MX269036A

Measurement Software for

MediaFLO

Operation Manual

Operation

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 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.**

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These indicate that the marked part should be recycled.

MX269036A
Measurement Software for MediaFLO
Operation Manual   Operation

14   October   2009 (First Edition)
30   March   2010 (Third Edition)

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

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

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  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.

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CE marking

$C\ E$

1. Product Model

Software: MX269036A Measurement Software for MediaFLO

2. Applied Directive and Standards

When the MX269036A Measurement Software for MediaFLO is installed in the MS2690A/MS2691A/MS2692A, the applied directive and standards of this unit conform to those of the MS2690A/MS2691A/ MS2692A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that the MX269036A 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

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PS: About main frame
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About This Manual

■ **Composition of Operation Manuals**

The operation manuals for the MX269036A Measurement Software for MediaFLO are comprised as shown in the figure below.
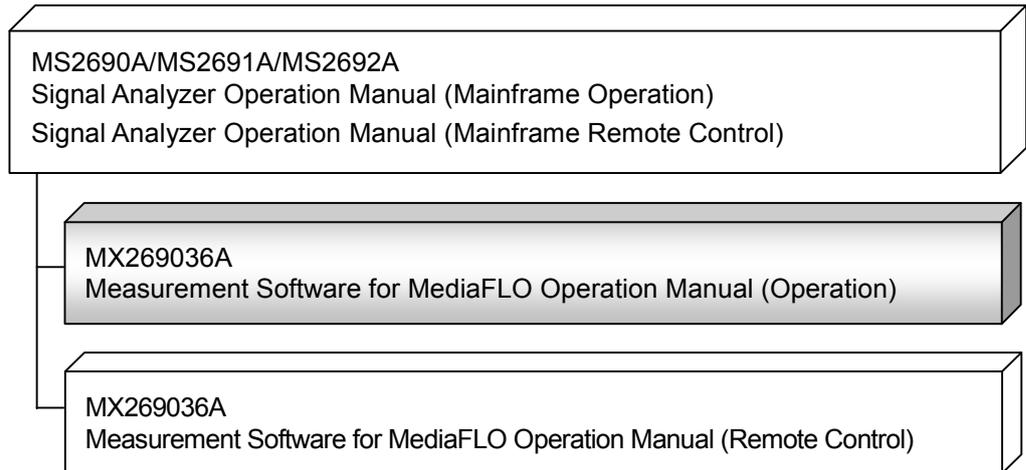
MS2690A/MS2691A/MS2692A
Signal Analyzer Operation Manual (Mainframe Operation)
Signal Analyzer Operation Manual (Mainframe Remote Control)

MX269036A
Measurement Software for MediaFLO Operation Manual (Operation)

MX269036A
Measurement Software for MediaFLO Operation Manual (Remote Control)

- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)

These manuals describe basic operating methods, maintenance procedures, common functions, and common remote control of the signal analyzer mainframe.

- Measurement Software for MediaFLO Operation Manual (Operation) <This document>

This manual describes basic operating methods, and functions of the Measurement Software for MediaFLO.

- Measurement Software for MediaFLO Operation Manual (Remote Control)

This manual describes remote control of the Measurement Software for MediaFLO.

In this document, ⬜ indicates a panel key.

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Appendix

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IV.

Chapter 1   Overview

This chapter provides an overview of the MX269036A Measurement Software for MediaFLO and describes the product configuration.

1

Overview

1.1 Product Overview

The MS2690A/MS2691A/MS2692A Signal Analyzer (hereinafter referred to as the MS2690A/MS2691A/MS2692A) enables fast, accurate, simple measurements of transmission characteristics of base stations and mobile stations for various mobile communications types, as well as such measurements of transmission characteristics of transmitters and terminals for broadcasting. The MS2690A/MS2691A/MS2692A is equipped with high-performance signal analyzer and spectrum analyzer functions as standard, with optional measurement software allowing modulation analysis functionality supporting various digital modulation modes.

The MX269036A Measurement Software for MediaFLO (hereinafter referred to as the MX269036A) is a software option for measuring RF characteristics of FLO signals as specified by the United States TIA standards TIA-1099 and TIA-1099-A.

The MX269036A provides the following measurement features.

- Modulation error ratio measurement
- Carrier frequency measurement
- Transmitter power measurement
- Frequency response
- Transmitter timing measurement

1.2 Product Configuration

1.2.1 Standard configuration

Table 1.2.1-1 lists the standard configuration of the MX269036A.

Table 1.2.1-1   Standard configuration

Item	Model Name/Symbol	Product Name	Q'ty	Remarks
Application	MX269036A	Measurement Software for MediaFLO	1	
Accessory	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

1.2.2 Applicable parts

Table 1.2.2-1 lists the applicable parts for the MX269036A.

Table 1.2.2-1   Applicable parts

Model Name/Symbol	Product Name	Remarks
W3313AE	MX269036A Measurement Software for MediaFLO Operation Manual (Operation)	English, printed version
W3314AE	MX269036A Measurement Software for MediaFLO Operation Manual (Remote Control)	English, printed version

1

Overview

1.3 Specifications

Table 1.3-1 shows the specifications for the MX269036A.

Table 1.3-1   Specifications

Item	Specification
Common Specifications	
Channel bandwidth	5 MHz, 6 MHz, 7 MHz, 8 MHz
FFT size	2K, 4K, 8K
Modulation/Frequency Measurement	
Measurement frequency range	34 to 1600 MHz
Measurement level range	−26 to + 30 dBm (at Pre-Amp Off, or Pre-Amp not installed.) −38 to +10 dBm (at Pre-Amp On)
Carrier frequency accuracy	An average of 10 times after CAL execution at 18º to 28ºC For a signal that is greater than or equal to 33 dB (MER DATA) ± (accuracy of reference crystal oscillator × carrier frequency) ± 0.1 Hz
Residual MER	After CAL execution at 18º to 28ºC 49 dB (MER DATA)<
Waveform display	The MX269036A has the following waveform display features: Constellation MER vs Subcarrier MER vs Symbol Spectral Flatness (Amplitude, Group Delay)

This chapter describes the preparations required for using the application you are using. Refer to the "MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)" for common features not included in this manual.

2

Preparation

2.1 Part Names

This section describes the panel keys for operating the instrument and connectors used to connect external devices. For general points of caution, refer to the "MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)".

2.1.1 Front panel

This section describes the front-panel keys and connectors.
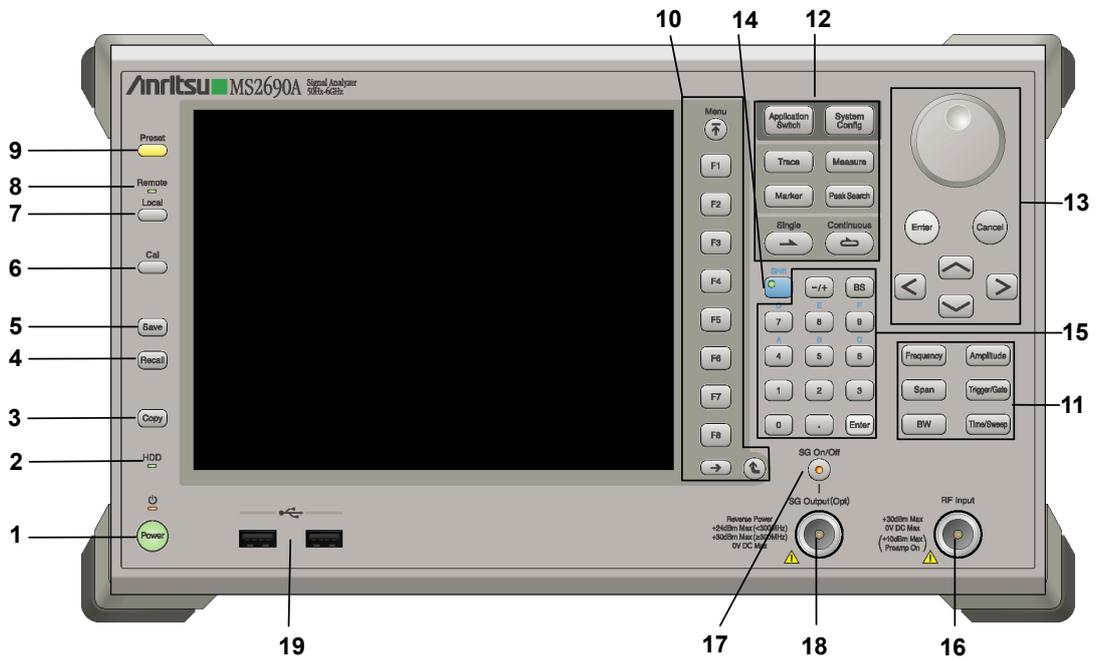
Figure 2.1.1-1   MS269x series front panel

1   Power Switch

Press to switch between the standby state (AC power supplied) and power-on state. The Power lamp ⏻ lights orange at Standby and green at Power On. Press the power switch for about 2 seconds.

2   HDD   Hard disk access lamp

Lights when accessing the internal hard disk

3   Copy   Copy key

Press to capture display screen and save to file.

