
ADVANTEST[®]
ADVANTEST CORPORATION

R3465 Series OPT75
Constellation Option
Operation Manual

MANUAL NUMBER FOE-8324139B01

Applicable model
R3465

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

Safety Summary

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

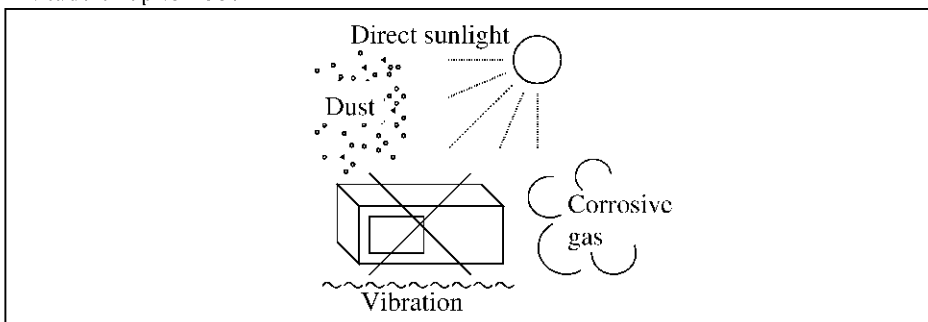


Figure-1 Environmental Conditions

- Operating position

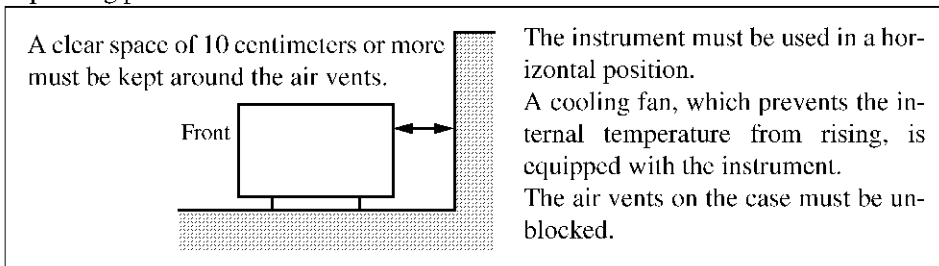


Figure-2 Operating Position

- Storage position

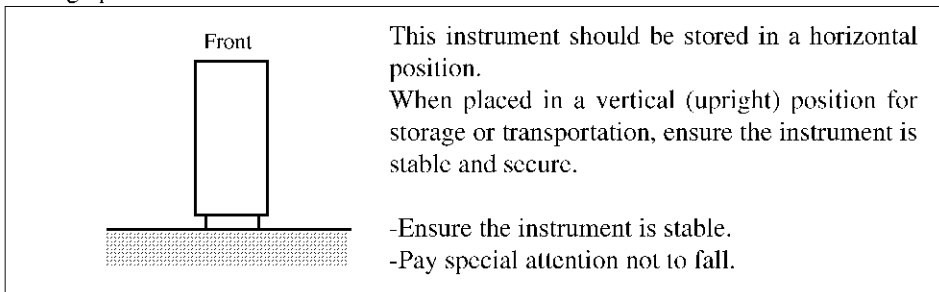


Figure-3 Storage Position

- 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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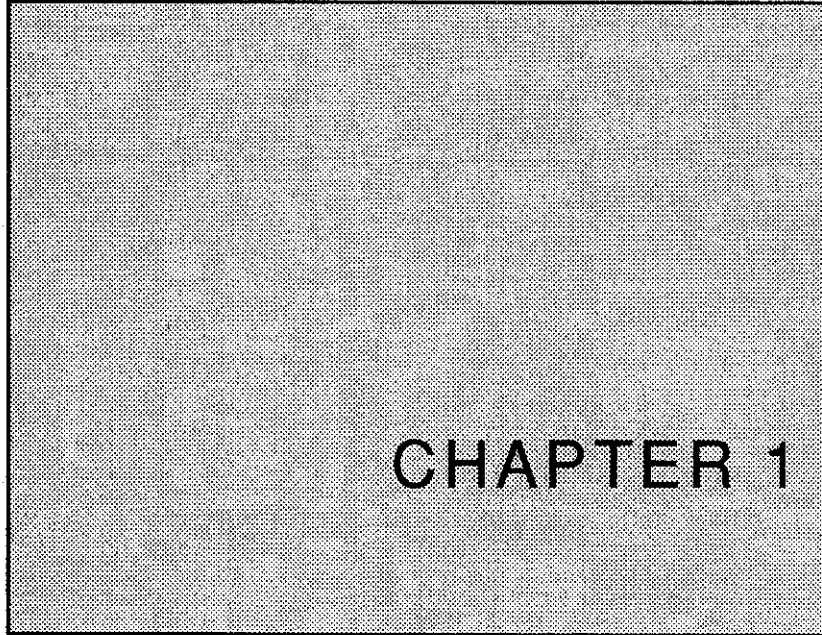
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Measurement Function

