ADVANTEST®

ADVANTEST CORPORATION

R3465 Series OPT76

Graphics Option

Operation Manual

MANUAL NUMBER FOE-8324141B01

Applicable models

R3465
R3463

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Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

- **Warning Labels**

  Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

  Symbols of those warning labels are shown below together with their meaning.

  DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

  WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

  CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

- **Basic Precautions**

  Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

  - Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
  - When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
  - When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
  - Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
  - Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protected ground terminal.
  - Be sure to use fuses rated for the voltage in question.
  - Do not use this instrument with the case open.
  - Do not place anything on the product and do not apply excessive pressure to the product. Also, do not place flower pots or other containers containing liquid such as chemicals near this

product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

- **Caution Symbols Used Within this Manual**

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

The following parts used in the instrument are main parts with limited life.
Replace the parts listed below before their expected lifespan has expired to maintain the performance and function of the instrument.
Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used.
The parts inside are not user-replaceable. For a part replacement, please contact the Advantest sales office for servicing.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	5 years

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.

- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.

- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in solder).

Example: fluorescent tubes, batteries

Environmental Conditions

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- Altitude of up to 2000 m

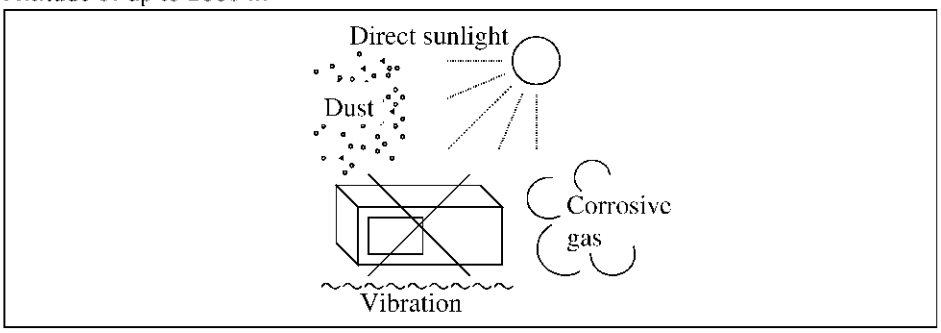


Figure-1 Environmental Conditions

- Operating position

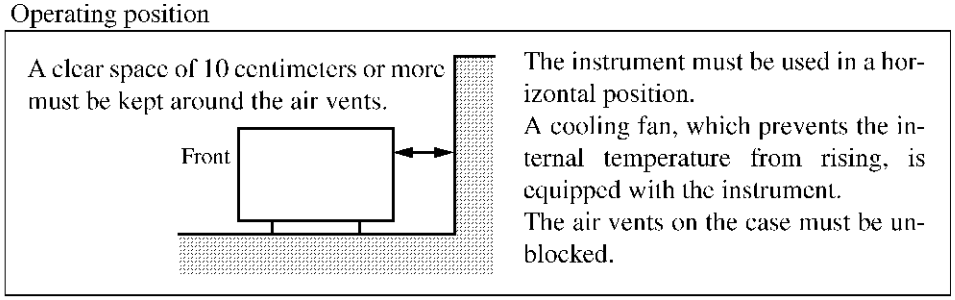


Figure-2 Operating Position

- Storage position

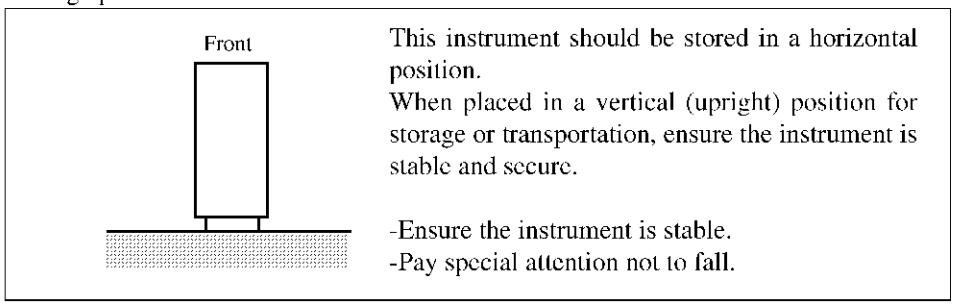


Figure-3 Storage Position

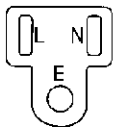
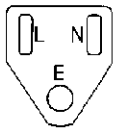
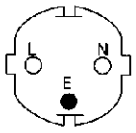
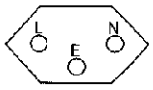
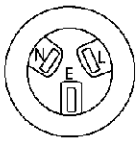
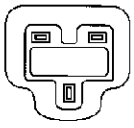
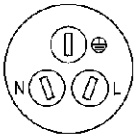
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

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LIST OF ILLUSTRATIONS

CHAPTER 1

Measurement Function

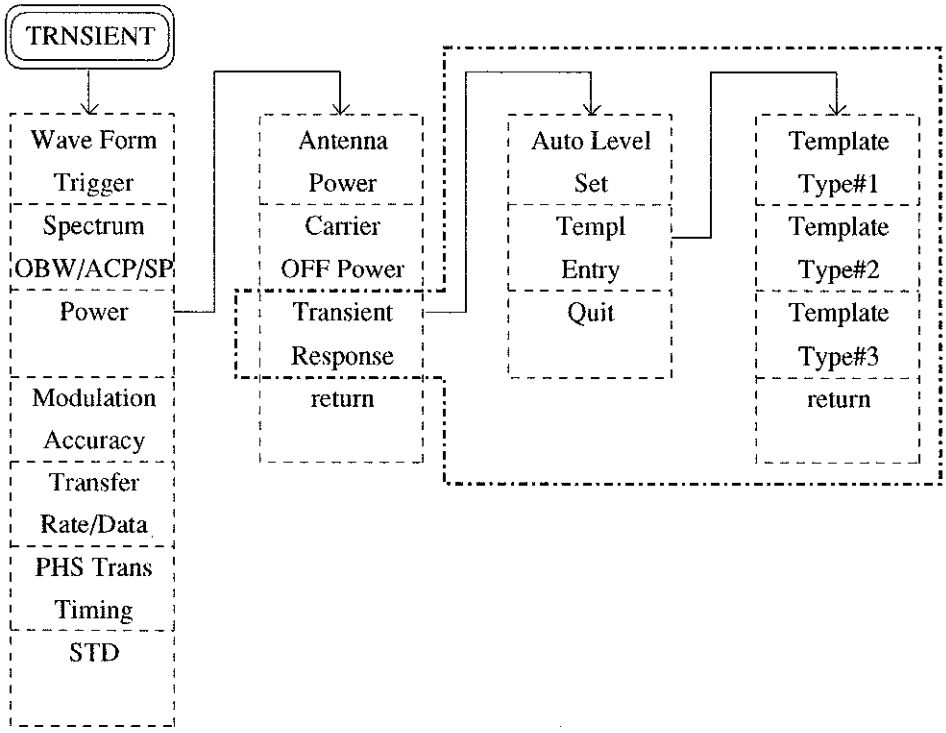
This chapter explains the measurement function of Spectrum Analyzer Graphics Option.

CONTENTS

1. Outline of Graphics Option

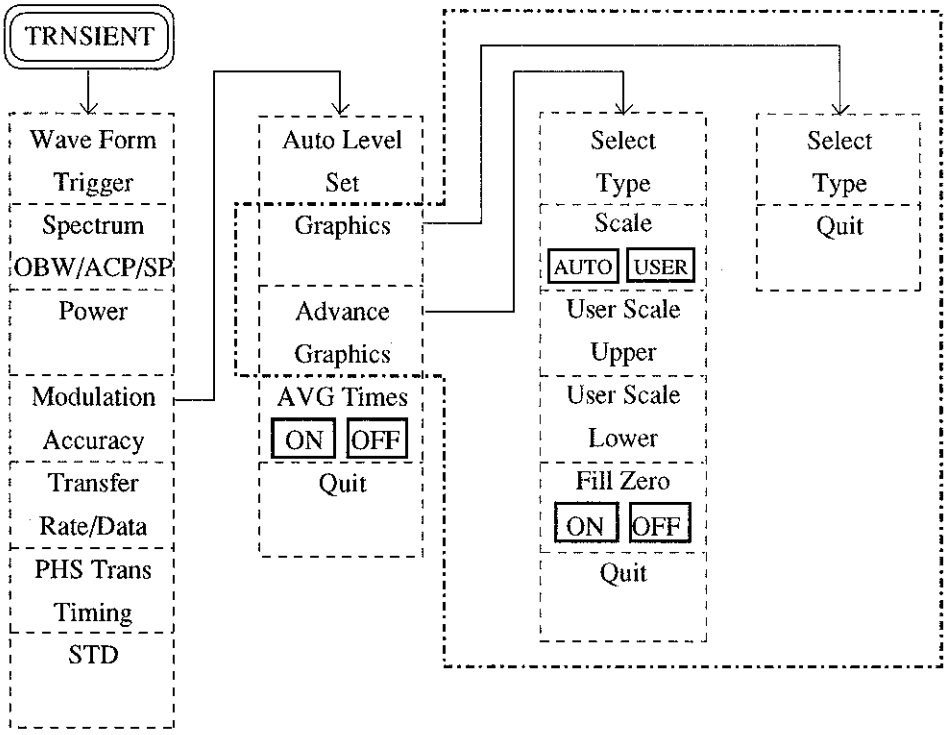
Graphic display of modulation analysis, Time vs Power display, and PHS transfer timing measurement are included in graphics options.
The following shows a list of software key menu.