4   Recall   Recall key

Press to recall parameter file.

5   Save   Save key

Press to save parameter file.

6   Cal   Cal key

Press to display the Calibration menu.

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Preparation

7   Local

Local key

Press to return to local operation from remote control via GPIB, Ethernet, or USB (B), and enable panel settings.

8   Remote

Remote lamp

Lights when in remote-control state

9   Preset

Preset key

Resets parameters to initial settings

10

Menu

F1

F2

F3

F4

F5

F6

F7

F8

Function keys

Selects or configures function menu displayed on the right of the screen. The function menu is provided in multiple pages and layers.

Press ⟶ to fetch next function menu page. The current page number is displayed at the bottom of the function menu, as in "1 of 2".

Sub-menus may be displayed when a function menu is pressed. Press ↺ to go back to the previous menu. Press the Menu key to go back to the top menu.

11

Frequency   Amplitude

Span   Trigger/Gate

BW   Time/Sweep

Main function keys 1

Press to set or execute main functions.
Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

Frequency   Press to set frequency parameters.

Amplitude   Press to set level parameters.

Span   No function is assigned to this key.

Trigger/Gate   Press to set trigger parameters.

BW   No function is assigned to this key.

Time/Sweep   Press to set measurement item parameters.

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Application Switch   System Config

Trace   Measure

Marker   Peak Search

Single   Continuous
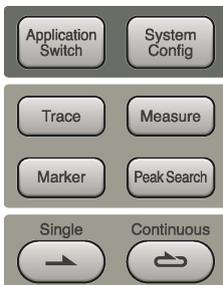
Main function keys 2

Press to set or execute main functions.
Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

Application Switch   Press to switch application.

System Config   Press to display Configuration screen.

Trace   Press to set the trace items or to switch the operation window.

Measure   Press to set measurement item parameters.

Marker   Use when switching graph marker operation.

Peak Search   Press to set parameters related to the peak search function.

Single   Press to start single measurement.

Continuous   Press to start continuous measurements.

2

Preparation

13
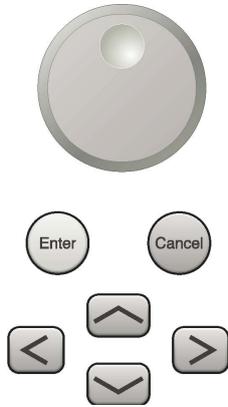
Rotary knob/Cursor key/Enter key/Cancel key

The rotary knob and cursor keys select display items or change settings.

Press (Enter) to set the entered or selected data.

Press (Cancel) to cancel input or selected data.

14

Shift key

Operates keys with functions in blue characters on panel. Press the Shift key so the key lamp is green and then press the target key.

15
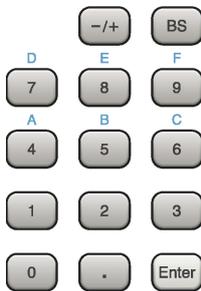
Numeric keypad

Enters numbers on parameter setup screens.

Press (BS) to delete the last entered digit or character.

[A] to [F] can be entered by pressing keys (Shift) to (4) while the Shift key lamp (9) is green.

16
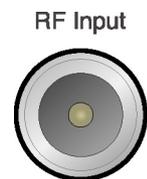
RF Input connector

Inputs RF signal. This is an N type input connector.

17

RF Output Control key

Press (SG On/Off) to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. The RF output control key lamp lights orange when the RF signal output is set to On.

18

SG Output(Opt)

RF Output connector (when Option 020 installed)

Outputs RF signal, when the Vector Signal Generator option is installed. This is an N type output connector.

19

USB connector (type A)

Connect the accessory USB keyboard, mouse or USB memory.

20

Mod On/Off

Modulation control key (MS2830A only)

Press to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. The lamp on the key lights up in green in the modulation On state.

21

SPA

SA

SG

Appli

Application key (MS2830A only)

Press to switch between applications.

SPA   Press to display the Spectrum Analyzer main screen.

SA   Press to display the Signal Analyzer main screen, when Option 005/105 and 006/106 are installed.

SG   Press to display the Signal Analyzer main screen, when Vector Signal Generator option is installed.

This is a blank key. Not used.

Appli   Displays the main screen of the application that is selected using the Application Switch (Auto), or displays that of the pre-selected application (Manual).
For details, refer to 3.5.4 Changing application layout in "MS2830A Signal Analyzer Operation Manual (Mainframe Operation)".

2.1.2   Rear panel

This section describes the rear-panel connectors.
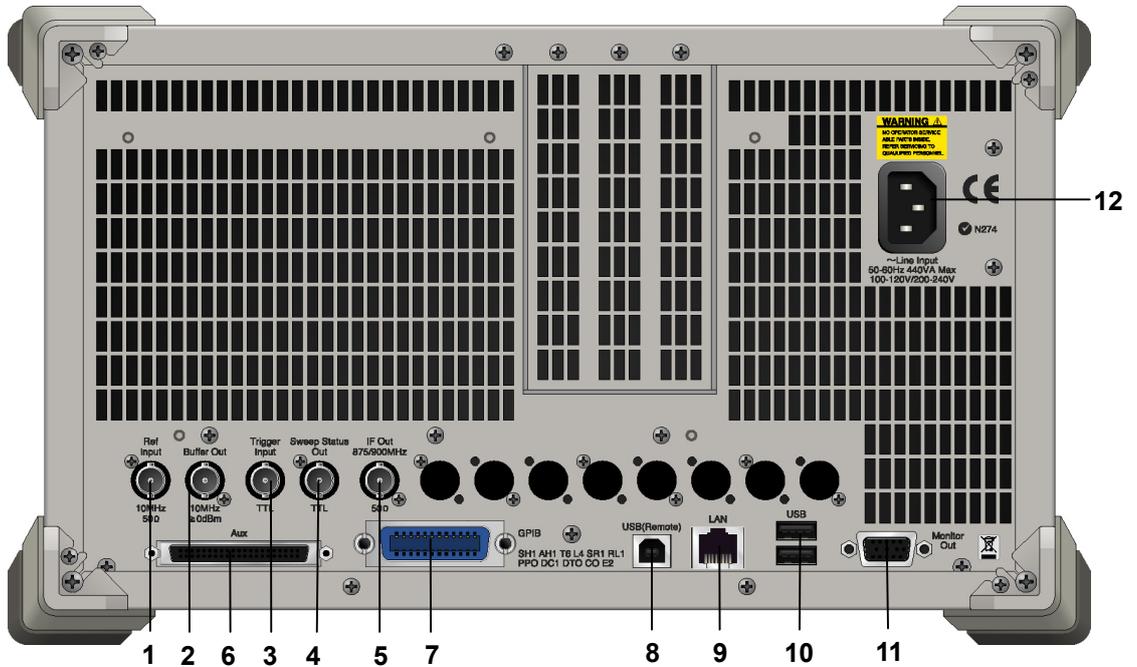
Figure 2.1.2-1   MS269x series rear panel

1

Ref
Input

Ref Input connector (reference frequency signal input connector)

Inputs external reference frequency signal. It is for inputting reference frequency signals with higher accuracy than the instrument's internal reference signal, or for synchronizing the frequency of the MS2690A/MS2691A/MS2692A to that of other equipment. The following frequencies are supported:

MS269x series: 10 MHz/13 MHz

2

Buffer Out

Buffer Out connector (reference frequency signal output connector)

Outputs the internal reference frequency signal (10 MHz). It is for synchronizing frequencies between other equipment and the MS2690A/MS2691A/MS2692A.

3

Trigger
Input

Trigger Input connector (MS269x series only)

Inputs trigger signal from external device.

4

Sweep Status
Out

Sweep Status Out connector

Outputs signal when internal measurement is performed or measurement data is obtained.

5

IF Out
875/900MHz

IF Out connector (MS269x series only)

Not used

6

Aux

AUX connector

Not used

7

GP-IB

GPIB connector

For external control via GPIB.

8

USB(Remote)

USB connector (type B)

For external control via USB

2

Preparation

9   LAN

Ethernet connector

Connects PC or Ethernet network.

10   USB

USB connector (type A)

Used to connect a USB keyboard or mouse or the USB memory supplied.

11   **Monitor Out**

Monitor Out connector

Connects external display

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~Line Input
50-60Hz 440VA Max
100-120V/200-240V

AC inlet

Supplies power

13   SA Trigger Input TTL

SA Trigger Input connector (MS2830A only)

This is a BNC connector for inputting external trigger signal (TTL) for SPA and SA applications.

14   SG Trigger Input(Opt) TTL

SG Trigger Input connector (MS2830A only)

This is a BNC connector for inputting external trigger signal (TTL) for Vector Signal Generator option.

15 HDD

HDD slot (MS2830A only)

This is a standard hard disk slot.

16 HDD(Opt)

HDD slot for Option (MS2830A only)

This is a hard disk slot for the options.

2.2   Signal Path Setup

As shown in Figure 2.2-1, connect the instrument and the DUT using an RF cable, so that the signal to be tested is input to the RF Input connector. To prevent an excessive level signal from being input, do not input the signal before setting the input level using this application.