This chapter explains the measurement function of Modulation Spectrum Analyzer Constellation Option.

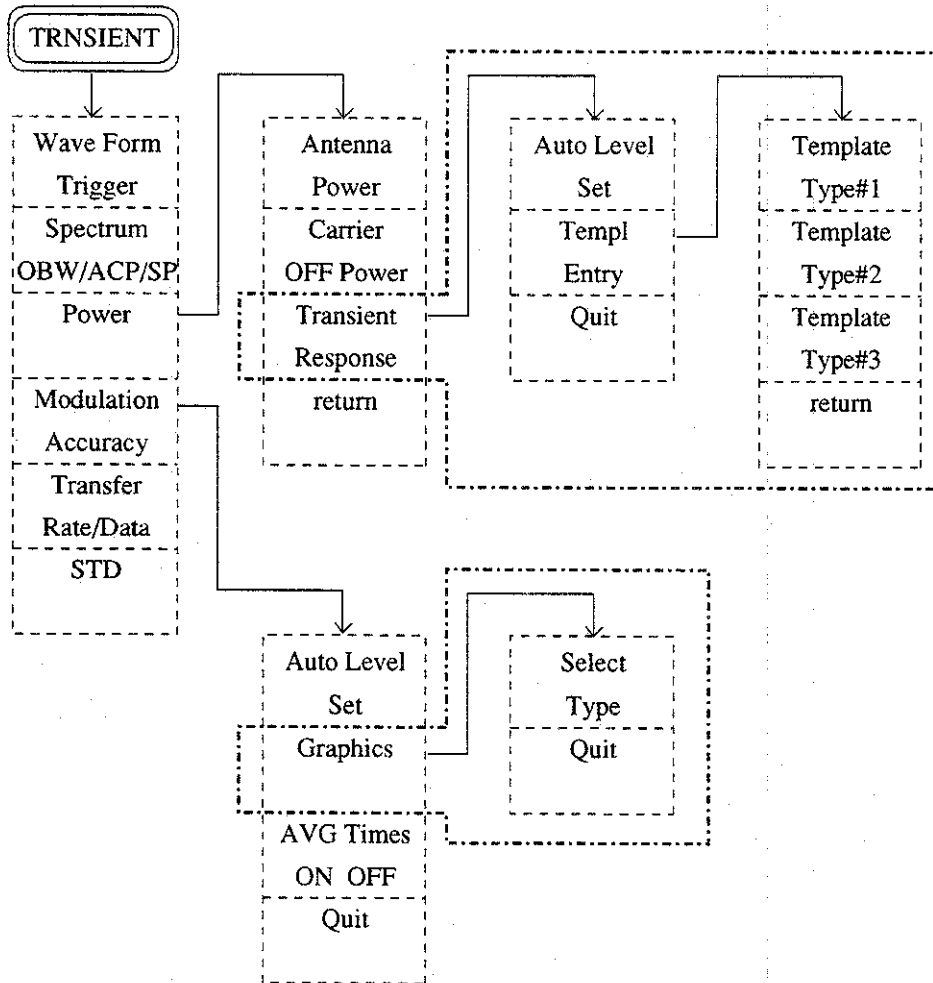
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1. Constellation Time vs Power Measurement

The Constellation Option includes the function of the modulation analysis graph display and the time vs Power display. The following shows the softkey menu list.

<Softkey Menu List>



Softkeys enclosed by are added by using this Constellation Option.