<Software key menu list 1>



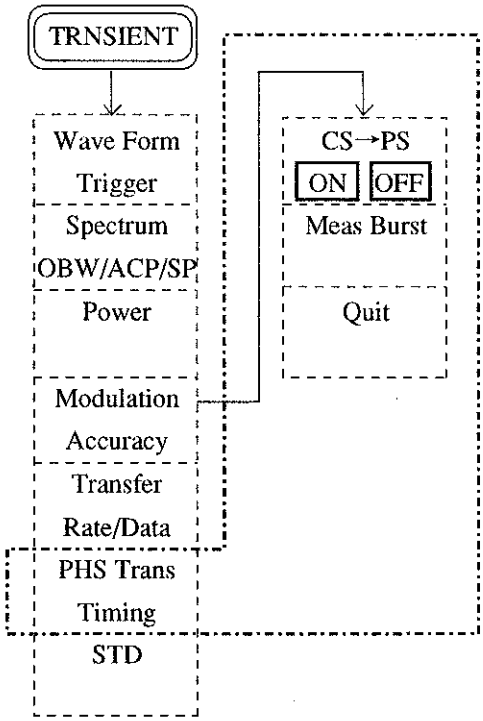
Softkeys enclosed by [ ] are added by using this Constellation Option.

<Software key menu list 2>



Softkeys enclosed by [ ] are added by using this Constellation Option.

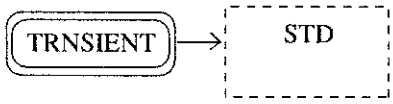
<Software key menu list 3>



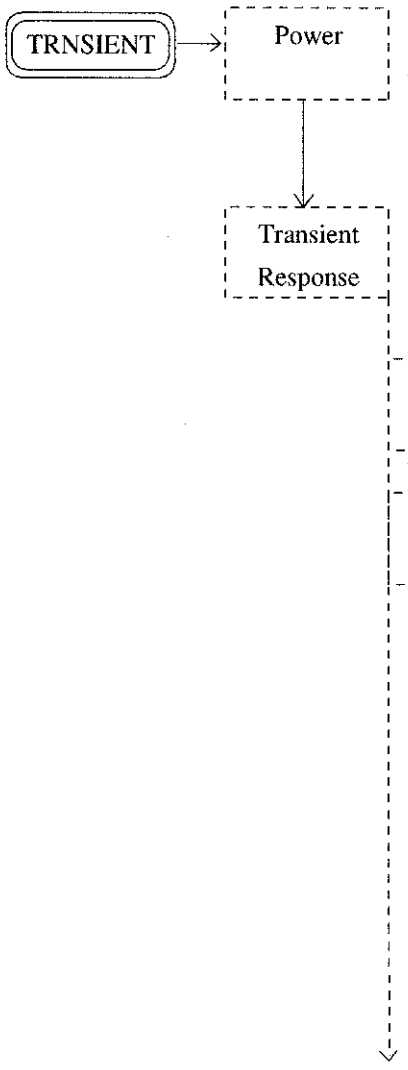
Softkeys enclosed by  are added by using this Constellation Option.

2. Transient Response (Time vs Power Measurement)

The input signal is demodulated then is triggered with Sync Word to suit with the template.



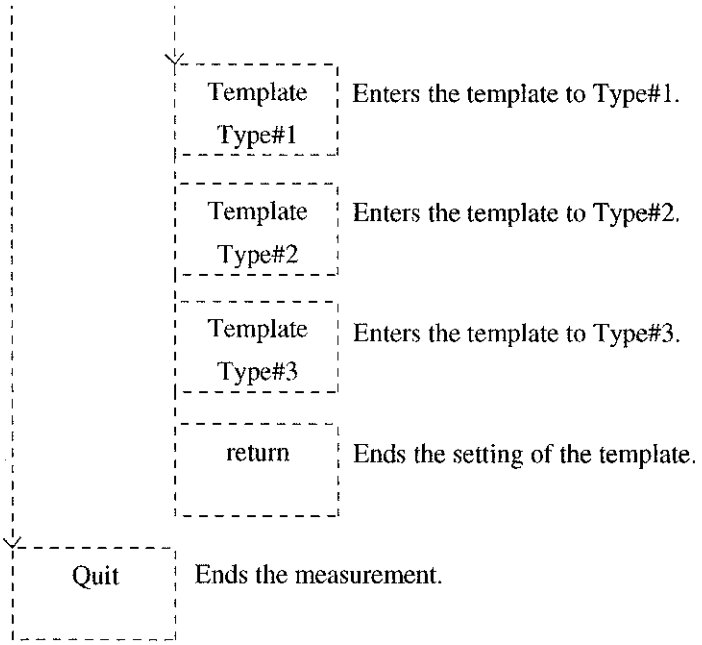
Opens the measurement parameter setting menu to set the parameter.
(Set the Sync Type to Sync Word or Unique Word.)



Displays the power template measurement display.

Sets the optimum internal-reference-level (REF LEVEL) depending on the measurement signal.

Enters the arbitrary template.



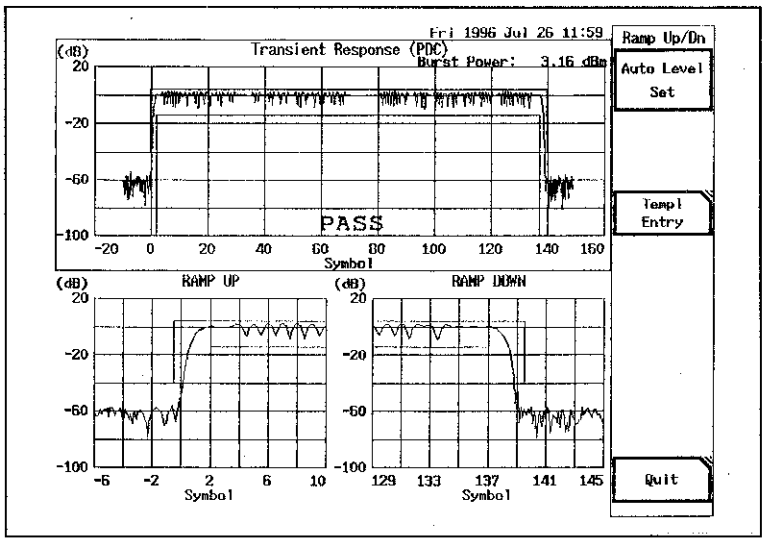


Figure 1-1 Example of Ramp UP/DOWN Measurement

NOTE: Burst Power calculates the power of the burst-ON period.

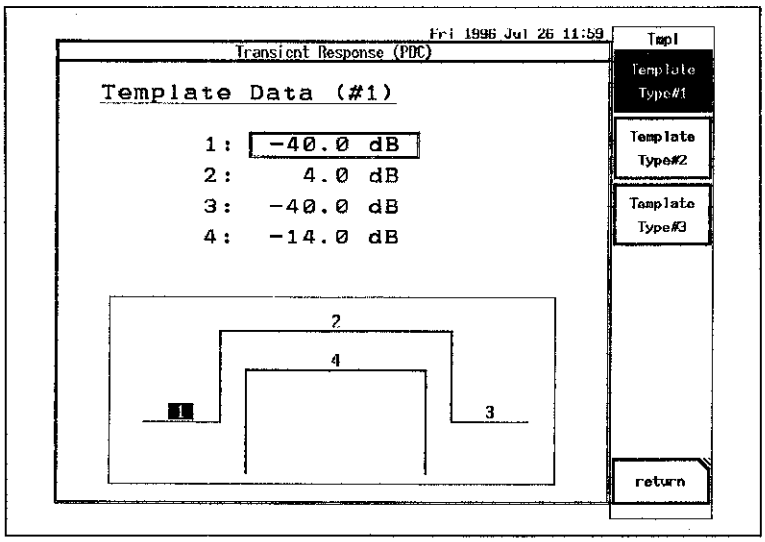


Figure 1-2 Display of User Template Entry

NOTE: The default template is as shown in Figure 1-2 due to shortage of the dynamic range.
Because the specified dynamic range is not satisfied, use the template in combination with "Waveform" measurement.

Pressing MARKER [ON] to display the marker, the data at each symbol point can be read out.

To set the marker to OFF, press MARKER [ON] again.

3. Graphics (Constellation, Eye pattern, Demodulated data)

TRNSIENT → Modulation Accuracy

Selects the modulation accuracy measurement.

