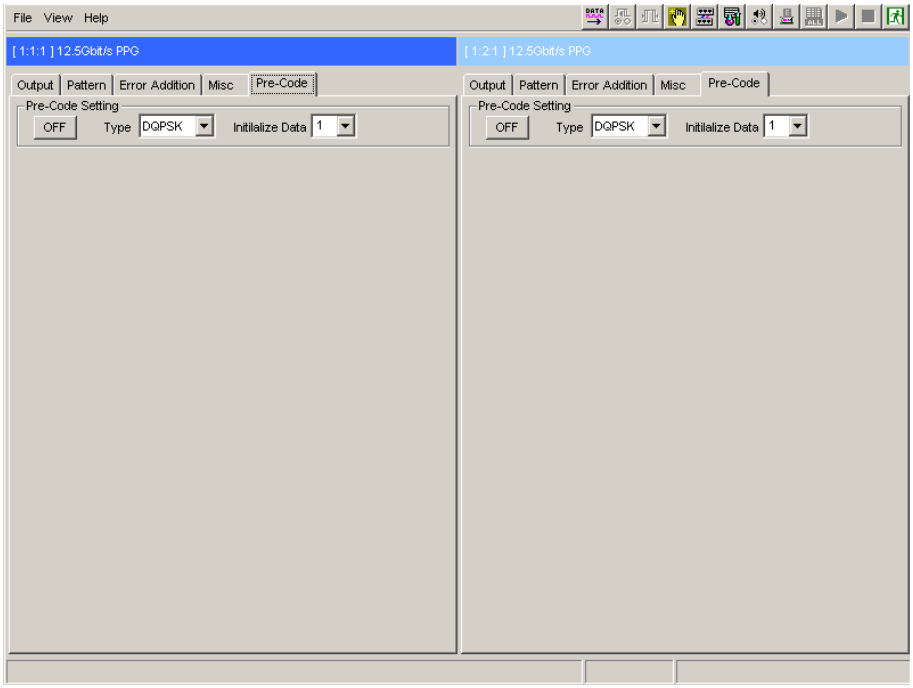


Figure 3.2-1 Pre-Code tab window

Since this function supports DQPSK, DPSK, and DB technologies, it can calculate and output Data as shown in the following Pre-Code logic diagram.

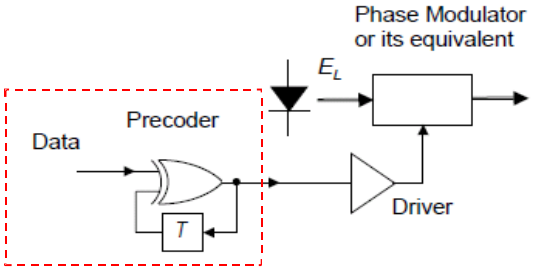


Figure 3.2-2 Pre-Code Logic (DQPSK) Diagram

3.2.1 Pre-Code setting

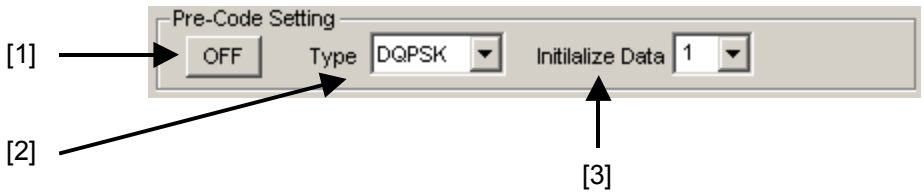


Figure 3.2.1-1 Pre-Code Setting dialog box

Table 3.2.1-1 Pre-Code Setting item

No.	Item	Function
[1]	Pre-Code ON/OFF	Sets Pre-Code ON and OFF
[2]	Type	Sets Pre-Code modulation method When 25Gx2ch Combination (Pre-Code) selected: DQPSK When 4ch Combination(Pre-Code): Select from DPSK and DB (Default: DPSK)
[3]	Initialize Data	Sets Pre-Code to default values (Default: 1)

3.3 Setting De-Code Function

To set the De-Code function, select the [De-Code] tab.