■ Constellation

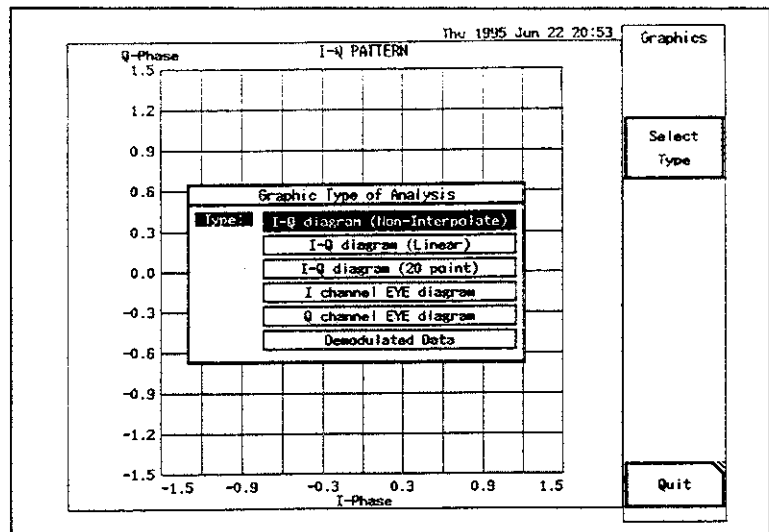
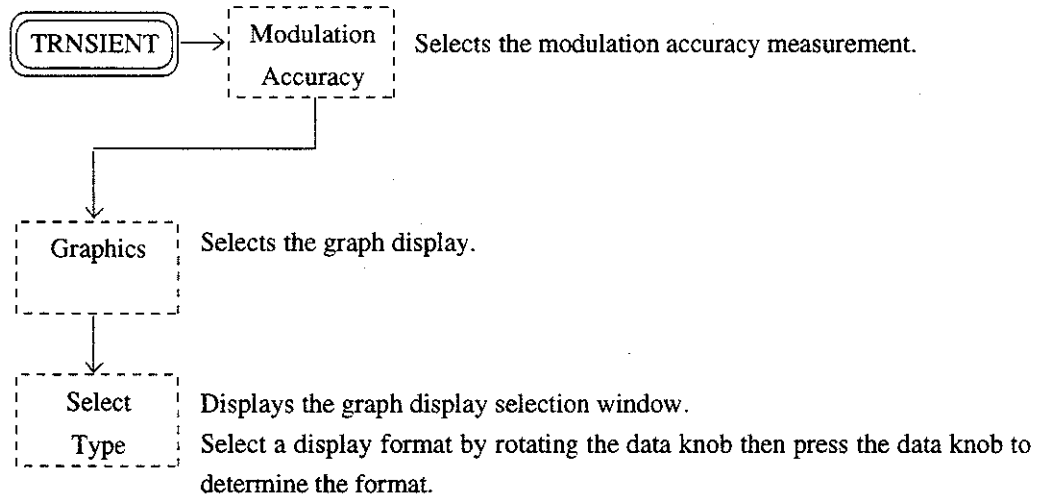