↓

Graphics

Selects the graph display.

↓

Select Type

Displays the graph display selection window.
Select a display format by rotating the data knob then press the data knob to determine the format.

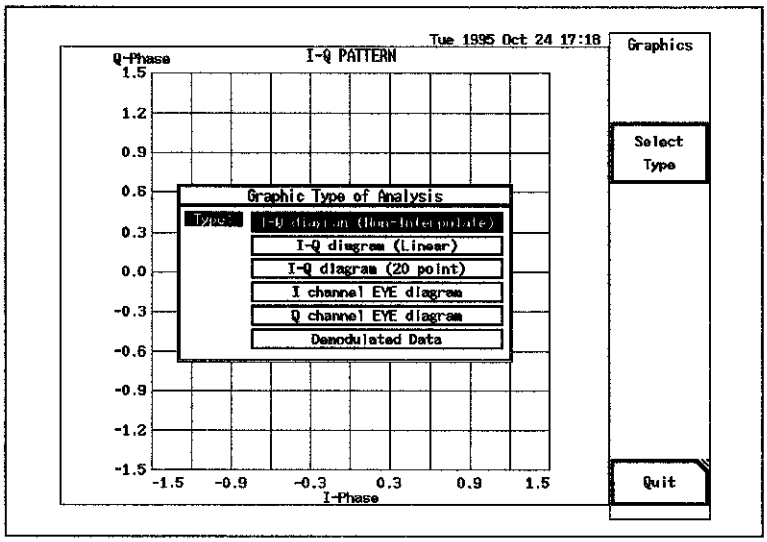


Figure 1-3 Display of Modulation Analysis Graph Selection

Pressing [SINGLE] or [REPEAT] starts the measurement.

Pressing [MARKER ON] to display the marker, the data at each symbol point can be read out.

To set the marker to OFF, press [MARKER ON] again.

■Example of Display Data

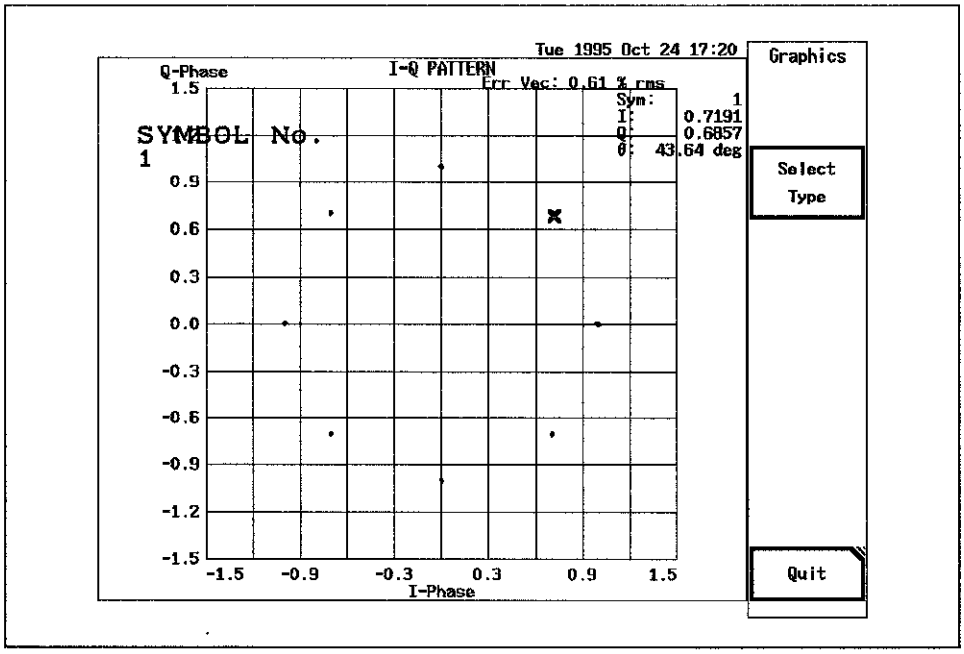


Figure 1-4 I-Q diagram (Non-interpolate)

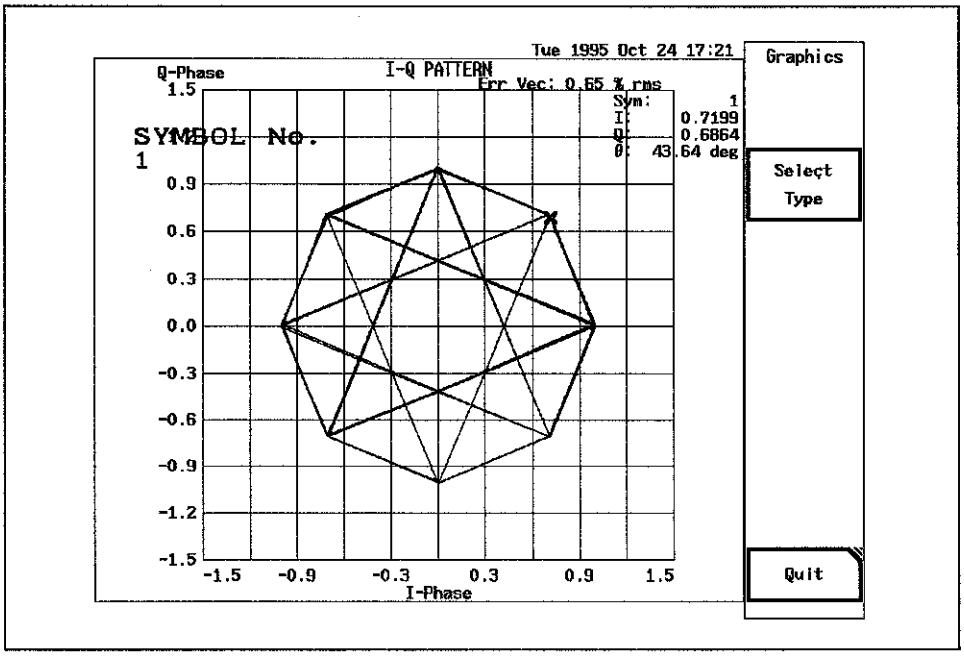


Figure 1-5 I-Q diagram (Linear)

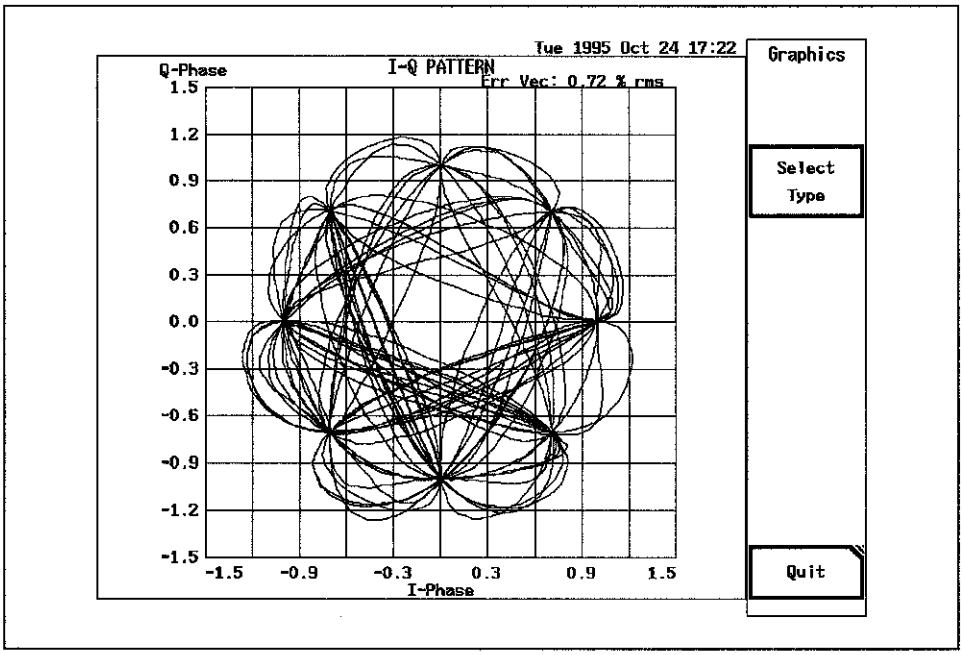


Figure 1-6 I-Q diagram (20 point)