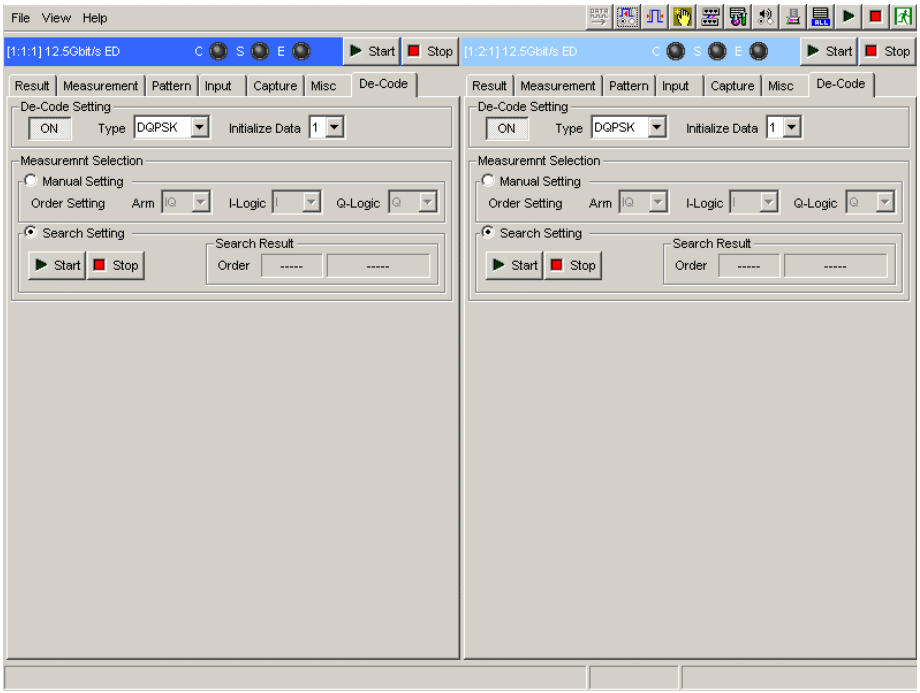


Figure 3.3-1 De-Code tab window

This function decodes the precoded Rx data to measure DQPSK, DPSK, and DB data. The bit swap and logic status can be set either manually or automatically.

The following functions are disabled when [4ch Combination] (De-Code), or [25Gx2ch Combination] (De-Code) is selected.

- Block Window at [Pattern] tab
- Capture function at [Capture] tab

When De-Code Setting is ON, the following settings are disabled.

- Frame OFF and Quick sync at [Measurement] tab
- POS/NEG setting at [Pattern] tab

Note:

When De-Code Setting is On, it takes some time for synchronization if the PRB mark rate of the Test Pattern Length is 1/4, 1/8, 3/4, or 7/8.

3.3.1 De-Code setting

Figure 3.3.1-1 De-Code Setting dialog box

Table 3.3.1-1 De-Code Setting item

No.	Item	Function
[1]	De-Code ON/OFF	Sets De-Code ON and OFF
[2]	Type	Sets De-Code modulation method When 25Gx2ch Combination(De-Code): DQPSK When 4ch Combination(De-Code): Select from DPSK and DB (Default: DPSK)
[3]	Initialize Data	Sets De-Code to default values (Default: 1)

Note:

When disabling the De-Code ON/OFF setting [1], check the following:

- The Length setting at the [Pattern] tab must be 512 bits or more.
- The Block Window at the [Pattern] tab must be OFF.
- The Sync Control setting at the [Measurement] tab must be Frame ON (except when the Test Pattern setting at [Pattern] tab is PRBS).