RF Input

DUT
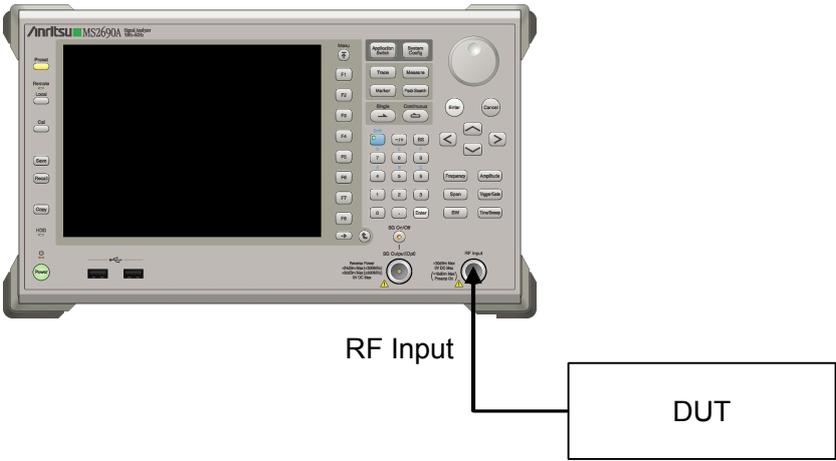
Figure 2.2-1   Signal path setup example

Set the reference signal and/or trigger signal paths from external sources, as required.

Trigger signal (TTL)

Reference frequency signal
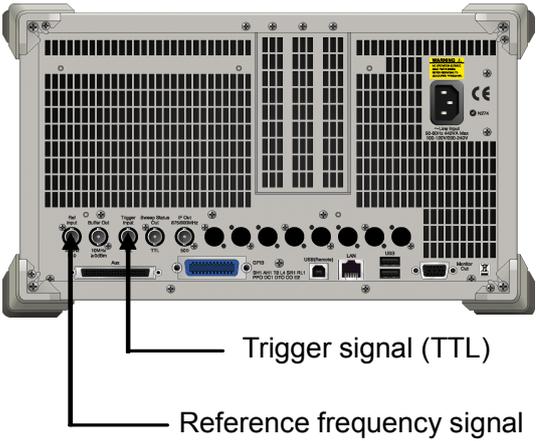
Figure 2.2-2   External signal input

2.3   Application Startup and Selection

To use this application, it is necessary to load (start up) and select the application.

2.3.1   Launching application

The application startup procedure is described below.

Note:

The XXX indicates the application name currently in use.

<Procedure>

1.   Press [System Config] to display the Configuration screen.

2.   Press [F4] (Application Switch Settings) to display the Application Switch Registration screen.

3.   Press [F1] (Load Application Select), and move the cursor to "XXX" in the Unloaded Applications list.
     If "XXX" is displayed in the **Loaded Applications** list, this means that the application is already loaded.
     If "XXX" appears in neither the **Loaded Applications** nor **Unloaded Applications** list, this means that the application has not been installed.

4.   Press [F7] (Set) to load the application. If "XXX" is displayed in the **Loaded Applications list**, this means that the application is already loaded.

2.3.2   Selecting application

The selection procedure is described below.

<Procedure>

1.   Press [Application Switch] to display the Application Switch menu.

2.   Press the menu function key displaying "XXX".

The application can also be selected with mouse, by clicking "XXX" on the task bar.

2.4 Initialization and Calibration

This section describes the parameter settings and the preparations required before starting measurement.

2.4.1 Initialization

After selecting this application, first perform initialization. Initialization returns the settable parameters to their default value in order to clear the measurement status and measurement results.

Note:

When another software application is switched to or this application is unloaded (ended), the application keeps the parameter settings at that time. The parameter values that were last set will be applied when this application is selected next time.

The initialization procedure is as follows.

<Procedure>

1.　　Press ⏥ to display the Preset function menu.
2.　　Press ⬜ (Preset).

2.4.2 Calibration

Perform calibration before performing measurement. Calibration sets the level accuracy frequency characteristics for the input level to flat, and adjusts level accuracy deviation caused by internal temperature fluctuations. Calibration should be performed when first performing measurement after turning on power, or if beginning measurement when there is a difference in ambient temperature from the last time calibration was performed.

<Procedure>

1.　　Press ⏥ to display the Application Cal function menu.
2.　　Press ⬜ (SIGANA All).

For details on calibration functionality only executable with this instrument, refer to the "MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)".

Chapter 3 Measurement

This section describes the measurement function, the parameter contents and the setting methods for this application.

3

Measurement

3.1 Basic Operation

3.1.1 Screen layout

This section describes the screen layout of this application.
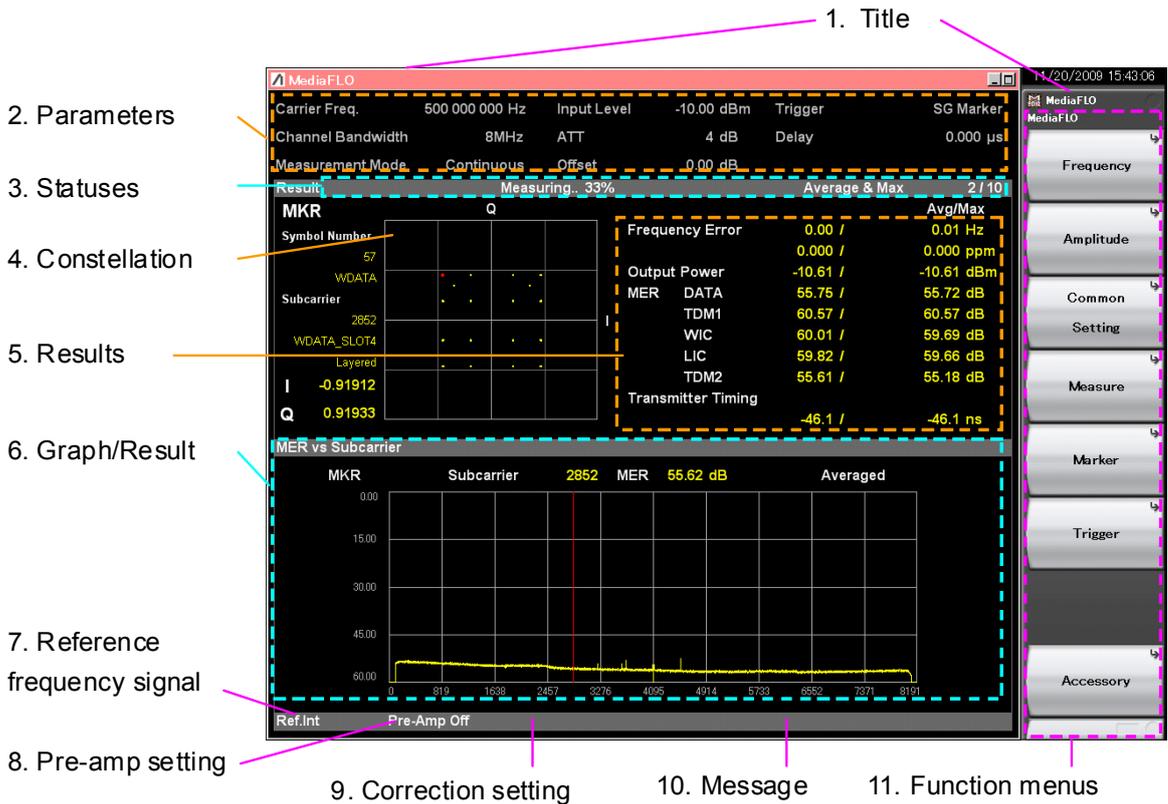
Figure 3.1.1-1 Screen Appearance (Modulation Analysis)

1. Title

   Indicates the application title. Title can be changed later.

2.   Measurement Parameter

This displays the settings of the main parameters.

Carrier Freq.	Input signal carrier frequency setting
Channel Bandwidth	Channel bandwidth setting
Measurement Mode	Measurement mode (Single/Continuous)
Input Level	Average power setting while input signal transmission on
ATT	Internal attenuator setting (automatic)
Offset	Level offset setting (displayed at Offset On)
Trigger	Trigger signal type setting (displayed at Trigger Switch On)
Delay	Trigger delay setting (displayed at Trigger Switch On)

3. Measurement Status

   This displays the measurement results of status and storage status.
   ⚠Level Over indicates that the level of the signal input for
   performing measurement is too large for the settings. When Level
   Over is displayed, either increase the Input Level value or decrease
   the level of the input signal and measure again.

   ☞ 3.2.2 Input Level

   "Measuring" indicates that measurement is in progress.

   ☞ 3.1.3 Performing measurement

   The storage status is indicated at the right side of the
   measurement status field. It is not displayed when Storage Mode is
   set to Off. The numeric value at the right side of "/" indicates the
   Storage Count setting and the numeric value at the left side
   indicates the completed measurement count.

4. Constellation

   This displays the symbol constellation for the specified range. The
   marker position, the I and Q coordinates for the marker position,
   subcarrier information, and symbol information are displayed at
   the left side of the constellation.

5. Numeric Results

   This displays the measurement results for the Trace Mode.