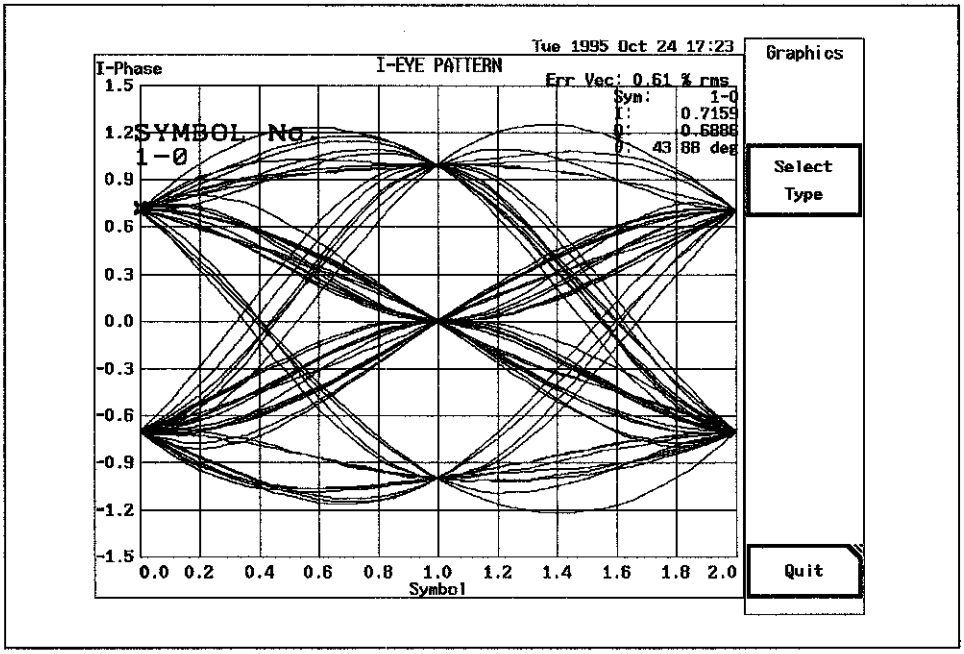


Figure 1-7 I channel EYE diagram

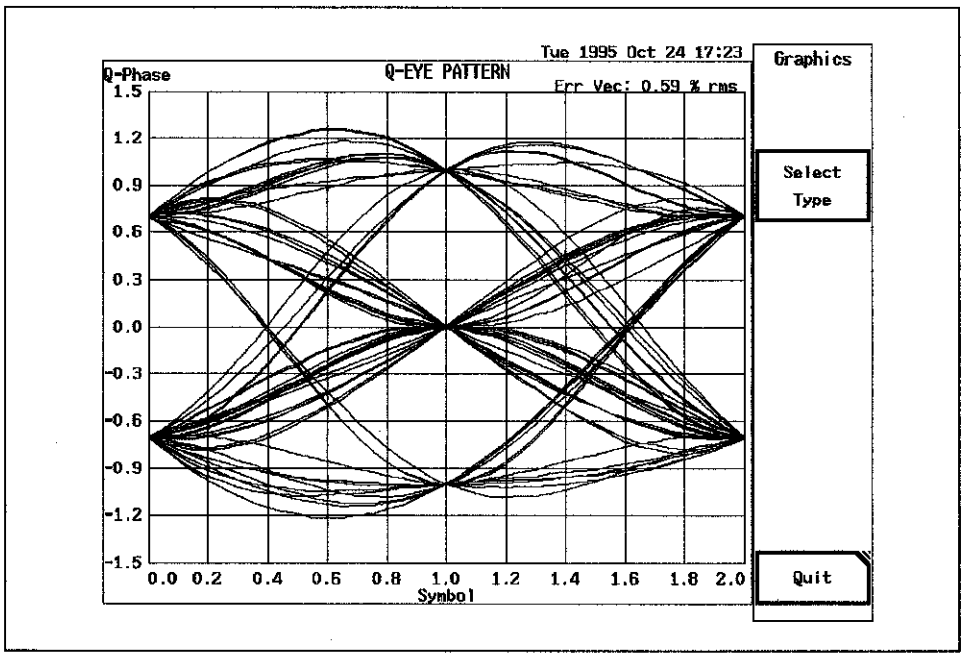


Figure 1-8 Q channel EYE diagram

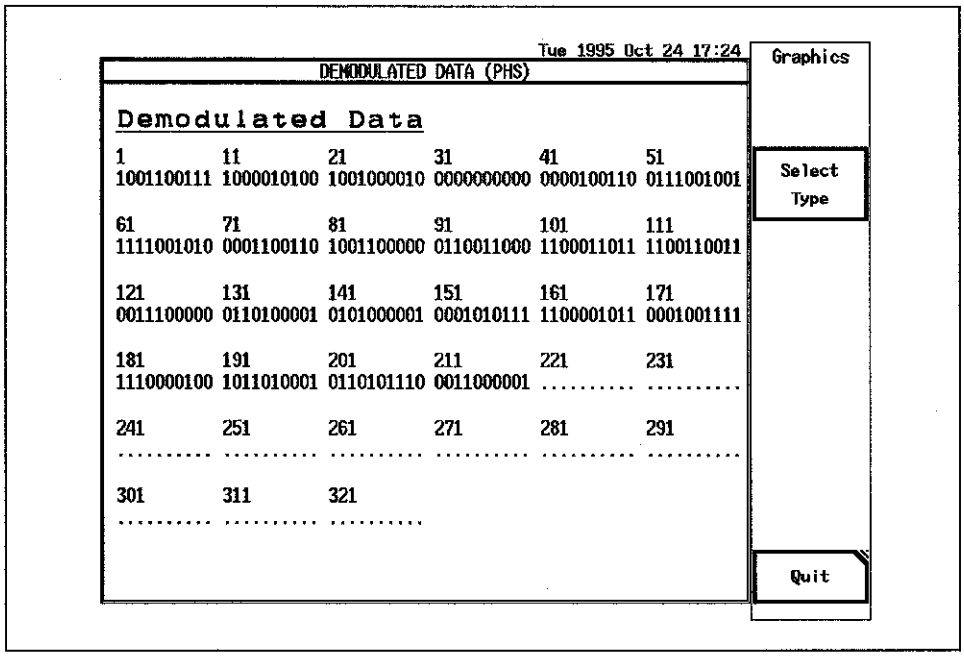


Figure 1-9 Demodulated Data

4. Advance Graphics (Analysis of horizontal axis symbol)

TRNSIENT → Modulation Accuracy → Advance Graphics — Select Advance Graphics.

Select Type

Graphic display selection window is displayed.
Turn the data knob to select a display type then press the data knob to determine the type.

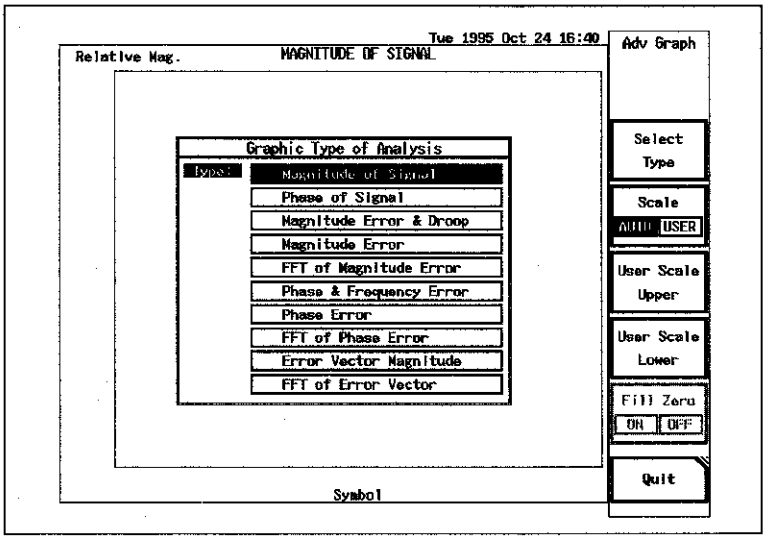


Figure 1-10 Advance Graphics Selection Screen

Perform the measurement by pressing SINGLE or REPEAT.

Scale AUTO USER

Select a graph scaling, AUTO or USER.
The scaling is changed after this setting.

User Scale Uppser

When USER is set for Scale, upper value of the scale is set.

User Scale Lower

When USER is set for Scale, lower value of the scale is set.

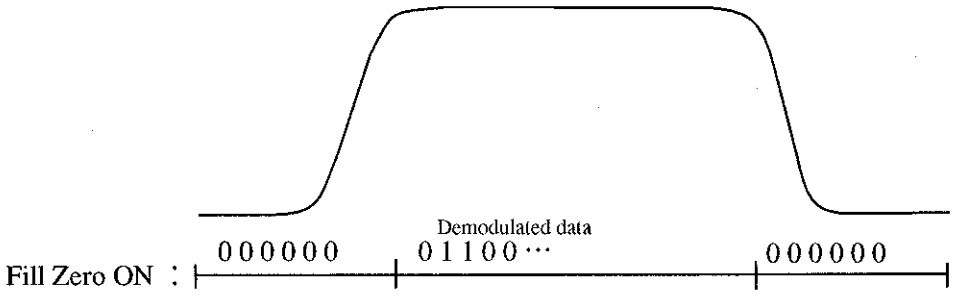
NOTE: When Scale is set to USER, the value between user-set upper value and lower value is divided equally into ten by grid.Then the upper value and the lower value may not equal user-set values due to self-rounding.