3.3.2 DQPSK setting

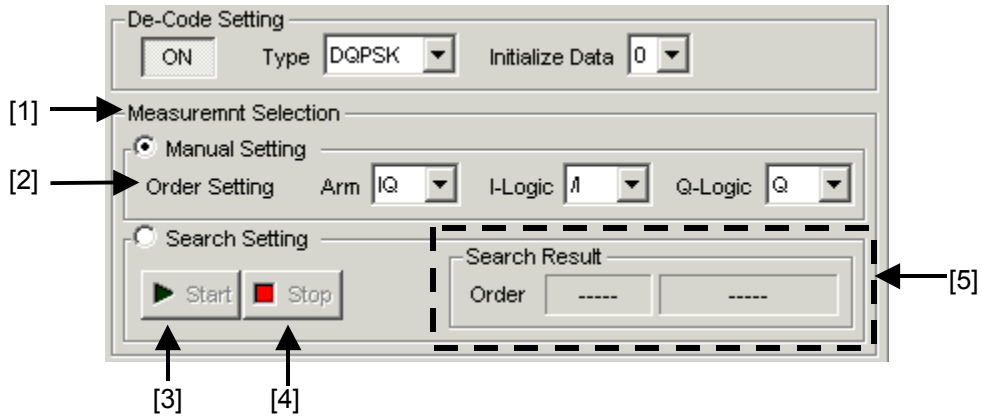


Figure 3.3.2-1 DQPSK Setting dialog box

Table 3.3.2-1 DQPSK Setting item

No.	Item	Function
[1]	Measurement Selection	Selects De-Code setting method Manual Setting: Sets De-Code settings manually Search Setting: Sets best De-Code settings automatically When the [Start] button in item [3] below is pressed, the items in [2] Order Setting are set automatically. The error rate at the best setting (smallest error rate) is displayed in [Search Result] of item [5].
[2]	Order Setting	Following settings enabled when [Manual Setting] selected: Arm: Select IQ or QI. I-Logic: Select I or /I. Q-Logic: Select Q or /Q.
[3]	Start	Starts Search
[4]	Stop	Stops Search
[5]	Search Result	Displays automatically detected results (Order setting and Error rate) Order: I Q,/I Q,I /Q,/I /Q,Q I,/Q I,Q /I,/Q /I ------(Defaults or at Alarm) Error rate: 0.0000E-16 to 1.0000E00 ------(Defaults or at Alarm)

Note:

Search cannot be executed when Clock Loss or CR Unlock occur.

3.3.3 DPSK/DB setting

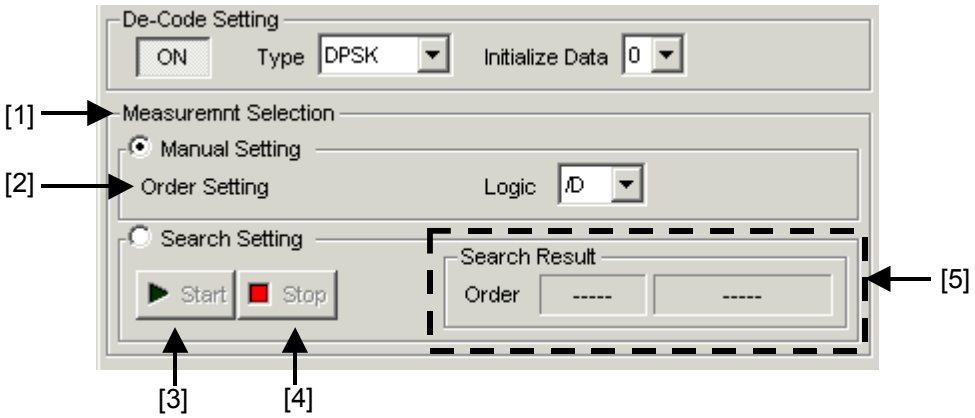


Figure 3.3.3-1 DPSK/DB Setting dialog box

Table 3.3.3-1 DPSK/DB Setting item

No.	Item	Function
[1]	Measurement Selection	Selects De-Code setting method Manual Setting: Sets De-Code settings manually Search Setting: Sets best De-Code settings automatically When the [Start] button in item [3] below is pressed, the items in [2] Order Setting are set automatically. The error rate at the best setting (smallest error rate) is displayed in [Search Result] of item [5].
[2]	Order Setting	Following settings enabled when [Manual Setting] selected: Logic: Select D or /D.
[3]	Start	Starts Search
[4]	Stop	Stops Search
[5]	Search Result	Displays automatically detected results (Order setting and Error rate) Order: D,/D ------(Defaults or at Alarm) Error rate: 0.0000E-16 to 1.0000E00 ------(Defaults or at Alarm)

Note:

Search cannot be executed when Clock Loss or CR Unlock occur.

Chapter 4 Remote Command

This chapter explains remote commands added by this option. Refer to this chapter for the new remote commands and existing commands that have changed. Refer to the MX180000A Remote Control Instruction Manual for any other commands.

Table 4-1 lists the new commands added by this option as well as changed existing commands. "New command" means a command added by this option.
"Parameter changed" means the function is the same as the function of existing command but the setting parameter or response is changed. In addition, this table explains the changed contents of each command.