6. Graph/Numeric Results

   This displays the measurement results for the currently selected
   Measure Function and Trace Mode. The Trace Mode contents are
   displayed when Modulation Analysis is selected.

7. Reference Frequency Signal

   This indicates that type and status of the detected reference
   frequency signal.

Ref.Int	Internal reference frequency signal/lock status
Ref.Ext	External reference frequency signal/lock status
Ref.Int Unlock	Internal reference frequency signal/unlock status
Ref.Ext Unlock	External reference frequency signal/unlock status

8. Pre-amplifier Setting

   This indicates a pre-amplifier settings status.

Pre-Amp On	Preamplifier On
Pre-Amp Off	Preamplifier Off or not installed

   ☞ 3.2.4 Pre-Amp

9. Correction Setting

   This is displayed when the Correction function is On.

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Measurement

For details, refer to the "MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual".

10.   Message

The message below is displayed if phase characteristics vary.

Phase characteristic unsynchronized. (Variance: 32.738)

This message indicates that phase characteristics vary. It also displays the dispersion value as a reference to indicate how much phase characteristics vary.

The possible causes of this message are as follows. Resolve any measurement errors by checking the input signal and specified parameters, and then perform measurement again.

- The phase of the input signal varies.
- The carrier frequency of the input signal differs from the setting for Carrier Frequency.
- The input level specified for Input Level is too low.
- The setting for FFT Size is incorrect.
- The setting for Channel Bandwidth is incorrect.

11.   Function Menu

This indicates the functions that can be executed by the relevant function keys.

3.1.2   Types of Measurement Function

This application has the following measurement functions.

Modulation Analysis

Measures the frequency error, MER, etc.

3.1.3   Performing Measurement

There are two measurement modes: single and continuous. Measurement is performed once in the single measurement mode, and continuously in the continuous measurement mode.

Single Measurement

Items are measured only for the measurement count (Storage Count) before measurement is stopped.

1.   First, press [Measure] to select the measurement function.
2.   Press (Single).

Continuous Measurement

The selected measurement function is performed repeatedly for the Storage Count. Measurement will continue even if parameters are changed or the window display is changed.

1.   First, press [Measure] to select the measurement function.
2.   Press (Continuous).

3

Measurement

3.2   Setting Frequency and Level

3.2.1   Carrier Frequency

This command sets the carrier frequency of the input signal.

Procedure

[Frequency]

Or

Menu [⤒] **>** [F1] (Frequency) **>** [F1] (Carrier Frequency)

Range | 30 MHz to 6 GHz (MS2690A)
30 MHz to 13.5 GHz (MS2691A)
30 MHz to 26.5 GHz (MS2692A)

Minimum resolution | 1 Hz
Default | 207 MHz

3.2.2   RF Spectrum

This command sets whether to reverse the input signal IQ spectrum.

Procedure

Menu [⤒] **>** [F1] (Frequency) **>** [F7] (RF Spectrum)

Options | Norm. | Measures without reversed IQ spectrum.
| Rvs. | Measures with reversed IQ spectrum.
Default | Norm.

3.2.3 Input Level

This sets the average power (effective value) in the input signal transmission-on period.

The difference between the average power and the peak power (crest factor) with this application is 14 dB.

Procedure

[Amplitude]

Or

[Menu ⬆] **>** [F2] (Amplitude) **>** [F1] (Input Level)

Range   With Pre-Amp On:
               (−80.00+Offset Value) to (10.00+Offset Value) dBm
               With Pre-Amp Off:
               (−60.00+Offset Value) to (30.00+Offset Value) dBm

Minimum resolution   0.01 dB

Default   −10.00 dBm

3

Measurement

3.2.4   Offset

This adds the displayed offset to the Input Level setting. Input the increase or decrease in the level due to devices such as cables, attenuators, amplifiers, etc., between this equipment and the measurement target as the level offset and set the same input level as the output level at the antenna of the DUT.

| DUT 40 dBm Output | → | Attenuator 30 dB | → 10 dBm | This Equipment Input Level 40 dBm / Offset On / Offset Value 30 dB |
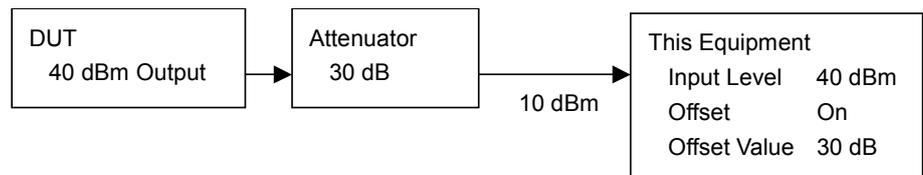
Figure 3.2.3-1   Setting Input Level and Level Offset

Offset

This turns on/off the Offset function.

Procedure

Amplitude **>** F8 (Cancel) **>** F7 (Offset)

Or

Menu **>** F2 (Amplitude) **>** F7 (Offset)

Options   On, Off

Default   Off

Note:

Offset is set automatically to on when setting Offset Value.

Offset Value

This sets the level correction coefficient.

Procedure

[Amplitude] **>** [F8] (Cancel) **>** [F8] (Offset Value)

Or

[Menu ↑] **>** [F2] (Amplitude) **>** [F8] (Offset Value)

Range	−99.99 to +99.99 dB
Minimum resolution	0.01 dB
Default	0.00 dB

Note:

The correction set at the System Config. screen is used irrespective of the Offset Value.

☞ 3.1.1 Screen layout

3

Measurement

3.2.5   Pre-Amp

The 6 GHz Pre-amp option (opt-008 hereafter) is installed in this equipment. The level sensitivity can be increased by setting this pre-amp to On.

Procedure

[Amplitude] **>** [F8] (Cancel) **>** [F4] (Pre-Amp)

Or

[Menu ↑] **>** [F2] (Amplitude) **>** [F4] (Pre-Amp)

Options	On, Off
Default	Off

Note:

If opt-008 is not installed, the Pre-Amp menu is not displayed.

3.3 Setting Trigger

The trigger signal determining the measurement start timing may be either the external input signal from the Trigger Input connector on the back panel or an internal signal generated from the optional signal generator (opt-020) installed within this equipment. For this application, the header timing of one-second-cycle Superframe intervals is input.

3.3.1 Trigger Switch

This enables/disables the trigger function.

Procedure

[Trigger/Gate] **>** [F1] (Trigger Switch)

Or

[Menu] **>** [F6] (Trigger) **>** [F1] (Trigger Switch)

Options   On (Enabled), Off (Disabled)
Default   Off

3.3.2 Trigger Source

This sets the trigger signal type.

Procedure

[Trigger/Gate] **>** [F2] (Trigger Source)

Or

[Menu] **>** [F6] (Trigger) **>** [F2] (Trigger Source)

Options

External	Measurement starts with external trigger signal input.
SG Marker	Starts measurement by timing inside the MS2690A/MS2691A/MS2692A Option 020 Vector Signal Generator.
Default	External

3.3.3 Trigger Slope

Sets the trigger polarity.

Procedure

[Trigger/Gate] **>** [F3] (Trigger Slope)

Or

[Menu ⬆] **>** [F6] (Trigger) **>** [F3] (Trigger Slope)

Options

Rise	Synchronizes with rising edge of the trigger.
Fall	Synchronizes with falling edge of the trigger.
Default	Rise

3.3.4 Trigger Delay

This sets the difference between the trigger signal detection timing and the measurement start timing.

Procedure

[Trigger/Gate] **>** [F8] (Trigger Delay)

Or

[Menu ⬆] **>** [F6] (Trigger) **>** [F8] (Trigger Delay)

Range	−2 to 2 s
Minimum resolution	50 ns
Default	0 s

3

Measurement

3.4 Common Settings

This section describes the parameters that apply to all the measurement functions of this application.

3.4.1 Channel Bandwidth

This sets the bandwidth of input signal.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F4] (Channel Bandwidth)

Or

[Menu 🔝] **>** [F3] (Common Setting) **>** [F1] (Channel Bandwidth)

Options   5 MHz, 6 MHz, 7 MHz, 8 MHz
Default   6 MHz

3.5 Setting Modulation Analysis

This section explains the measurement conditions for modulation analysis.

3.5.1 End Symbol

This sets the analysis interval in symbol units. The setting is an interval of consecutive symbols, regardless of the symbol type.

Procedure

> Time/Sweep **>** F2 (End Symbol)

Or

> Measure **>** F1 (Modulation Analysis) > F1 (Analysis Time) > F2 (End Symbol)

Range	FRAME OIS to (Superframe Symbol – PPC / RS / SPC Symbol – 1)
Minimum resolution	1 Symbol
Default	17 Symbol

1 Superframe

TDM1	WIC	LIC	TDM2	FRAME OIS	FRAME 1	FRAME 2	FRAME 3	FRAME 4	PPC	SPC

Symbol Number[1]

0	1	2	3	17	309	601	893	1185	1186	1194

FRAME OIS value.

FRAME 1 value

FRAME 2 value

FRAME 3 value

FRAME 4 value

Start symbol (0)

Maximum value of End Symbol

[1] The Symbol Number value is the initial setting.

This value is the number of symbols at the end of each frame.