Fill Zero
ON OFF

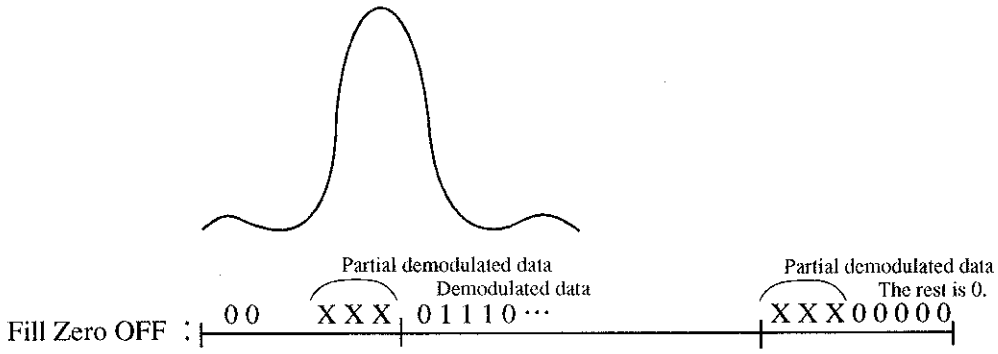
When the graph displays Error between ideal signal and measurement signal, this item becomes active. This setting is effective only when measurement waveform is a burst.
The ideal signal is created by demodulating the measurement data and calculating on the basis of this demodulated data.

File Zero ON: Puts demodulated data 0 into the burst-OFF section and creates an ideal signal when the measurement data is a burst.

File Zero OFF: Demodulates as far as demodulation is possible in the rising and falling sections of the burst, and in the rest, puts 0 for the demodulated data to create an ideal signal when the measurement data is a burst.



As the data in the burst-OFF section is required in filter process, put 0 for the demodulated data in the burst-OFF section.



Even if it is in the burst-OFF section, use demodulated data where demodulated data can be taken and 0 in the rest to calculate.

Displaying the marker with MARKER ON, the data can be read. To switch the marker OFF, press the MARKER ON again.

●Magnitude of Signal

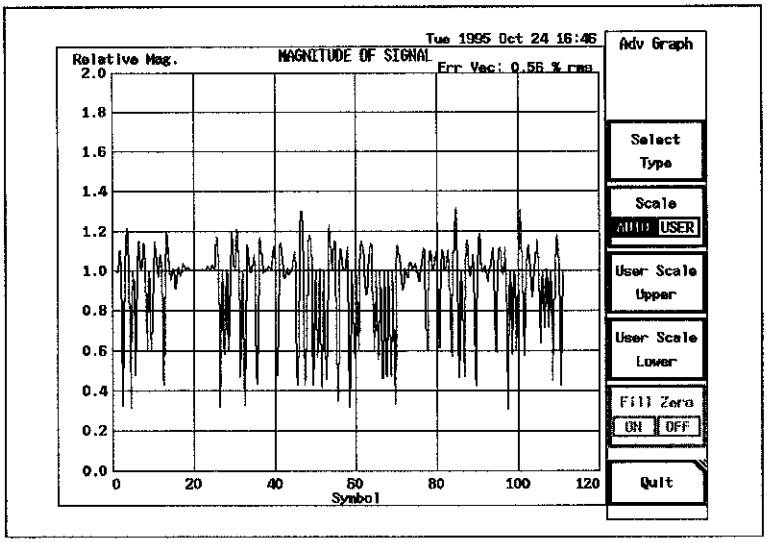


Figure 1-11 Magnitude of Signal Screen

"Magnitude" of each symbol vector in one slot is displayed as a graph. Normalized value based on 1 is used. Also, the shift between symbols is displayed. (5 points between symbols)

$$\text{Magnitude}(i)=\sqrt{Im(i)^2+Qm(i)^2}$$

Im(i), Qm(i) : Measurement Value

i : Symbol Number

●Phase of Signal

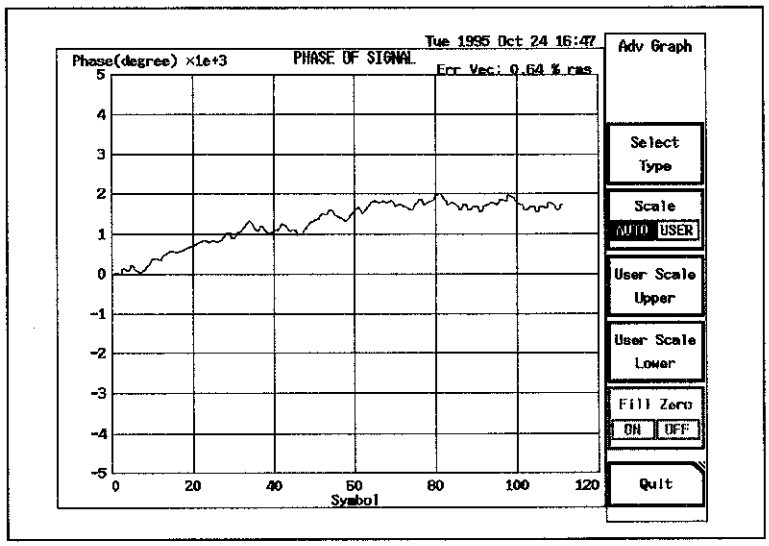


Figure 1-12 Phase of Signal Screen

"Phase" of each symbol in one slot is displayed as a graph.
The data displayed here is the value including phase shift between symbols.

●Magnitude Error & Droop

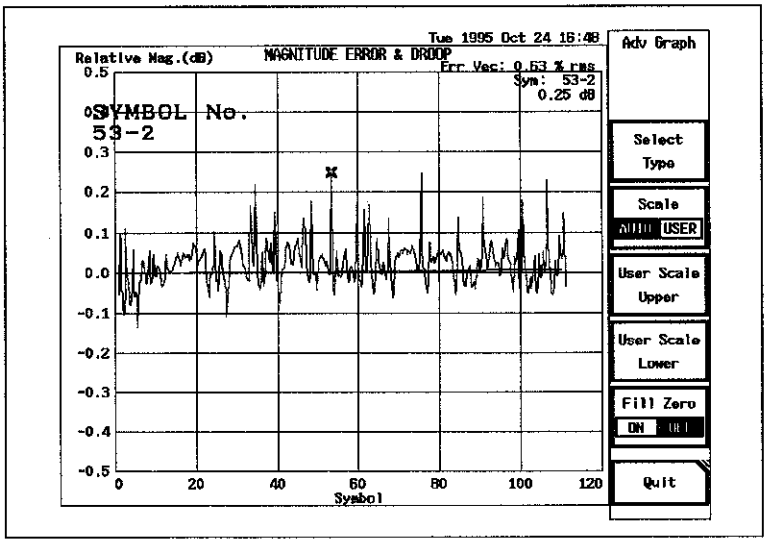


Figure 1-13 Magnitude Error & Droop Screen

"Magnitude Error" for the reference signal of each symbol in one slot is relatively-displayed. Also, the Droop value is displayed by a leaning straight line.
The "Magnitude Error" value displayed here is the value including this Droop component.

$$\text{Magnitude Error}(i)=10\log_{10}((Im(i)^2+Qm(i)^2)/(Ir(i)^2+Qr(i)^2))+\text{Droop}\cdot i$$

Im(i), Qm(i) :	Measurement Value	i :	Symbol Number
Ir(i), Qr(i) :	Reference Value	Droop(dB/symbol) :	Droop Value

●Magnitude Error

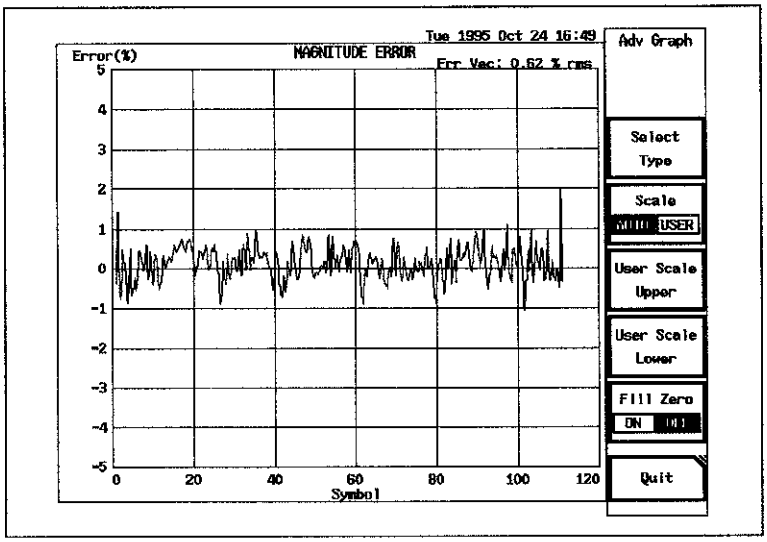
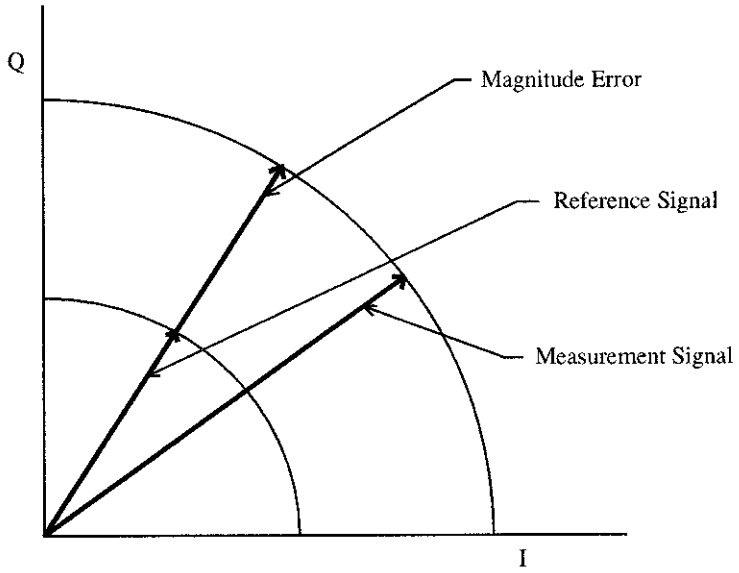