Table 4-1 List of Changed Commands

Modules	Command	Change
Common Commands	:COMBination:OPERation:SETTing	Parameter changed
	:COMBination:OPERation:SETTing?	Parameter changed
	:COMBination:OPERation:ABILity:COMBination?	Parameter changed
PPG Commands	:SOURce:PRECode:SET	New command
	:SOURce:PRECode:SET?	
	:SOURce:PRECode:TYPE	New command
	:SOURce:PRECode:TYPE?	
	:SOURce:PRECode:INITialize	New command
	:SOURce:PRECode:INITialize?	
ED Commands	:SENSe:DECode:SET	New command
	:SENSe:DECode:SET?	
	:SENSe:DECode:TYPE	New command
	:SENSe:DECode:TYPE?	
	:SENSe:DECode:INITialize	New command
	:SENSe:DECode:INITialize?	
	:SENSe:DECode:MEASure:SELection	New command
	:SENSe:DECode:MEASure:SELection?	
	:SENSe:DECode:MANual:ARM	New command
	:SENSe:DECode:MANual:ARM?	
	:SENSe:DECode:MANual:ILOGic	New command
	:SENSe:DECode:MANual:ILOGic?	
	:SENSe:DECode:MANual:QLOGic	New command
	:SENSe:DECode:MANual:QLOGic?	
	:SENSe:DECode:MANual:LOGic	New command
	:SENSe:DECode:MANual:LOGic?	
	:SENSe:DECode:SEARch:STARt	New command
	:SENSe:DECode:SEARch:STOP	New command
	:SENSe:DECode:SEARch:STATe?	New command
	:SENSe:DECode:SEARch:RESult?	New command

4.1 Common Commands

This section explains commands related to common settings and common functions.

Table 4.1-1 Common Commands

Setting Items	Commands
Combination Setting	:COMBination:OPERation:SETTing
	:COMBination:OPERation:SETTing?
	:COMBination:OPERation:ABILity:COMBination?

:COMBination:OPERation:SETTing <configuration>[,<unit>]

Parameter

<configuration>=<NR1 NUMERIC PROGRAM DATA>

0	Independent
21	2 Ch PPG Combination
22	2 Ch ED Combination
23	2 Ch PPG/ED Combination
41	4 Ch PPG Combination
42	4 Ch ED Combination
71	25G x 2 Ch PPG Combination
72	25G x 2 Ch ED Combination
81	4 Ch PPG Combination (Pre-Code)
82	4 Ch ED Combination (De-Code)
83	25G x 2 Ch PPG Combination (Pre-Code)
84	25G x 2 Ch ED Combination (De-Code)

[<unit>]=<DECIMAL NUMERIC PROGRAM DATA>

1 to 4	Mainframe Nos. 1 to 4

When using two or more MT1810A units in serial connection, specify the mainframe number.

Can be omitted. Mainframe No. 1 is specified when omitted.

Function

Sets the combination setting for the specified unit, from Combination or Independent.

Example

To set the combination setting of Unit 3 to 4-ch PPG combination:

> :COMBination:OPERation:SETTing 41,3

Changed Contents

Added parameter

:COMBination:OPERation:SETTing? <slot>[,<unit>]

Parameter

<slot>=<CHARACTER PROGRAM DATA>
SLOT1 to SLOT6 Slot No.1 to 6
ALL All modules (units)
When using the MP1800A: 1 to 6, when using the MT1810A: 1 to 4

[<unit>]=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4 Mainframe Nos. 1 to 4
When using two or more MT1810A units in serial connection, specify the mainframe number.
Can be omitted. Mainframe No. 1 is specified when omitted.

Response

<numeric>=<NR1 NUMERIC RESPONSE DATA>

0	Independent
1	Channel Synchronization
21	2 Ch PPG Combination
22	2 Ch ED Combination
23	2 Ch PPG/ED Combination
41	4 Ch PPG Combination
42	4 Ch ED Combination
71	25G x 2 Ch PPG Combination
72	25G x 2 Ch ED Combination
81	4 Ch PPG Combination (Pre-Code)
82	4 Ch ED Combination (De-Code)
83	25G x 2 Ch PPG Combination (Pre-Code)
84	25G x 2 Ch ED Combination (De-Code)

Function

Queries the combination setting of the specified slot.

Example

To query the combination setting of Unit 1:
> :COMBination:OPERation:SETTing? ALL
< 0
To query the combination setting of Slot 3 in Unit 2:
> :COMBination:OPERation:SETTing? SLOT3,2
< 41
To query the combination setting of Unit 3:
> :COMBination:OPERation:SETTing? ALL,3
< 0

Changed Contents

Added response

:COMBination:OPERation:ABILity:COMBination? [<unit>]

Parameter	[<unit>]=<DECIMAL NUMERIC PROGRAM DATA> 1 to 4 Mainframe Nos. 1 to 4 When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted.
Response	<numeric>=<NR1 NUMERIC RESPONSE DATA> 0 Independent 21 2 Ch PPG Combination 22 2 Ch ED Combination 23 2 Ch PPG/ED Combination 41 4 Ch PPG Combination 42 4 Ch ED Combination 71 25G x 2 Ch PPG Combination 72 25G x 2 Ch ED Combination 81 4 Ch PPG Combination (Pre-Code) 82 4 Ch ED Combination (De-Code) 83 25G x 2 Ch PPG Combination (Pre-Code) 84 25G x 2 Ch ED Combination (De-Code)
Function	Queries the available combination configuration.
Example	To query the combination configuration available for Unit 1: > :COMBination:OPERation:ABILity:COMBination? < 41
Changed Contents	Added response