Figure 1-1 Display of Modulation Analysis Graph Selection

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

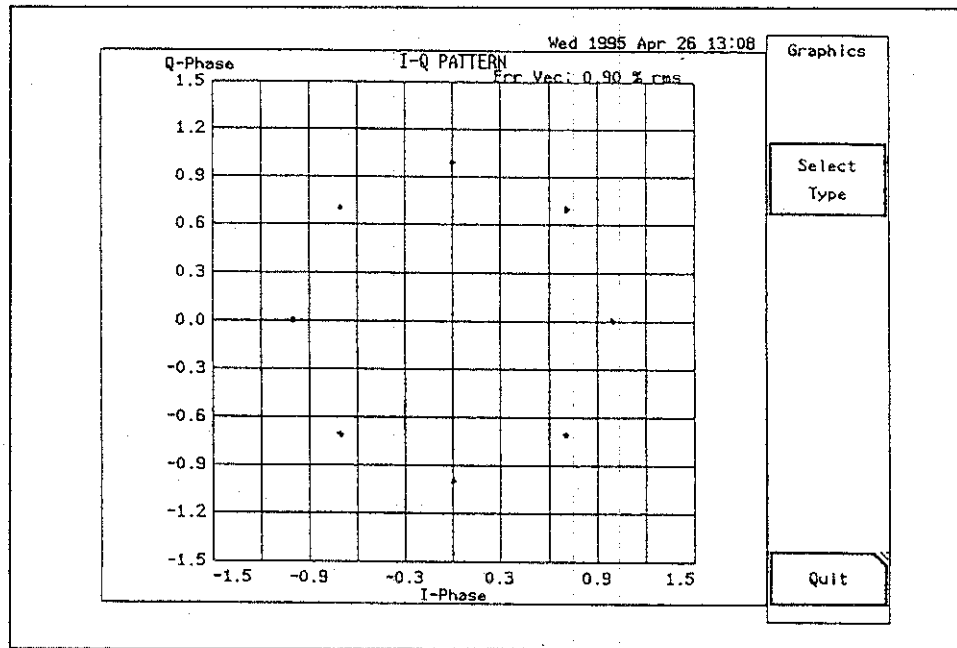


Figure 1-2 I-Q diagram (Non-interpolate)

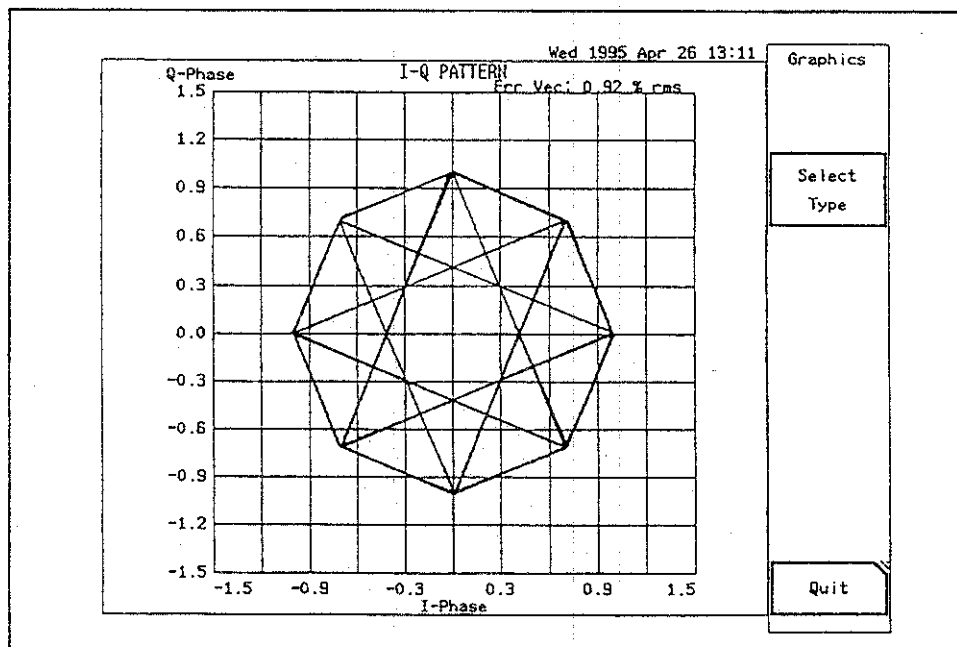


Figure 1-3 I-Q diagram (Linear)