Figure 1-14 Magnitude Error Screen

"Magnitude Error" for the reference signal of each symbol in one slot is plotted in percentage.

$$\text{Measurement}(i)=(\sqrt{\text{Im}(i)^2+\text{Qm}(i)^2}-\sqrt{\text{Ir}(i)^2+\text{Qr}(i)^2})\times 100$$

Im(i), Qm(i) : Measurement Value i : Symbol Number
Ir(i), Qr(i) : Reference Value



●FFT of Magnitude Error

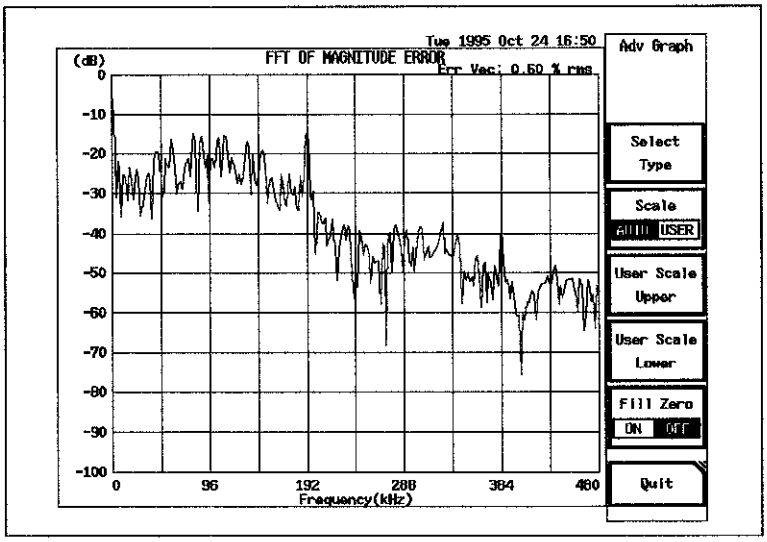


Figure 1-15 FFT of Magnitude Error Screen

The "Magnitude Error" value is FFTed and displayed. The AM modulation component of the signal analyzed in this graph is shown.
The 100% data is normalized as 1 (0 dB) here.

●Phase & Frequency Error

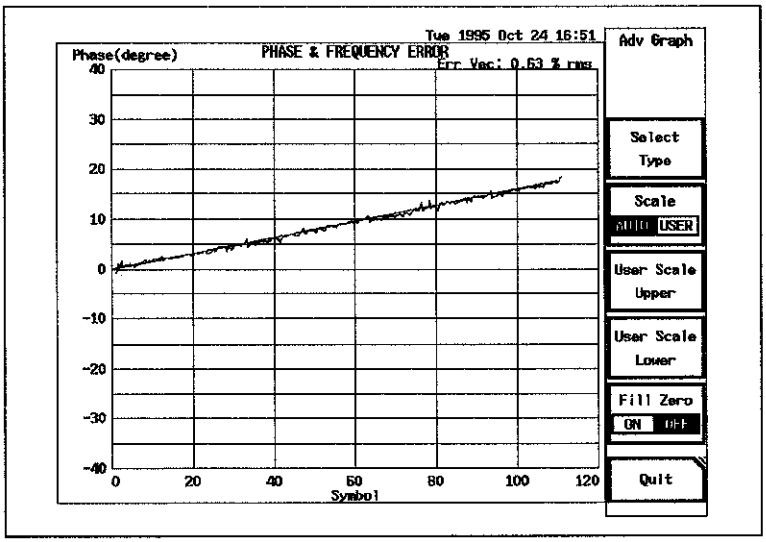


Figure 1-16 Phase & Frequency Error Screen

"Phase Error" for the reference signal of each symbol in one slot is displayed in the unit degree. Also, the shift for time of "Frequency Error" is plotted.
Measurement Value
Phase Error(i)=$\tan^{-1}$(Qm(i)/Im(i))-$\tan^{-1}$(Qr(i)/Ir(i))+360° · Frequency Error/Symbol Rate · i
Im(i), Qm(i) : Measurement Value i : Symbol Number
Ir(i), Qr(i) : Reference Value

●Phase Error

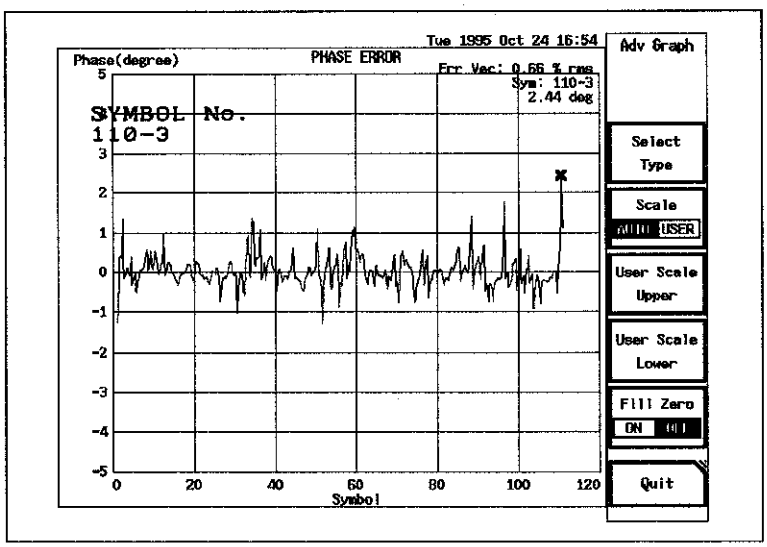
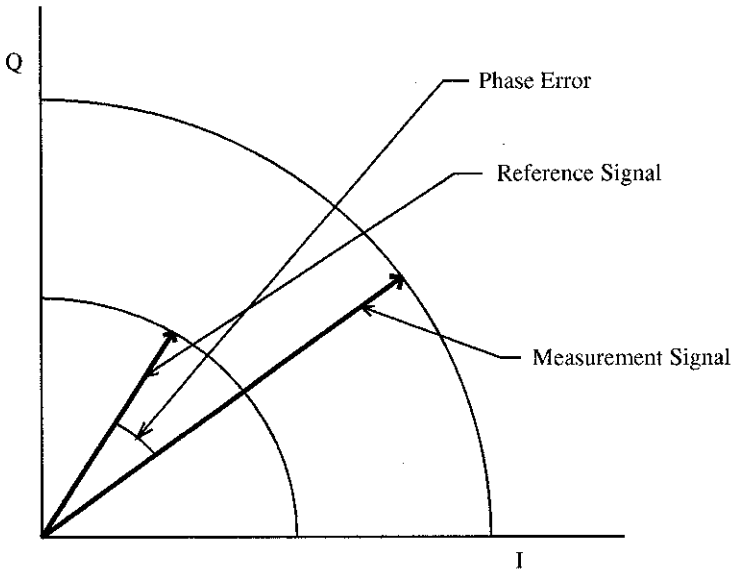


Figure 1-17 Phase Error Screen

"Phase Error" for the reference signal of each symbol in one slot is plotted in the unit degree.