4.2 Pre-Code Function Commands

Installing the MX180000A-x01 Pre-Code option adds the Pre-Code tab shown in Fig. 4.2-1 to the MU181020A/B PPG. Table 4.2-1 explains the details of the commands for setting the items shown in Figure 4.2-1.

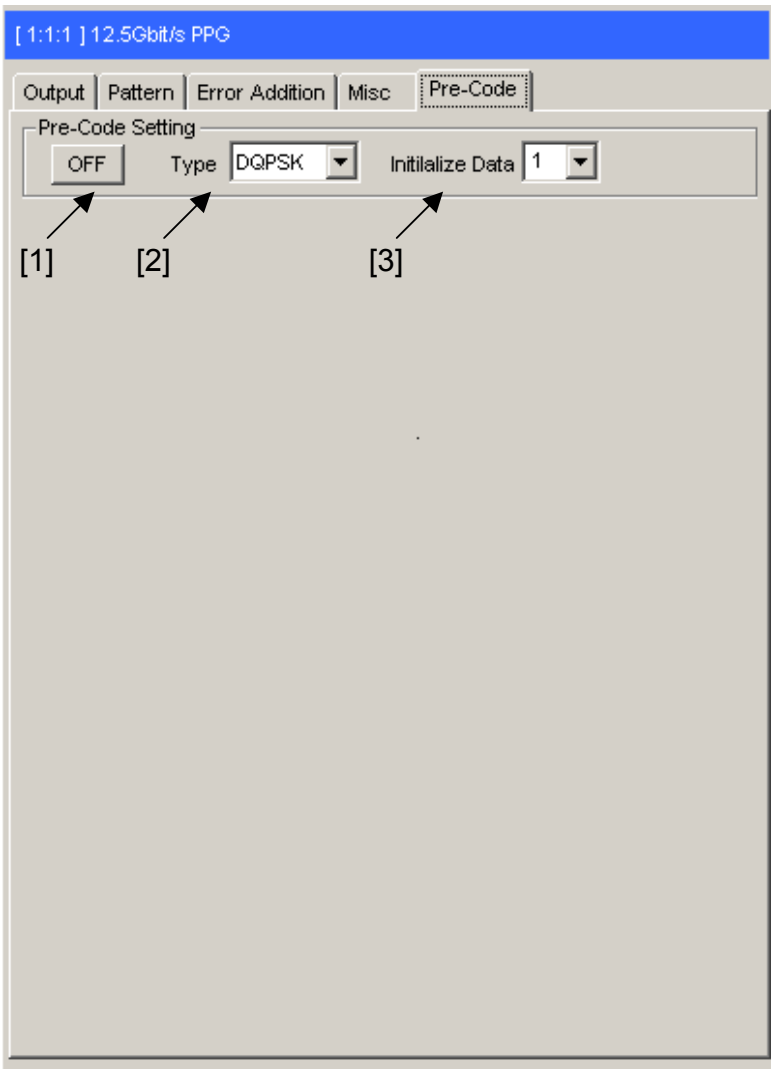


Figure 4.2-1 Pre-Code tab window

Table 4.2-1 Pre-Code setting commands

No.	Setting Items	Commands
[1]	Pre-Code ON/OFF	:SOURce:PRECode:SET
		:SOURce:PRECode:SET?
[2]	Type	:SOURce:PRECode:TYPE
		:SOURce:PRECode:TYPE?
[3]	Initialize Data	:SOURce:PRECode:INITialize
		:SOURce:PRECode:INITialize?

:SOURce:PRECode:SET <boolean>

Parameter	<boolean>=<BOOLEAN PROGRAM DATA>	
	OFF or 0	Pre-Code OFF
	ON or 1	Pre-Code ON
Function	Sets Pre-Code Setting to ON or OFF	
Example	Set Pre-Code Setting to ON	
	> :SOURce:PRECode:SET ON	
Changed Contents	New command	

:SOURce:PRECode:SET?