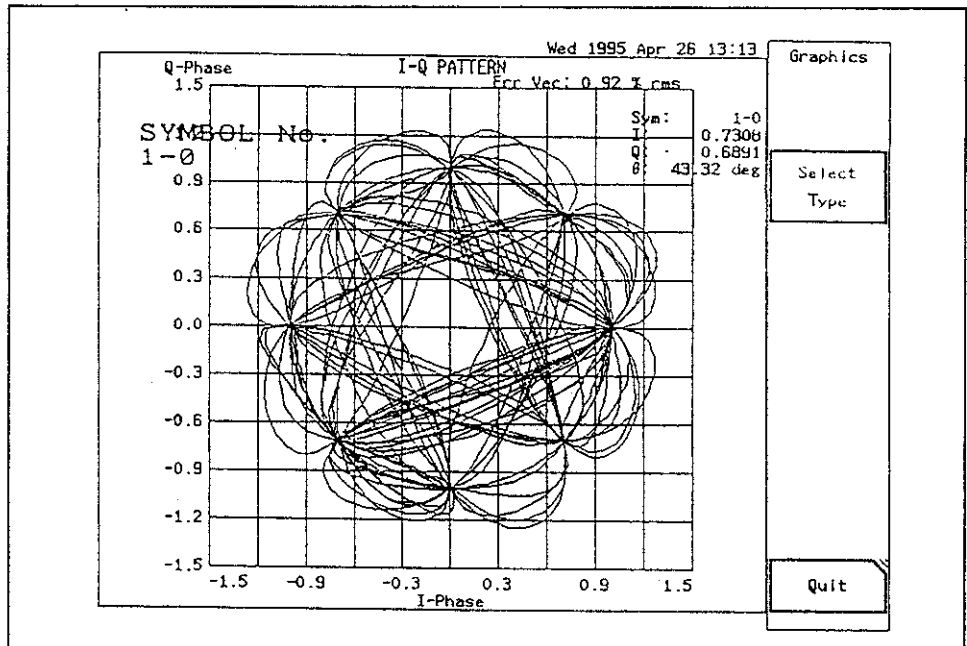


Figure 1-4 I-Q diagram (20 point)