Phase Error(i)=$\tan^{-1}$(Qm(i)/Im(i))-$\tan^{-1}$(Qr(i)/Ir(i))

Im(i), Qm(i) : Measurement Value i : Symbol Number
Ir(i), Qr(i) : Reference Value



●FFT of Phase Error

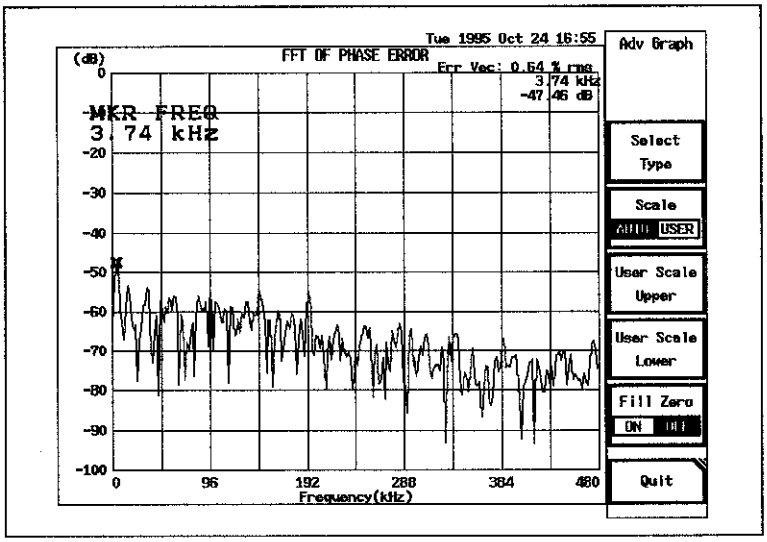


Figure 1-18 FFT of Phase Error Screen

The result of the "Phase Error" frequency analysis by FFT is displayed.
The ϕ M modulation component of the analyzed signal is shown in this display.
90° is normalized as 1 (0 dB) here.

●Error Vector Magnitude

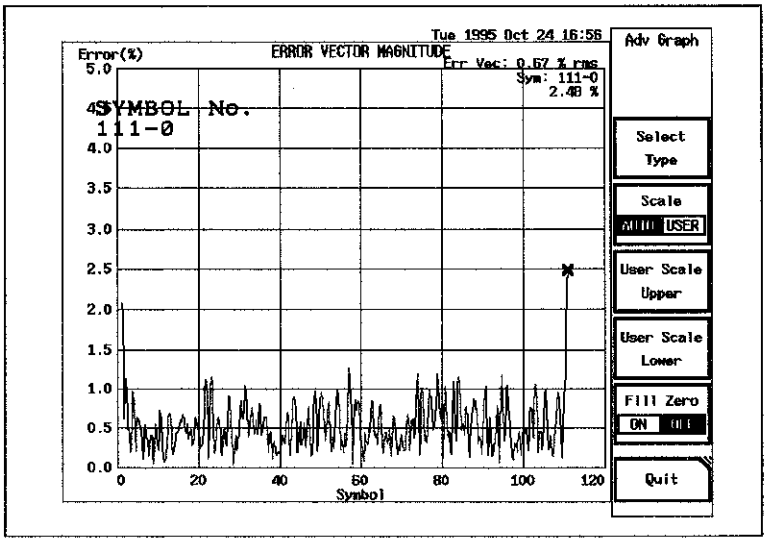
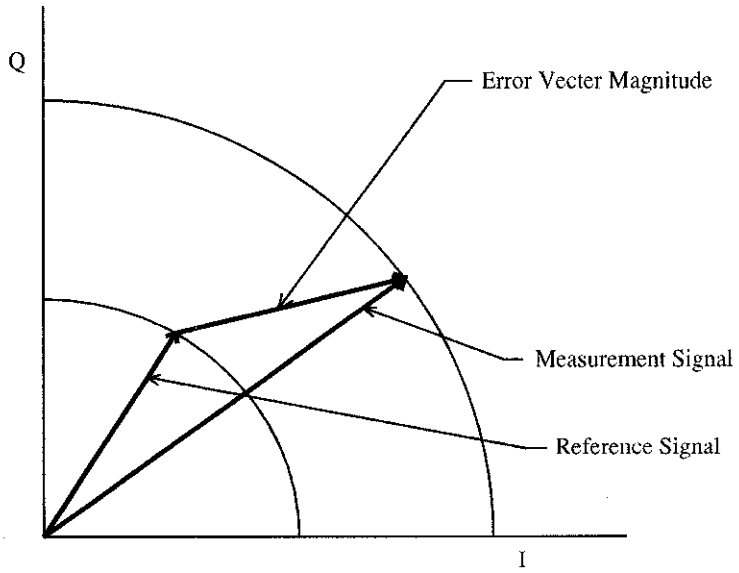


Figure 1-19 Error Vector Magnitude Screen

"Error Vector Magnitude" for the reference signal of each symbol in one slot is displayed.

$$\text{Error Vector Magnitude}(i)=\sqrt{(\overline{Im(i)-Ir(i)})^2+(Qm(i)-Qr(i))^2}\times 100$$

Im(i), Qm(i) : Measurement Value I : Symbol Number
Ir(i), Qr(i) : Reference Value



●FFT of Error Vector

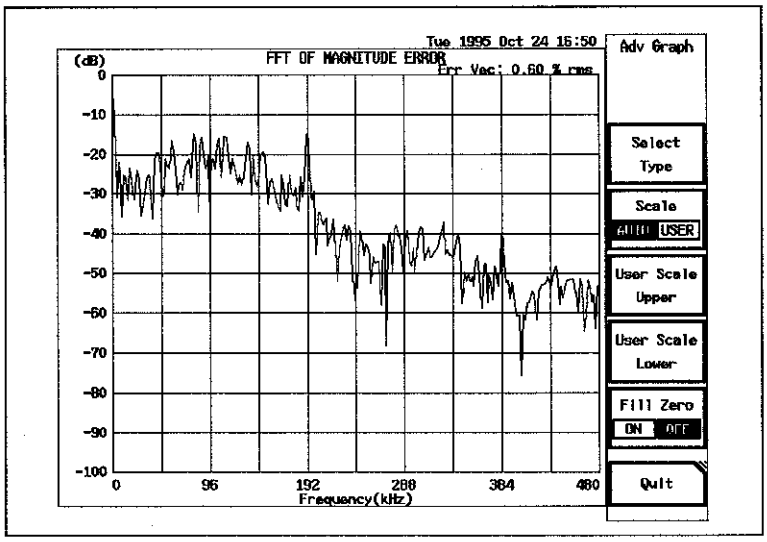
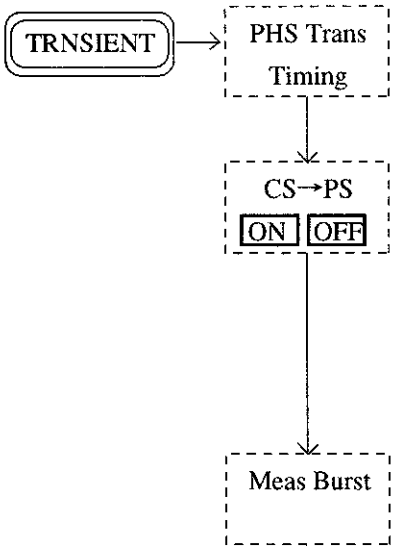


Figure 1-20 FFT of Error Vector Screen

The data that Im(i)-Ir(i) and Qm(i)-Qr(i) are processed in complex-FFT is displayed.
The noise component for the base band signal is shown in this graph.
The 100% data is normalized as 1 (0 dB).

5. PHS Trans Timing

The PHS burst transfer timing is displayed.
It is effective only when the communication type is PHS and the signal type is the burst in the STD menu.



The setting of CS→PS is effective only when Uplink is selected in STD menu.

ON : A burst from CS to PS is measured.

OFF : Timing from burst to burst is measured.

Sets the number of measurement bursts.

Perform the measurement by pressing [SINGLE] or [REPEAT] .

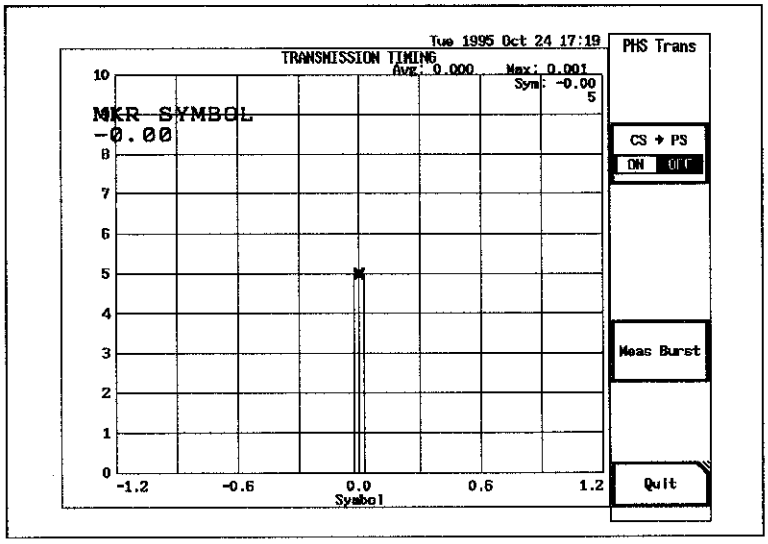


Figure 1-21 PHS Trans Timing Measurement Screen

Displaying the marker with [MARKER ON] , data can be read.

To switch the marker OFF, press the [MARKER ON] again.

CHAPTER 2

GPIB

This chapter contains the GPIB code list and the GPIB sample program.