Response	<numeric>=<NR1 NUMERIC RESPONSE DATA>	
	0	Pre-Code OFF
	1	Pre-Code ON
Function	Queries whether Pre-Code Setting ON or OFF	
Example	> :SOURce:PRECode:SET?	
	< 1	
Changed Contents	New command	

:SOURce:PRECode:TYPE <type>

Parameter	<type>=<CHARACTER PROGRAM DATA>	
	DQPSk	DQPSK
	DPSK	DPSK
	DB	DB
Function	Sets Pre-Code Setting Type	
Example	Set Pre-Code Setting Type to DQPSK	
	> :SOURce:PRECode:TYPE DQPSk	
Changed Contents	New command	

:SOURce:PRECode:TYPE?

Response	<type>=<CHARACTER RESPONSE DATA>	
	DQPS, DPSK, DB	
Function	Queries Pre-Code Setting Type	
Example	> :SOURce:PRECode:TYPE?	
	< DQPS	
Changed Contents	New command	

:SOURce:PRECode:INITialize <numeric>

Parameter	<numeric>=<DECIMAL NUMERIC PROGRAM DATA>
	0, 1
Function	Sets Pre-Code Setting Initialize Data
Example	Set Pre-Code Setting Initialize Data to 1
	> :SOURce:PRECode:INITialize 1
Changed Contents	New command

:SOURce:PRECode:INITialize?

Response	<numeric>=<NR1 NUMERIC RESPONSE DATA>
	0, 1
Function	Queries Pre-Code Setting Initialize Data
Example	> :SOURce:PRECode:INITialize?
	< 1
Changed Contents	New command

4.3 De-Code Function Commands

Installing the MX180000A-x02 De-Code option adds the De-Code tab shown in Figure 4.3-1 to the MU181040A/B ED. Table 4.3-1 explains the details of the commands for setting the items shown in Figure 4.3-1 and Figure 4.3-2.

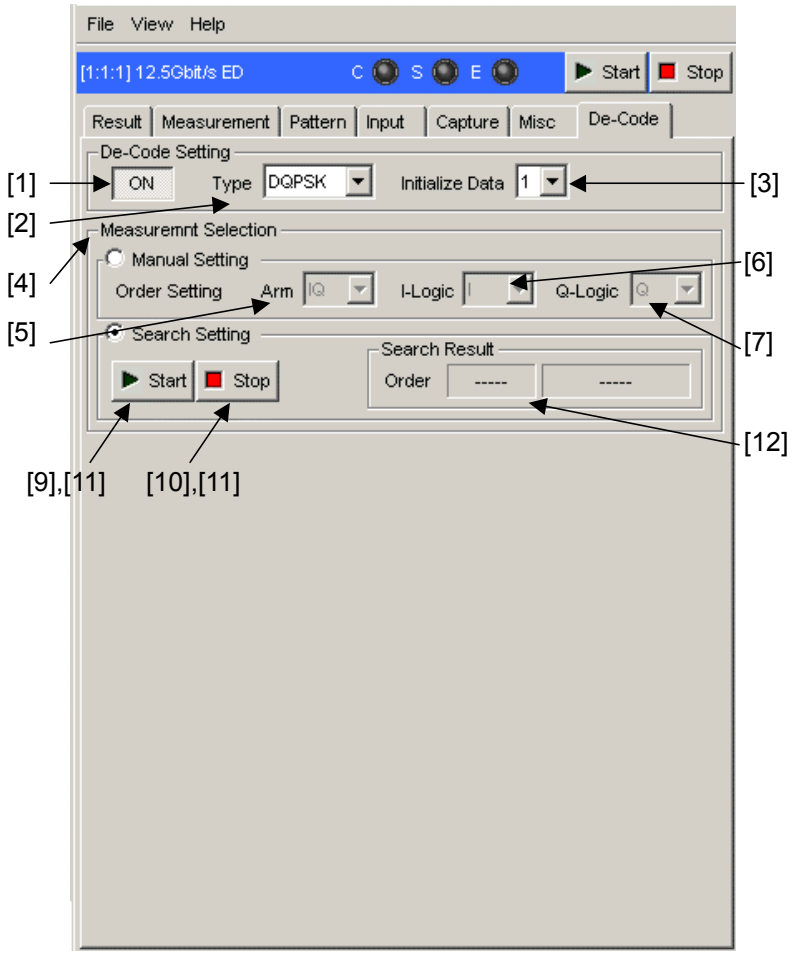


Figure 4.3-1 De-Code tab window (at DQPSK setting)