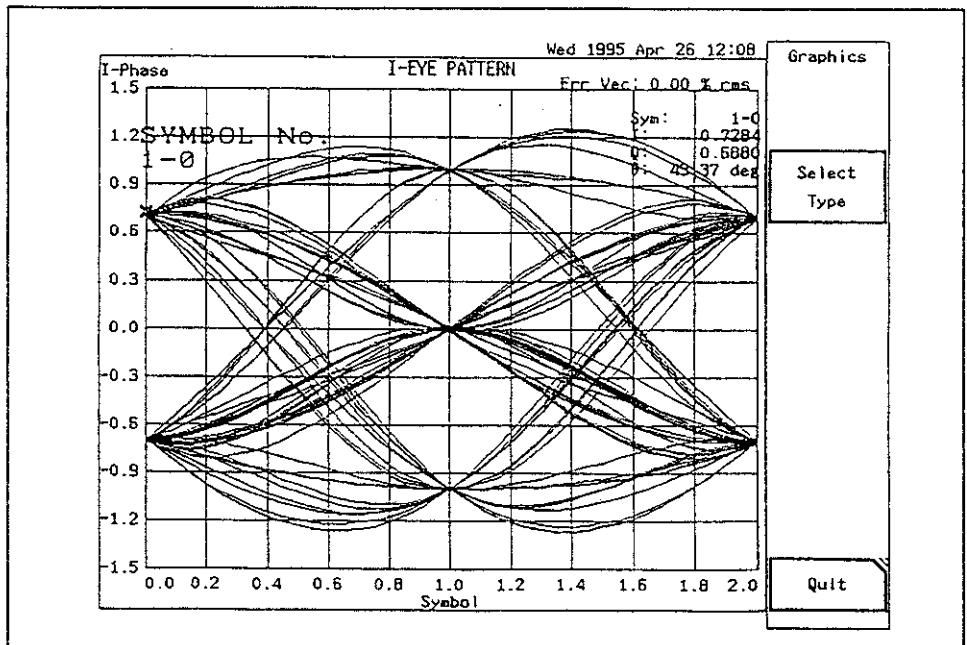


Figure 1-5 I channel EYE diagram

1. Constellation Time vs Power Measurement