Figure 3.5.1-1   Specifying End Symbol

FRAME OIS

This sets the analysis interval from the start symbol (0) to FRAME OIS.

Procedure

[Time/Sweep] **>** [F3] (FRAME OIS)

Or

[Measure] **>** [F1] (Modulation Analysis) **>** [F1] (Analysis Time) **>** [F3] (FRAME OIS)

FRAME 1

This sets the analysis interval from the start symbol (0) to FRAME 1.

Procedure

[Time/Sweep] **>** [F4] (FRAME 1)

Or

[Measure] **>** [F1] (Modulation Analysis) **>** [F1] (Analysis Time) **>** [F4] (FRAME 1)

FRAME 2

This sets the analysis interval from the start symbol (0) to FRAME 2.

Procedure

[Time/Sweep] **>** [F5] (FRAME 2)

Or

[Measure] **>** [F1] (Modulation Analysis) **>** [F1] (Analysis Time) **>** [F5] (FRAME 2)

FRAME 3

This sets the analysis interval from the start symbol (0) to FRAME 3.

Procedure

[Time/Sweep] **>** [F6] (FRAME 3)

Or

[Measure] **>** [F1] (Modulation Analysis) **>** [F1] (Analysis Time) **>** [F6] (FRAME 3)

FRAME 4

This sets the analysis interval from the start symbol (0) to FRAME 4.

Procedure

[Time/Sweep] **>** [F7] (FRAME 4)

Or

[Measure] **>** [F1] (Modulation Analysis) **>** [F1] (Analysis Time) **>** [F7] (FRAME 4)

3.5.2 Detail Settings

This sets analysis parameters.

The analysis parameters shown in sections 3.5.3 to 3.5.13 are specified in Detail Settings.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

After specifying the parameters in Detail Settings, press [F7] (Set) to finalize them.

3.5.3 Tracking Mode

This sets the Tracking Mode type.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Options	Manual	This manually sets the Tracking Mode.
	Estimation	This sets the Tracking Mode to modulation method estimation.
Default	Manual	

3.5.4 Modulation

This sets the modulation method.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

| Options | QPSK, 16QAM/Layered (ER=4), Layered (ER=6.25) |
| Default | 16QAM/Layered (ER=4) |

Note:

Available when Tracking Mode is Manual.

3.5.5 SPC Presence

This turns on/off SPC.

Changing the SPC Presence setting affects the parameter values as shown in Table 3.5.5-1.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Options   Present, Absent
Default   Present

Table 3.5.5-1   Dependency of Parameters on SPC Presence

For SPC Presence Absent (absent) (conforms with TIA-1099)

Channel Bandwidth		5 MHz	6 MHz	7 MHz	8 MHz
PPC/RS Number	PPC Presence Present		6, 10, 14		
	PPC Presence Absent		2, 6, 10, 14		
FFT Size		4K			
Cyclic Prefix		1/8			
Slot to Interlace		Pattern1			
Superframe Symbol Number*1		1000	1200	1400	1600
Wide-area Data Symbols		$0 \le W \le \dfrac{S-18-P}{4} - 4$ W: Wide-area Data Symbol S: Superframe Symbol Number P: PPC / RS Number			

For SPC Presence Present (present) (conforms with TIA-1099-A)

FFT Size		2K	4K	8K
PPC / RS (Reserved Symbol) Number	PPC Presence Present	16	8	8
	PPC Presence Absent	0		
Cyclic Prefix		1/16, 1/8, 3/16, 1/4		
Slot to Interlace		Pattern 1, Pattern 2		
Wide-area Data Symbols		Depends on Channel Bandwidth, FFT Size, Cyclic Prefix, and PPC Presence (This conforms with the TIA-1099-A standards.)		

*1 For details about Superframe Symbol Number, refer to Figure 3.5.1-1   Specifying End Symbol.

3.5.6 FFT Size

This sets the FFT size.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Options   2K, 4K, 8K
Default   4K
Note:

>   Options become selectable only when SPC Presence is present. It is
>   fixed to 4K when SPC Presence is absent (refer to Table 3.5.5-1).

3.5.7 Cyclic Prefix

This sets the Cyclic Prefix.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Range   1/16, 1/8, 3/16, 1/4
Default   1/8
Note:

>   Options become selectable only when SPC Presence is present. It is
>   fixed to 1/8 when SPC Presence is absent (refer to Table 3.5.5-1).

3.5.8 Slot to Interlace

Slot to Interlace sets the pattern for Slot to be placed on Interlace.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Options   Pattern1, Pattern2
Default   Pattern1
Note:

>   Options become selectable only when SPC Presence is present. It is
>   fixed to Pattern1 when SPC Presence is absent (refer to Table
>   3.5.5-1).

3.5.9 PPC Presence

This turns on/off PPC.

Procedure

⸨Measure⸩ **>** ⸨F1⸩ (Modulation Analysis) **>** ⸨F7⸩ (Detail Settings)

Range   Present, Absent
Default   Present

Note:

The PPC / RS Number setting varies depending on whether PPC is present. (Refer to Table 3.5.5-1.)

3.5.10 PPC / RS (Reserved OFDM Symbol) Number

This sets the Positioning Pilot Channel / Reserved OFDM Symbol Number.

Procedure

⸨Measure⸩ **>** ⸨F1⸩ (Modulation Analysis) **>** ⸨F7⸩ (Detail Settings)

Options   2, 6, 10, 14
Default   6

Note:

The PPC / RS Number setting varies depending on the settings for SPC Presence, PPC Presence, and FFT Size. (Refer to Table 3.5.5-1.)

3.5.11 Wide-area Data Symbols

This sets the value for Wide-area Data Symbols (refer to Table 3.5.5-1).

Procedure

⸨Measure⸩ **>** ⸨F1⸩ (Modulation Analysis) **>** ⸨F7⸩ (Detail Settings)

Range   When SPC Presence is Absent:
                 0 to ((Superframe Symbol Number – 18 – PPC or RS Number)/4-4)

                 When SPC Presence is Present:
                 0 to (the value that conforms with the TIA-1099-A standards)

Minimum resolution   1
Default   288

Note:

After entering a numeric parameter by aligning the cursor with it and using the numeric keypad, press ⸨Enter⸩ (Enter) or ⸨F7⸩ (Set) to finalize the entry.

3.5.12 WID

This sets WID (Wide-area Differentiator) value.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Range   0 to 15
Minimum resolution   1
Default   15
Note:

> After entering a numeric parameter by aligning the cursor with it and using the numeric keypad, press (Enter) (Enter) or [F7] (Set) to finalize the entry.

3.5.13 LID

This sets LID (Local-area Differentiator) value.

Procedure

[Measure] **>** [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Range   0 to 15
Minimum resolution   1
Default   10

Note:

> After entering a numeric parameter by aligning the cursor with it and using the numeric keypad, press (Enter) (Enter) or [F7] (Set) to finalize the entry.

3.5.14 Channel Estimation

This sets OFDM signal Channel Estimation processing On and Off.
If Channel Estimation is set to On, correction is performed for the amplitude and phase based on the reference signal.

Procedure

[Measure] > [F1] (Modulation Analysis) **>** [F7] (Detail Settings)

Options   On, Off
Default   On

3.6 Modulation Analysis Measurement and Results

Modulation analysis is applied to intervals according to the End Symbol settings.

Unless specified otherwise, the measurement interval for performing modulation analysis once is based on the synchronized symbol start and uses the average of the values in the interval from the start symbol (0) position to End Symbol.

Modulation analysis measurement is performed as described below.

Procedure

1. Set frequency, level and trigger.

    ☞ 3.2 Setting Frequency and Level

    ☞ 3.3 Setting Trigger

2. Set system parameters.

    ☞ 3.4 Shared Settings

3. Press [Measure] **>** [F1] (Modulation Analysis).

4. Set modulation analysis related parameters.

    ☞ 3.5 Setting Modulation Analysis

5. Set Storage-related parameters.

    ☞ 3.6.1 Setting Storage Mode/Count

6. Measure.

    ☞ 3.1.3 Measuring

7. Select display contents.

    ☞ 3.6.2 Trace Mode

    ☞ 3.6.8 Markers

3.6.1   Setting Storage Mode/Count

Storage Mode

This enables Storage (Averaging) and the display method.

Procedure

[Trace] **>** [F4] (Storage) **>** [F1] (Mode)

Options	Off	Storage off
	Average	Displays the average value.
	Average & Max	Displays the average and maximum value.
Default	Off	

Note:

The minimum Average & Max value is displayed to show the worst Max value for the MER.

Storage Count

This sets the Storage count (number of averagings).

Procedure

[Trace] **>** [F4] (Storage) **>** [F2] (Count)

Range	2 to 9999
Minimum resolution	1
Default	10

3.6.2   Trace Mode

Modulation analysis has four trace types (display modes) as listed below.

(1)   MER vs Subcarrier

This displays the main numeric results, such as IQ constellation, frequency error, transmission power, MER, etc., for each OFDM symbol, as well as the MER graph for each Subcarrier. The type of graph varies depending on MER vs Subcarrier View.

(2)   MER vs Symbol

This displays the main numeric results, such as IQ constellation, frequency error, transmission power, MER, etc., for each OFDM symbol, as well as the MER graph for each OFDM symbol.