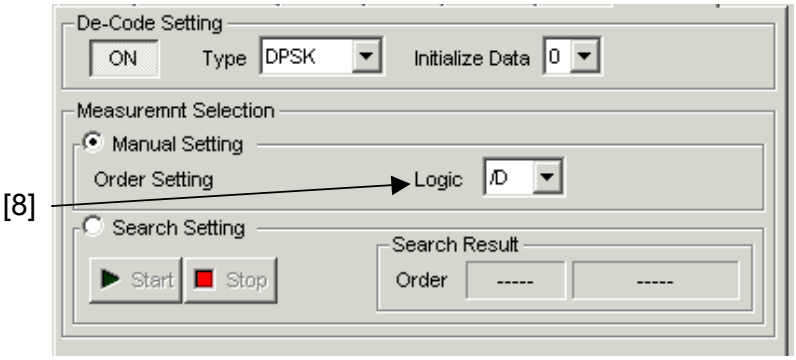


Figure 4.3-2 De-Code tab window (at DPSK/DB setting)

Table 4.3-1 De-Codesetting commands

No.	Setting Items	Commands
[1]	De-Code ON/OFF	:SENSe:DECode:SET
		:SENSe:DECode:SET?
[2]	Type	:SENSe:DECode:TYPE
		:SENSe:DECode:TYPE?
[3]	Initialize Data	:SENSe:DECode:INITialize
		:SENSe:DECode:INITialize?
[4]	Measurement Selection	:SENSe:DECode:MEASure:SELection
		:SENSe:DECode:MEASure:SELection?
[5]	Order Setting Arm	:SENSe:DECode:MANual:ARM
		:SENSe:DECode:MANual:ARM?
[6]	Order Setting I-Logic	:SENSe:DECode:MANual:ILOGic
		:SENSe:DECode:MANual:ILOGic?
[7]	Order Setting Q-Logic	:SENSe:DECode:MANual:QLOGic
		:SENSe:DECode:MANual:QLOGic?
[8]	Order Setting Logic	:SENSe:DECode:MANual:LOGic
		:SENSe:DECode:MANual:LOGic?
[9]	Search Start	:SENSe:DECode:SEARch:STARt
[10]	Search Stop	:SENSe:DECode:SEARch:STOP
[11]	Search State	:SENSe:DECode:SEARch:STATe?
[12]	Search Result	:SENSe:DECode:SEARch:RESult?

:SENSe:DECode:SET <boolean>

Parameter	<boolean>=<BOOLEAN PROGRAM DATA>	
	OFF or 0	De-Code OFF
	ON or 1	De-Code ON
Function	Sets De-Code Setting to ON or OFF	
Example	Set De-Code Setting to ON	
	> :SENSe:DECode:SET ON	
Changed Contents	New command	

:SENSe:DECode:SET?

Response	<numeric>=<NR1 NUMERIC RESPONSE DATA>	
	0	De-Code OFF
	1	De-Code ON
Function	Queries whether De-Code Setting ON or OFF	
Example	> :SENSe:DECode:SET?	
	< 1	
Changed Contents	New command	

:SENSe:DECode:TYPE <type>

Parameter	<type>=<CHARACTER PROGRAM DATA>	
	DQPSk	DQPSK
	DPSK	DPSK
	DB	DB
Function	Sets De-Code Setting Type	
Example	Set De-Code Setting Type to DQPSK	
	> :SENSe:DECode:TYPE DQPSk	
Changed Contents	New command	

:SENSe:DECode:TYPE?

Response	<type>=<CHARACTER RESPONSE DATA>	
	DQPS, DPSK, DB	
Function	Queries De-Code Setting Type	
Example	> :SENSe:DECode:TYPE?	
	< DQPS	
Changed Contents	New command	

:SENSe:DECode:INITialize <numeric>

Parameter	<numeric>=<DECIMAL NUMERIC PROGRAM DATA>
	0, 1
Function	Sets De-Code Setting Initialize Data
Example	Set De-Code Setting Initialize Data to 1
	> :SENSe:DECode:INITialize 1
Changed Contents	New command

:SENSe:DECode:INITialize?

Response	<numeric>=<NR1 NUMERIC RESPONSE DATA>
	0, 1
Function	Queries De-Code Setting Initialize Data
Example	> :SENSe:DECode:INITialize?
	< 1
Changed Contents	New command

:SENSe:DECode:MEASure:SELection <selection>

Parameter	<selection>=<CHARACTER PROGRAM DATA>
	MANual Manual Setting
	SEARch Search Setting
Function	Sets De-Code Setting Measurement Selection
Example	Set De-Code Setting Measurement Selection to Manual
	> :SENSe:DECode:MEASure:SELection MANual
Changed Contents	New command

:SENSe:DECode:MEASure:SELection?