CONTENTS

1. GPIB Code List

(1 of 4)

Function	Listener code	Talker request		Remarks
		Code	Output format	
Condition setting				
<Ramp UP/DOWN setup>				
Select template	RUTEMP * *: 1/2/3	RUTEMP?	Template number (1/2/3)	
Edit template	EUTEMP d1, d2, d3, d4 d1 to d4: Relative level (dB)	—	—	
<Graphics Type>				
I-Q diagram(Non-int.)	GPHTYP DOT	GPHTYP?	0: DOT	
I-Q diagram(Linear)	GPHTYP LIN		1: LIN	
I-Q diagram(20 point)	GPHTYP INP		2: INP	
I-ch EYE diagram	GPHTYP IEYE		3: IEYE	
Q-ch EYE diagram	GPHTYP QEYE		4: QEYE	
Demodulated Data	GPHTYP DEMOD		5: DEMOD	
<Advance Graphics Type>				
Magnitude of Signal	AGPTYP DOT	AGPTYP?	0	
Phase of Signal	AGPTYP PS		1	
Magnitude Error & Droop	AGPTYP MED		2	
Magnitude Error	AGPTYP ME		3	
FFT of Magnitude Error	AGPTYP FME		4	
Phase & Frequency Error	AGPTYP PFE		5	
Phase Error	AGPTYP PE		6	
FFT of Phase Error	AGPTYP FPE		7	
Error Vector Magnitude	AGPTYP EVM		8	
FFT of Error Vector	AGPTYP FEV		9	

(2 of 4)

Function		Listener code	Talker request		Remarks
			Code	Output format	
<Advance Graphics setup>					
Scale	AUTO	AGPSCL AUTO	AGPSCL?	0/1(0: AUTO, 1: USER)	
	USER	AGPSCL USER			
User Scale	Upper	AGPUP *	AGPUP?	Upper data	
	Lower	AGPLOW *	AGPLOW?	Lower data	
Fill Zero	ON	AGPFIL ON	AGPFIL?	ON/OFF	
	OFF	AGPFIL OFF			
<PHS Trans Timing setup>					
CS→PS	ON	AGPCSPS ON	AGPCSPS?	ON/OFF	
	OFF	AGPCSPS OFF			
Measurement Burst number		AGPBUR *	AGPBUR?	Integer(1 to 50)	
Measurement Start /Execute					
Executing Ramp UP/DOWN measurement		RUPDN	—	—	
Executing Graphics display		MODGPH	—	—	
Advance Graphics		MODAGPH	—	—	
PHS Trans Timing		MODPGPH	—	—	
Data Output					
<Ramp UP/DOWN>					
Ramp UP/DOWN Power			RUDPWR?	Lebel (dBm)	
PASS/FAIL			RUDJDG?	0/1(0: FAIL, 1: PASS)	
<Graphics>					
I-ch data output		—	GPHI?	ndata, d1, ... , dn	
Q-ch data output		—	GPHQ?	ndata, d1, ... , dn	
Degree data output		—	GPHDEG?	ndata, d1, ... , dn ndata: Output data number d1 to dn : Float(32bit) , : Separator(CR+LF)	Separator is fixed to CR+LF.

1. GPIB Code List

(3 of 4)

Function	Listener code	Talker request		Remarks
		Code	Output format	
Demod data output	—	DEMOD?	n-str, d1$,...,dn$ n-str: Number of output character strings d1$ to dn$: Character string data (1 data: 10 bits)	
<Advance Graphics>			ndata:Number of output data	
X data (Symbol number)	—	GPHX?	ndata, d1,...dn d1 to dn=integer(16bit)	
X data (Frequency)	—	GPHF?	ndata, d1,...dn d1 to dn=float(32bit)	
Y data (Relative mag) (Phase) (Error) (Level)	—	GPHY?	ndata, d1,...dn d1 to dn=float(32bit)	
<PHS Trans Timing>				
X data	—	GPHF?	ndata, d1,...dn d1 to dn=float(32bit)	
Y data	—	GPHYP?	ndata, d1,...dn d1 to dn=integer(16bit)	
AVG data	—	PHSAVG?	AVG data	
MAX data	—	PHSMAX?	MAX data	
Marker				
Marker ON Marker OFF	GMK ON GMK OFF	GMK?	ON/OFF	

(4 of 4)

Function	Listener code	Talker request		Remarks
		Code	Output format	
<Ramp UP/DOWN>				
Marker movement				
(symbol number)	GMKX *	GMKX?	Symbol number	
Marker Y data	—	GMKY?	Level	
<Graphics>				
Marker movement				
(symbol number)	GMKX *	GMKX?	Symbol number	
Marker Y data	—	GMKIQD?	I, Q, Degree	
<Advance Graphics>				
Marker movement				
(symbol number)	GMKX *	GMKX?	Symbol number	
(Frequency)	GMKF *	GMKF?	Frequency	
Marker Y data	—	GMKY?	Relative mag	
			Phase	
			Error	
			Level	
<PHS Trans Timing>				
Marker movement	GMKF *	GMKF?	Symbol data	
Marker Y data	—	GMKYP?		

2. GPIB Sample Program

The following is a sample program(HP Basic) to read the I data and the Q data of constellation (Non Interpolation) and display them on the personal computer.

《Program example》 (1 of 2)

```
 10   ! Graphics Data
 20   !
 30    Spa=708                          ! SPA GPIB address
 31   !
 40    DIM Gri(3600),Grq(3600)
 50    OUTPUT Spa;"*CLS"                ! Status clear
 60    OUTPUT Spa;"GPHTYP DOT"          ! Set graph type
 70    OUTPUT Spa;"MODGPH"              ! Execute graphics
 80 Loop:!
 90    OUTPUT Spa;"OPREVT?"             ! Get operation status register
100    ENTER Spa;State
110    IF BIT(State,4)=0 THEN GOTO Loop ! Wait until measuring end...
120   !
130    GOSUB Scale_line                 ! Draw scale sub
140   !
150    OUTPUT Spa;"DL0 GPHI?"           ! Get I-Phase data
160    ENTER Spa;Num
170    FOR I=0 TO Num-1
180       ENTER Spa;A
190       Gri(I)=A
200    NEXT I
210   !
220    OUTPUT Spa;"GPHQ?"               ! Get Q-Phase data
230    ENTER Spa;Num
240    FOR I=0 TO Num-1
250       ENTER Spa;A
260       Grq(I)=A
270    NEXT I
280   !
290    AREA PEN 3                       ! Set marker color
300    FOR I=0 TO Num-1                 ! Draw points
310       MOVE Gri(I),Grq(I)
320       POLYGON .01,10,10,FILL
330    NEXT I
340    STOP
350   !
360 Scale_line:!
370    GINIT                            ! Initial graphics condition
380    GRAPHICS ON                      ! Graphics mode on
390    VIEWPORT 29,91,28,90             ! Draw scale
```

(2 of 2)

```
400    WINDOW -1.5,1.5,-1.5,1.5
410    PEN 1
420    LINE TYPE 4
430    GRID .3,.3,-1.5,-1.5
440    LINE TYPE 1
450    AXES .3,.3,-1.5,-1.5
460    AXES -.3,-.3,1.5,1.5
470   !
480    CLIP OFF                          ! Draw label
490    CSIZE 3
500    LORG 4
510    MOVE 0,1.6
520    LABEL "I-Q PATTERN"
530   !
540    CSIZE 2.5
550    LORG 6
560    MOVE 0,-1.65
570    LABEL "I-Phase"
580    FOR X=-1.5 TO 1.5 STEP .6
590       MOVE X,-1.5
600       LABEL USING "MZ.D";X
610    NEXT X
620    LORG 8
630    DEG
640    LDIR 90
650    MOVE -1.9,.3
660    LABEL "Q-Phase"
670    LDIR 0
680    FOR Y=-1.5 TO 1.5 STEP .6
690       MOVE -1.5,Y
700       LABEL USING "MZ.D";Y
710    NEXT Y
720   !
730    LORG 5
740    LINE TYPE 1
750    RETURN
760   !
770    END
```

CHAPTER 3

SPECIFICATIONS

This chapter explains the specifications of the graphics option function.

CONTENTS

1. Graphics Option Functional Specification

■Time vs Power display

- ●Sync Word trigger and Unique Word trigger are available.
- ●Measuring the power of the burst-ON area
- ●Template setting function
- ●Template Pass/Fail judgment function

■I vs Q diagram display

- ●Displaying the data only at the symbol point
- ●Displaying the data at the symbol point by linear interpolation
- ●Displaying the data between symbols by 20-sample interpolation

■I signal Eye diagram display

■Q signal Eye diagram display

■Demodulation data display

■Amplitude display (for each symbol, 5 points between symbols)

■Phase display (for each symbol, 5 points between symbols)

■Amplitude error display

- ●Amplitude error display
- ●Amplitude error + Droop display
- ●FFT display of the amplitude error

■Phase error display

- ●Phase error display
- ●Phase error + Frequency error display
- ●FFT display of the phase error

■Vector error display

- ●Magnitude display of the I/Q vector error
- ●FFT display of the I/Q vector error

■PHS burst timing measurement

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