(3)   Spectral Flatness

This displays the main numeric results, such as IQ constellation, frequency error, transmission power, MER, etc., for each OFDM symbol, as well as a graph for Spectral Flatness. The type of graph varies with the Spectral Flatness Type.

(4)   Summary

This displays the main numeric results, such as frequency error, transmission power, MER, and Carrier Suppression, etc.

Procedure

       Trace **>** F1 (Trace Mode)

Options   MER vs Subcarrier, MER vs Symbol, Spectral Flatness, Summary

Default   MER vs Symbol

3.6.3 Main Numeric Results

The main numeric results of modulation analysis are listed below.

(1) Frequency Error [Hz]/[ppm]

This is the difference between the set Carrier Frequency value and the carrier frequency of the input signal. The maximum value is determined by comparing the absolute value of each measurement result.

(2) Output Power [dBm]

This is the average value in the measurement range for the power of each bandwidth centered on the specified Carrier Frequency.

(3) MER DATA [dB]

This displays the MER for each subcarrier that targets symbols other than those for TDM Pilot1, WIC, LIC, TDM Pilot2, PPC (or RS), and SPC (including Data Channel, Pilot Channel and TPC).

(4) MER TDM1 [dB]

This displays the MER of all the symbols for TDM Pilot1.

(5) MER WIC [dB]

This displays the MER of all the symbols for WIC.

(6) MER LIC [dB]

This displays the MER of all the symbols for LIC.

(7) MER TDM2 [dB]

This displays the MER of all the symbols for TDM Pilot2.

(8) Transmitter Timing [ns]

This displays the time offset between the Superframe header and trigger.
It is displayed only when Trigger Switch is set to On.
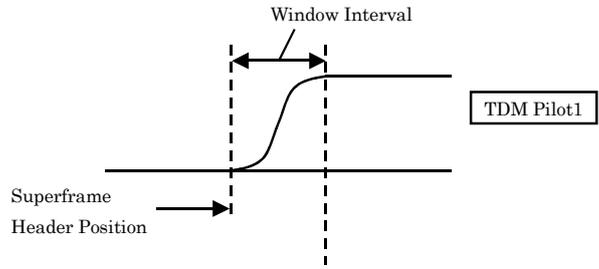
Figure 3.6.3-1   Superframe Header Position

3.6.4   Constellation

The IQ constellation is displayed at the left side of the screen when the Trace Mode is MER vs Subcarrier, MER vs Symbol, or Spectral Flatness.

All the subcarriers in the OFDM symbols specified by Symbol Number in the range from the start symbol (0) to End Symbol are displayed.

Scale Mode

This specifies the constellation scale display mode.

Procedure

[Trace] **>** [F2] (Constellation Scale) **>** [F1] (Scale Mode)

Options	Auto	Auto-adjusts and displays the Constellation scale according to IQ data.
	Manual	The Constellation scale is fixed to the value set in Scale Range.
Default	Auto	

Scale Range

This manually sets the Constellation scale that is reflected in Scale Mode.

Procedure

[Trace] **>** [F2] (Constellation Scale) **>** [F2] (Scale Range)

| Range | 1 to 10 |
| Default | 4 |

Note:

Available when Scale Mode is Manual.

Measurement

3

Partition Number

This specifies the number of Constellation partitions.

Procedure

⬚ Trace **>** ⬚ F2 (Constellation Scale) **>** ⬚ F3 (Partition Number)

Options   4, 16
Default   4
Note:

Available when Scale Mode is Manual.

Marker Result (MKR)

This displays the I and Q coordinates for the subcarrier selected using the marker, as well as the subcarrier information.

3.6.5   MER vs Subcarrier

When the Trace Mode is MER vs Subcarrier, a graph that shows the MER for each subcarrier in the range from the start symbol (0) to End Symbol is displayed at the bottom of the screen.

☞ 3.6.2   Trace Mode
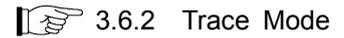
MER vs Subcarrier View

When MER vs Subcarrier View is averaged, the average MER value for analyzed OFDM symbols is displayed in the graph.

When MER vs Subcarrier View is Each, the MER value for the OFDM symbol specified by Symbol Number is displayed in the graph.

Procedure

     Trace **>** F1 (Trace Mode) **>** F8 (MER vs Subcarrier View)

Options　　　　　Each, Averaged
Default　　　　　Averaged

MER Scale

This sets the maximum value for the vertical-axis of the graph (MER).

Procedure

     Trace **>** F3 (MER Scale)

Range　　　　　40 dB, 60 dB
Default　　　　　60 dB

Marker Result (MKR)

This displays the MER at the subcarrier selected by the marker.

3

Measurement

3.6.6 MER vs Symbol

When the Trace Mode is MER vs Symbol, a graph that shows the MER of each OFDM symbol in the range of one Superframe is displayed at the bottom of the screen.
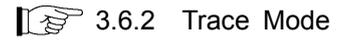
MER Scale

This sets the maximum value for the vertical-axis of the graph (MER).

Procedure

[Trace] **>** [F3] (MER Scale)

Range　　　　　40 dB, 60 dB
Default　　　　60 dB

Marker Result (MKR)

This displays the MER at the OFDM symbol selected by the marker.

3.6.7   Spectral Flatness

When the Trace Mode is Spectral Flatness, a graph that shows the average Spectral Flatness for analyzed OFDM symbols in the range from the first Superframe TPC to End Symbol is displayed in a graph at the bottom of the screen.

☞ 3.6.2 Trace Mode
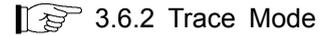
There are two types of Spectral Flatness graph that are set by Spectral Flatness Type.

(1)   Amplitude vs Subcarrier

This displays the relative power of each subcarrier versus the average power of all valid Subcarriers.

(2)   Group Delay vs Subcarrier

This displays the group delay for each subcarrier.

Spectral Flatness Type

This sets the Spectral Flatness display type.

Procedure

[Trace] **>** [F1] (Trace Mode) **>** [F8] (Spectral Flatness Type)

Options	Amptd	To set to Amplitude
	GD	To set to Group Delay
Default	Amptd	

Flatness Scale

This sets the display range for the vertical-axis of the graph.

Procedure

[Trace] **>** [F3] (Flatness Scale)

Range
Amplitude	0.5 to 10 dB	
Group Delay	50 to 10000 ns	

Minimum resolution
Amplitude	0.1 dB	
Group Delay	50 ns	

Default
|		
Amplitude	2 dB	
Group Delay	200 ns	

3

Measurement

Marker Result (MKR)

The value for the subcarrier selected by the marker is displayed according to the graph type.

3.6.8   Markers

This displays markers in the constellation at the top left of the screen and in the graph at the bottom of the screen.

Procedure

[Marker]

Or

[Menu] **>** [F5] (Marker)

The Procedure for using [Marker] is explained below.

Marker

Sets marker display/non-display.

Procedure

[Marker] **>** [F1] (Marker)

Options   On, Off
Default   On

Subcarrier Number

This sets the marker for the constellation, MER vs Subcarrier results, and Spectral Flatness results displayed when the Trace Mode is MER vs Subcarrier, MER vs Symbol, or Spectral Flatness, in subcarrier units.

Procedure

[Marker] **>** [F4] (Subcarrier Number)

Range

When the Trace Mode is MER vs Subcarrier or Spectral Flatness, Symbol Number and FFT Size are used to determine the display range for the Subcarrier results of Constellation, MER vs Subcarrier, and Spectral Flatness.

When Symbol Number is 0 to 2
0 to 4095

When Symbol Number is 3 to End Symbol
0 to 2047	FFT Size: 2K
0 to 4095	FFT Size: 4K
0 to 8191	FFT Size: 8K

Default   0

Symbol Number

This sets the marker for the constellation, MER vs Subcarrier results (when MER vs Subcarrier View is Each), MER vs Symbol results, and Spectral Flatness results displayed when the Trace Mode is MER vs Subcarrier, MER vs Symbol, or Spectral Flatness, in symbol units.

Procedure

[Marker] **>** [F5] (Symbol Number)
Or
[Trace] **>** [F5] (Symbol Number)

Range

When the Trace Mode is MER vs Subcarrier, MER vs Symbol, or Spectral Flatness, End Symbol is used to determine the display range for the results of Constellation and MER vs Symbol.
0 to (End Symbol)

Default   0

3

Measurement

Peak Search

Peak Search is a function used to move the marker result for the graph displayed at the bottom of the screen to the minimum value point.

Procedure

[Peak Search]

Or

[Marker] **>** [→] (Page 2) **>** [F1] (Peak Search)

Note:

This function is only enabled when the Trace Mode is MER vs Subcarrier or MER vs Symbol. The function is not enabled for Spectral Flatness.

3.6.9   Summary

When the Trace Mode is Summary, this displays the MER of each symbol in the input signal.

(1)   Carrier Suppression [dB]

This displays Carrier Suppression values in the range from WIC (1) to End Symbol.

(2)   MER PPC [dB]

Note:

Reserved for future use; only **.** will display.

(3)   MER SPC [dB]

Note:

Reserved for future use; only **.** will display.