Response	<selection>=<CHARACTER RESPONSE DATA>
	MAN, SEAR
Function	Queries De-Code Setting Measurement Selection
Example	> :SENSe:DECode:MEASure:SELection?
	< MAN
Changed Contents	New command

:SENSe:DECode:MANual:ARM <arm>

Parameter	<arm>=<CHARACTER PROGRAM DATA>
	IQ I Q
	QI Q I
Function	Sets arm for Manual Setting when De-Code Setting is DQPSK
Example	Set arm for Manual Setting to IQ when Code Setting is DQPSK
	> :SENSe:DECode:MANual:ARM IQ
Changed Contents	New command

:SENSe:DECode:MANual:ARM?

Response	<arm>=<CHARACTER RESPONSE DATA>
	IQ, QI
Function	Queries arm setting for Manual Setting when De-Code Setting is DQPSK
Example	> :SENSe:DECode:MANual:ARM?
	< IQ
Changed Contents	New command

:SENSe:DECode:MANual:ILOGic <ilog>

Parameter	<ilog>=<CHARACTER PROGRAM DATA>
	I I
	/I /I
Function	Sets I-Logic for Manual Setting when De-Code Setting is DQPSK
Example	Set I-Logic for Manual Setting to I when De-Code Setting is DQPSK
	> :SENSe:DECode:MANual:ILOGic I
Changed Contents	New command

:SENSe:DECode:MANual:ILOGic?

Response	<ilog>=<CHARACTER RESPONSE DATA>
	I, /I
Function	Queries I-Logic for Manual Setting when De-Code Setting is DQPSK
Example	> :SENSe:DECode:MANual:ILOGic?
	< I
Changed Contents	New command

:SENSe:DECode:MANual:QLOGic <ilog>

Parameter	<qlog>=<CHARACTER PROGRAM DATA>
	Q Q
	/Q /Q
Function	Sets Q-Logic for Manual Setting when De-Code Setting is DQPSK
Example	Set Q-Logic for Manual Setting to Q when De-Code Setting is DQPSK
	> :SENSe:DECode:MANual:QLOGic Q
Changed Contents	New command

:SENSe:DECode:MANual:QLOGic?

Response	<qlog>=<CHARACTER RESPONSE DATA>
	Q, /Q
Function	Queries Q-Logic for Manual Setting when De-Code Setting is DQPSK
Example	> :SENSe:DECode:MANual:QLOGic?
	< Q
Changed Contents	New command

:SENSe:DECode:MANual:LOGic <log>

Parameter	<log>=<CHARACTER PROGRAM DATA>
	D D
	/D /D
Function	Sets Logic for Manual Setting when De-Code Setting is DPSK/DB
Example	Set Logic for Manual Setting to /D when De-Code Setting is DPSK/DB
	> :SENSe:DECode:MANual:LOGic /D
Changed Contents	New command

:SENSe:DECode:MANual:LOGic?

Response	<log>=<CHARACTER RESPONSE DATA>
	D, /D
Function	Queries Logic for Manual Setting when De-Code Setting is DPSK/DB
Example	> :SENSe:DECode:MANual:LOGic?
	< /D
Changed Contents	New command

:SENSe:DECode:SEARch:STARt

Parameter	None
Function	Starts De-Code Setting Search
Example	> :SENSe:DECode:SEARch:STARt
Changed Contents	New command

:SENSe:DECode:SEARch:STOP

Parameter	None
Function	Stops De-Code Setting Search
Example	> :SENSe:DECode:SEARch:STOP
Changed Contents	New command

:SENSe:DECode:SEARch:STATe?

Response	<state>=<CHARACTER RESPONSE DATA>
	0 Search stopped
	1 Searching
Function	Queries De-Code Setting Search status
Example	> :SENSe:DECode:SEARch:STATe?
Changed Contents	New command

:SENSe:DECode:SEARch:RESult?

Response	<order>=<STRING RESPONSE DATA>
	"-----" Not executing or Alarm occurred
	"I Q", "/I Q", "I /Q", "/I /Q", "Q I", "/Q I", "Q /I", "/Q /I", "D", "/D"
	<rate>=<STRING RESPONSE DATA>
	"-----" Not executing or Alarm occurred
	"X.XXXXE-XX" 0.0000E-16 ~ 1.0000E00
Function	Captures De-Code Setting Search results
Example	> :SENSe:DECode:SEARch:RESult?
	< "-----", "-----" (Not executing or Alarm occurred)
	< "/I Q", "0.0000E-10"
Changed Contents	New command