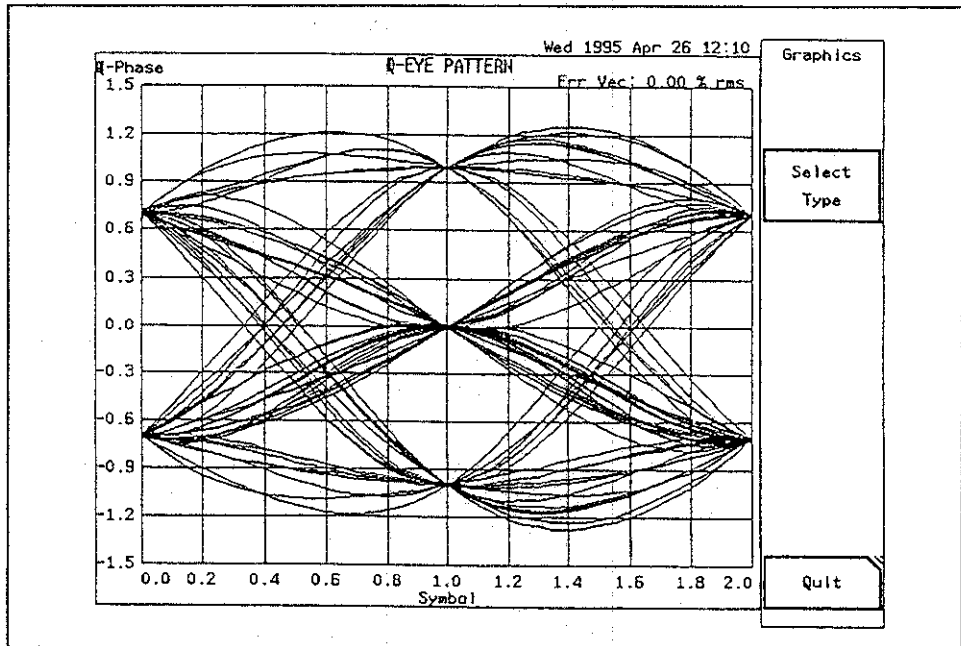


Figure 1-6 Q channel EYE diagram

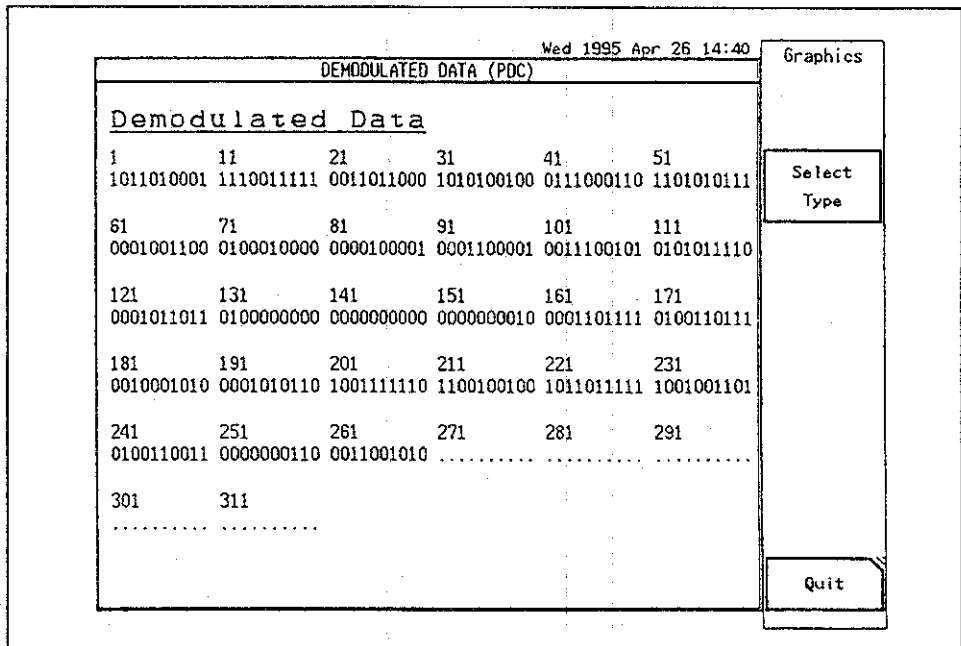
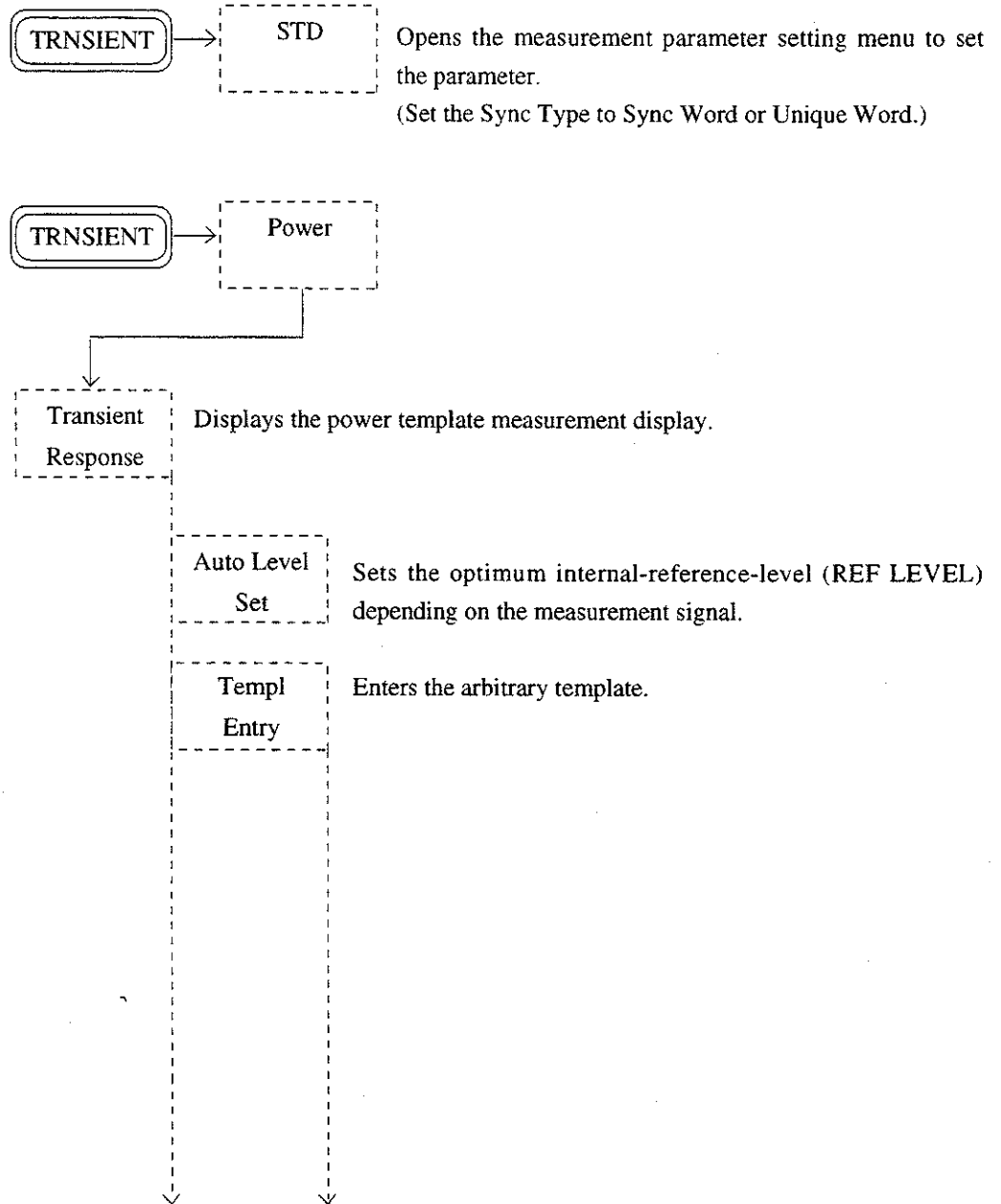