(4)   MER Total [dB]

This displays the total of the MER DATA &OIS Channel and MER Pilot values in the range from the start symbol (0) to End Symbol.

(5)   MER DATA &OIS Channel [dB]

This displays the total of the Wide-area OIS, Wide-area Data, Local-area OIS, and Local-area Data values in the range from the start symbol (0) to End Symbol.

(6)   MER Pilot [dB]

This displays the total of the OFDM Pilot values in the range from the start symbol (0) to End Symbol.

Refer to section 3.6.4 Main Numeric Results for results other than the above.

3

Measurement

3.7 Frequency Response Difference Calculation Function

This function saves the Spectral Flatness (Amplitude and Group Delay) measurement results to the internal hard disk and then displays the frequency response difference results on the screen.

3.7.1 Spectral Flatness Cal Value Save

This saves the Spectral Flatness (Amplitude and Group Delay) measurement result.

Procedure

    [Trace] **>** [F6] (Spectral Flatness Cal Value Save)

This saves the Spectral Flatness (Amplitude and Group Delay) measurement result. For details about the measurement result, see Table 3.7.1-1 "Spectral Flatness Measurement Result".

The name of the saved file is output in the format "SpectralFlatness_Cal_*Channel-Bandwidth-setting_FFT-Size-setting*.xml". If a file that has the same name exists, it is overwritten.

The following shows an example in which FFT Size is 6 MHz and Channel Bandwidth is 4K.
SpectralFlatness_Cal_6MHz_4K.xml

Files are saved to the following directory.

D:\Anritsu Corporation\Signal Analyzer\User Data\Measurement Results\MediaFLO\SpectralFlatnessCal

Note:

      −999.0 is saved when no measurement is made or an error occurs.

Table 3.7.1-1   Spectral Flatness Measurement Result

Measurement Result

<Parameters0>
  Channel Bandwidth
  FFT Size
</Parameters0>
< FLATNESS1>
 1 to N Spectral Flatness (Amplitude)
 1. 0th Spectral Flatness (Amplitude)
 2. 1st Spectral Flatness (Amplitude)
 …
 N. N−1st Spectral Flatness (Amplitude)
</FLATNESS1>
< FLATNESS2>
 1 to N Spectral Flatness (Group Delay)
 1. 0th Spectral Flatness (Group Delay)
 2. 1st Spectral Flatness (Group Delay)
 …
 N. N−1st Spectral Flatness (Group Delay)
</FLATNESS2>

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Measurement

3.7.2   Spectral Flatness Difference Cal

This calculates the difference between the measurement result and Cal value.

Procedure

[Trace] > [F7] (Spectral Flatness Difference Cal)

Options	On	This displays the result of calculating the difference between the measurement result and Cal value (or displays the measurement result without calculating this difference if the Cal value is invalid).
	Off	This displays the measurement result without calculating the difference between it and the Cal value.
Default	Off	

Note:

If the measurement result file does not exist (such as when the product has the factory settings or after a system reset), the Cal value must be saved in a file for each Channel Bandwidth and FFT Size.

3.8 Saving Measurement Results

Saves measurement results to the internal hard disk or USB memory. Pressing [Save] with the MediaFLO screen open displays the Save function menu.

Note:

> Use the USB memory supplied. Other USB memory may malfunction due to incompatibilities.

3.8.1 Device

Sets the save destination drive.

Procedure

> [Save] > [F1] (Device)

Options | D, E, F, …
All drives except for C
Default | D

3.8.2 Save as Type

This sets the type of file to save.

Procedure

> [Save] > [F2] (Save as Type)

Options | xml, csv
Default | xml

3.8.3 Save All Results

Procedure

Save > F5 (Save All Results)

This saves the measurement results. For details about the measurement results, see Table 3.8.3-1 "Modulation Measurement Result".

The name of the saved file is output in the format "MEDIAFLOdate_sequential-number.xml". If a file that has the same date has been saved, a sequential number is automatically appended to the name of the new file, resulting in a name such as "MEDIAFLOdate_00.xml" (for the first duplicate), "MEDIAFLOdate_01.xml" (for the second), or "MEDIAFLOdate_02.xml" (for the third).Measurement results can be saved in files that have names up to "MEDIAFLOdate_99.xml".

The sequential numbers suffixed to a file name are 0 to 99. Since the file number returns to 00 after 99, files with the same name are overwritten.

Files are saved to the following directory of the target drive specified using F1 (Device).

\Anritsu Corporation\Signal Analyzer\User Data\Measurement Results\MediaFLO

There can be up to 100 XML files and 100 CSV files among the files.

Note:

−999.0 is returned when no measurement is made or an error occurs. Note, however, that "999999999999" is returned in the case of a Frequency Error.

Table 3.8.3-1   Modulation Measurement Result

MER Number[1]	Measurement Result
1	Returns with comma-separated value formats in the following order: 1. Frequency Error (Average) [Hz] 2. Frequency Error (Maximum) [Hz] 3. Frequency Error (Average) [ppm] 4. Frequency Error (max) [ppm] 5. Output Power (Average) [dBm] 6. Output Power (Maximum) [dBm] 7. Transmitter Timing (Average) [seconds] 8. Transmitter Timing (Maximum) [seconds]

Table 3.8.3-1   Modulation Measurement Result (Cont'd)

MER Number[*1]	Measurement Result
2	Returns with comma-separated value formats in the following order: 1. Carrier Suppression (Average) [dB] 2. Carrier Suppression (Maximum) [dB] 3. MER DATA (Average) [dB] 4. MER DATA (Maximum) [dB] 5. MER TDM1 (Average) [dB] 6. MER TDM1 (Maximum) [dB] 7. MER WIC (Average) [dB] 8. MER WIC (Maximum) [dB] 9. MER LIC (Average) [dB] 10. MER LIC (Maximum) [dB] 11. MER TDM2 (Average) [dB] 12. MER TDM2 (Maximum) [dB] 13. MER PPC (Average) [dB] 14. MER PPC (Maximum) [dB] 15. MER SPC (Average) [dB] 16. MER SPC (Maximum) [dB] 17. MER Total (Average) [dB] 18. MER Total (Maximum) [dB] 19. MER DATA & OIS Channel (Average) [dB] 20. MER DATA & OIS Channel (Maximum) [dB] 21. MER Pilot (Average) [dB] 22. MER Pilot (Maximum) [dB]

3

Measurement

Table 3.8.3-1 Modulation Measurement Result (Cont'd)

MER Number[1]	Measurement Result
3	The Constellation graph display data is returned with comma-separated value formats in the following order: 1. Symbol Number, Symbol Name 2. Modulation (Slot 1－1) … 8. Modulation (Slot 7－1) 9. Modulation (Slot 1－2) … 15. Modulation (Slot 7－2) 16. I-phase data of the 0th subcarrier 17. I-phase data of the 0th subcarrier 18. I-phase data of the 1st subcarrier 19. Q-phase data of the 1st subcarrier … $2 \times N + 14$. I-phase data of the (N-1)th subcarrier $2 \times N + 15$. Q-phase data of the (N-1)th subcarrier N: Number of subcarriers determined by FFT Size ***Note:*** Modulation is only saved when Symbol is WDATA or LDATA. Lines 9 to 15 are only saved when FFT Size is 8K.
4	The MER (rms) vs Subcarrier graph display data is returned with comma-separated value formats in the following order: 1. MER (rms) of the 0th subcarrier 2. MER (rms) of the 1st subcarrier … N. MER (rms) of subcarrier N - 1 N: Number of subcarriers determined by FFT Size
5	Not used; for future use.

Table 3.8.3-1   Modulation Measurement Result (Cont'd)

MER Number[*1]	Measurement Result
6	The MER (rms) vs Symbol graph display data is returned with comma-separated value formats in the following order: 1. MER (rms) of the 0th symbol 2. MER (rms) of the 1st symbol … N. MER (rms) of symbol N - 1 N: Number of subcarriers determined by FFT Size
7	Not used; for future use.
8	The data displayed in the Spectral Flatness (Amplitude vs Subcarrier) graph is returned in the following order, separated by commas (,): 1. Spectral flatness amplitude of the 0th subcarrier 2. Spectral flatness amplitude of the 1st subcarrier … N. Spectral flatness amplitude of subcarrier N – 1 N: Number of subcarriers determined by FFT Size
9	The data displayed in the Spectral Flatness (Group Delay vs Subcarrier) graph is returned in the following order, separated by commas (,): 1. Group delay of subcarrier 0 2. Group delay of subcarrier 1 … N. Group delay of subcarrier N – 1 N: Number of subcarriers determined by FFT Size

*1 MER Number is a tag number displayed as a value such as
   <MER1> when the measurement results are saved.

3

Measurement

Chapter 4   Performance Test

This chapter describes measurement devices, setup methods, and performance test procedures required for performing performance tests as preventive maintenance of the MS2690A/MS2691A/MS2692A.

4

Performance Test

4.1   Overview of Performance Test

4.1.1   Performance test

Performance tests are performed as part of preventive maintenance in order to prevent the performance of the MS2690A/MS2691A/MS2692A from being degraded before it occurs.

Use performance tests when required for acceptance inspection, routine inspection and performance verification after repairs. Perform items deemed critical at regular intervals as preventive maintenance. Perform the following performance tests for acceptance inspection, routine inspection and performance verification after repairs of the MS2690A/MS2691A/MS2692A.

- Carrier frequency accuracy
- Residual MER

Perform items deemed critical at regular intervals as preventive maintenance. A recommended cycle for routine tests of once or twice a year is desirable.

If items that do not meet the required level are detected during performance testing, 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.

4.2 Performance Test Items

Warm up the subject testing device and measuring instruments for at least 30 minutes except where directed, in order to stabilize them sufficiently before running performance tests. Demonstrating maximum measurement accuracy requires, in addition to the above, conducting performance tests under ambient temperatures, little AC power supply voltage fluctuations, as well as the absence of noise, vibrations, dust, humidity or other problems.

4.2.1 Testing methods

(1) Test target standards
- Carrier frequency accuracy
- Residual MER

(2) Measuring instrument for tests
- Vector signal generator
- Frequency standard device   Unnecessary if signal source has sufficient frequency accuracy
- Power meter   Unnecessary if signal source has sufficient transmitter power accuracy

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Performance Test

(3)   Setup

Frequency standard device

Reference Input
10 MHz

Buffer Out
10 MHz

MS2690A/MS2691A/MS2692A

Buffer Out
10 MHz

Vector signal generator

Reference Input
10 MHz

RF Output

RF Input

Power Meter

RF Input
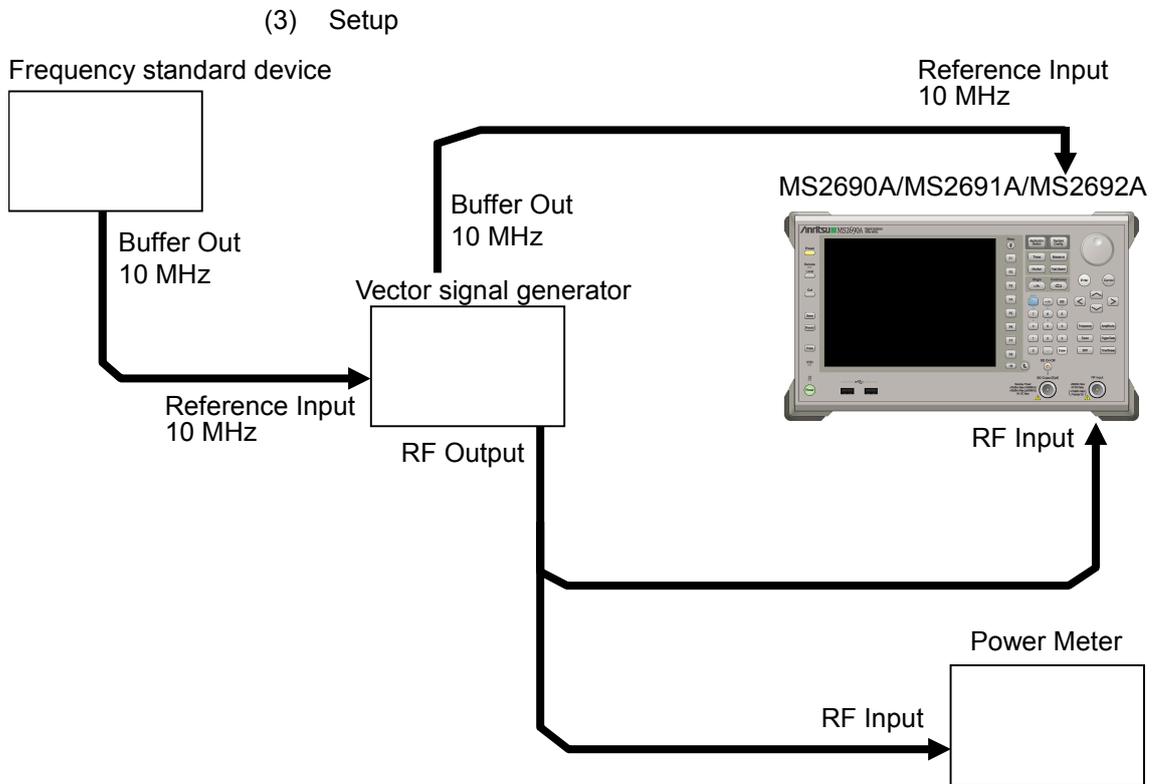
Figure 4.2.1-1   Reference oscillator frequency stability test

(4)   Test procedure

(a)   Signal source adjustment

1.   Input the 10 MHz reference signal output from the frequency standard device into the Reference Input connector of the vector signal generator.

2.   Output a MediaFLO modulation signal from the vector signal generator.

3.   Input the vector signal generator output signal into the power meter and measure the power.

4.   Input the 10 MHz reference signal output from the signal generator to the Reference Input connector of the MS2690A/MS2691A/MS2692A.

(b)   MS2690A/MS2691A/MS2692A settings

1.   Turn On the power switch on the front panel of the MS2690A/MS2691A/MS2692A then wait until the internal temperature of the MS2690A/MS2691A/MS2692A stabilizes (approx. 1.5 hours after the temperature in the thermostatic bath stabilizes).

2.   Press [Application Switch], then press the menu function key displaying the character string "MediaFLO."

3.   Press [Preset].

4.   Press [F1] (Preset) to perform initialization.

5.   Press [Cal].

6.   Press [F1] (SIGANA All) to perform calibration.

7.   Press [F8] (Close).

8.   Press [Frequency], enter the frequency output by the vector signal generator using the numeric keypad, then press [Enter].

9.   Press [Amplitude], enter the power meter measurement result using the numeric keypad, then press [Enter].

10.   Press [Measure] then press [F1] (Modulation Analysis) and press [F4] (Channel Bandwidth) to set the input signal bandwidth.

11.   Press [Measure] then press [F1] (Modulation Analysis) and press [F7] (Detail Settings) to set the analysis parameter for input signal.

12.   Press [Trace] then press [F4] (Storage) and press [F1] (Mode) to choose Average using the cursor key or the rotary knob , then press [Enter].

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Performance Test

13. Press $\boxed{F2}$ (Count), enter the measurement count, using the numeric keypad, then press $\overset{\text{Enter}}{\bigcirc}$.

14. Press $\overset{\text{Single}}{\frown}$ to perform measurement.

15. Confirm whether the measured Frequency Error is within the specifications.

16. Confirm whether the measured MER DATA value is within the specifications.

(5)   Test Result

Table 4.2.1-1   Carrier frequency accuracy

Frequency	Min. limit	Deviation (Hz)	Max. limit	Uncertainty	Pass/Fail
100 MHz	−0.1 Hz		+0.1 Hz	±0.01 Hz	
207 MHz					
1000 MHz					
1500 MHz					

Table 4.2.1-1   Residual MER

Frequency	Measured value [dB]	Min. limit	Uncertainty	Pass/Fail
100 MHz		49 dB	1 dB	
207 MHz				
1000 MHz				
1500 MHz				

Chapter 5   Other Functions

This chapter describes other functions of this application.

5

Other Functions

5.1   Selecting Other Functions

Pressing ⬚ F8 (Accessory) on the main function menu displays the Accessory function menu.

Table 5.1-1   Accessory function menu

Function Keys	Menu Display	Function
F1	Title	Sets the title character string.
F2	Title (On/Off)	Displays (On) or hides (Off) the title character string.
F3	Erase Warm Up Message	Erases the warmup message display.

5.2   Setting Title

A title of up to 32 characters can be displayed on the screen. (Character strings of up to 17 characters can be displayed on a function menu. The maximum number of characters to be displayed on the top of the function menu varies according to character string.)

\<Procedure>

1.   Press ⬚ F8 (Accessory) on the main function menu.

2.   Press ⬚ F1 (Title) to display the character string input screen. Select a character using the rotary knob, and enter it by pressing ⬚ Enter. Enter the title by repeating this operation. When the title is entered, press ⬚ F7 (Set).

3.   Press ⬚ F2 (Title) and then select "Off " to hide the title.

5.3   Erasing Warmup Message

The warmup message (⬚ Warm Up), which is displayed upon power-on and indicates that the level and frequency are not stable, can be deleted.

\<Procedure>

1.   Press ⬚ F8 (Accessory) on the main function menu.

2.   Press ⬚ F4 (Erase Warm Up Message) to erase the warmup message.

Appendix A   Error Messages

Table A-1   Error Messages

Messages	Description
Out of range.	—
No file to read.	—
File read error.	—
File format error.	—
Write error.	—
Save File Limit < 100	More than 100 files already exist in the save destination.
Search error	—
File not found.	—
Cannot find device.	—
Selected item is empty	The selected item or file could not be found.
Not available in Summary Trace. Select other mode.	—
No Cal data saved.	—
Not available when Tracing Mode is set to Estimation. Select Manual.	—
Not available when SPC Presence is set to Absent. Select Present.	—
Not available when SPC Presence is set to Present. Select Absent.	—
Not available when PPC Presence is set to Present. Select Absent.	—
Invalid character	—

Appendix

Appendix A

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