Figure 1-7 Demodulated Data

■ Time vs Power Measurement

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



1. Constellation Time vs Power Measurement

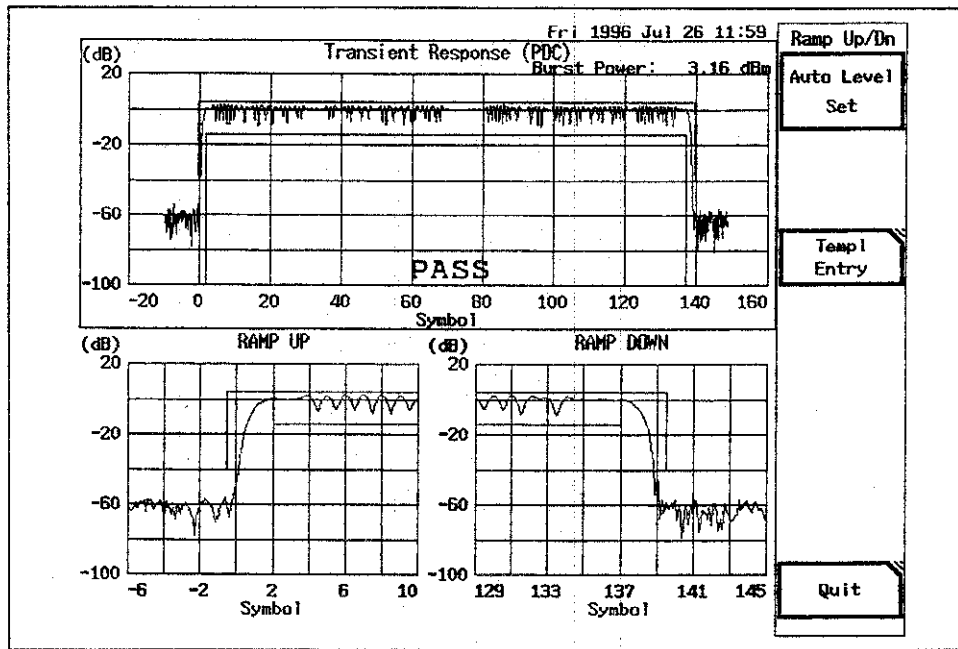
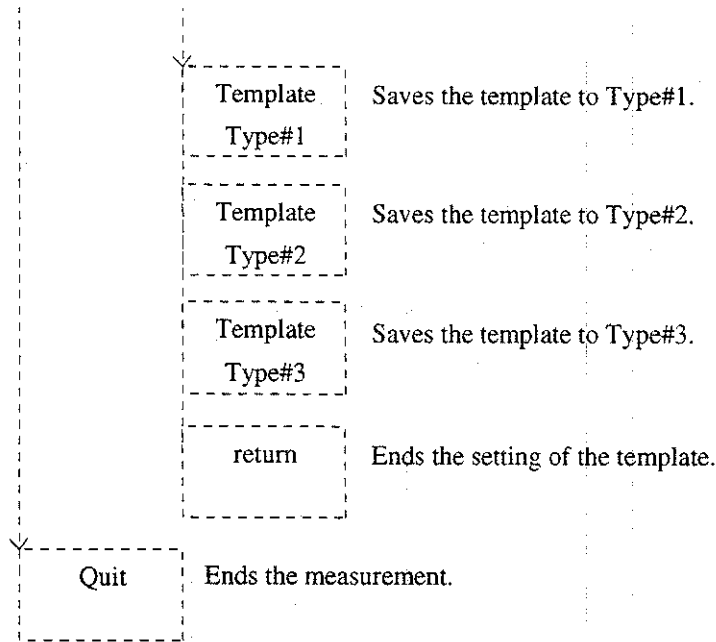


Figure 1-8 Example of Ramp UP/DOWN Measurement

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

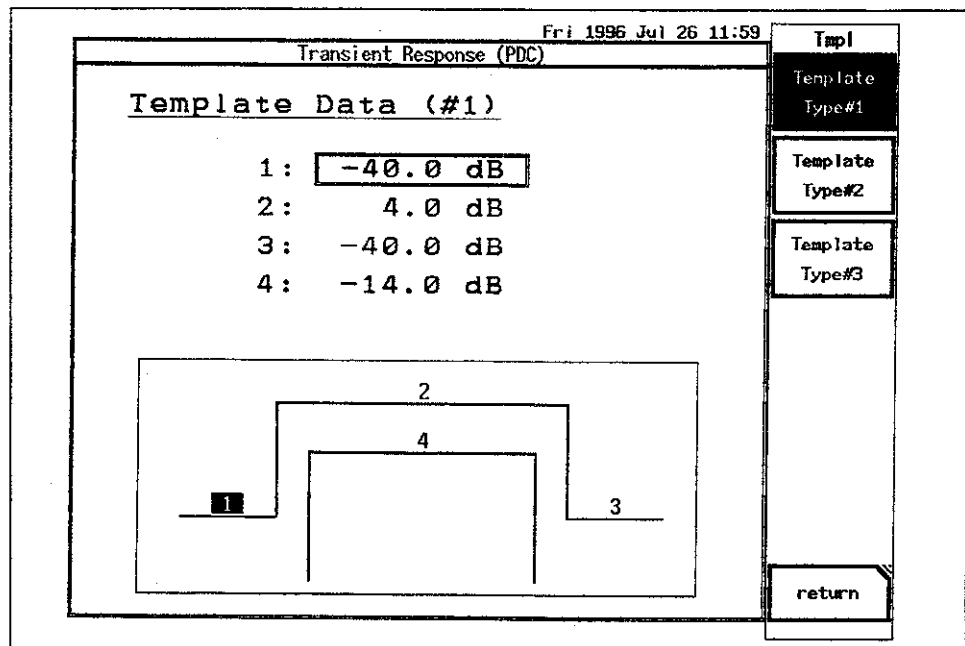
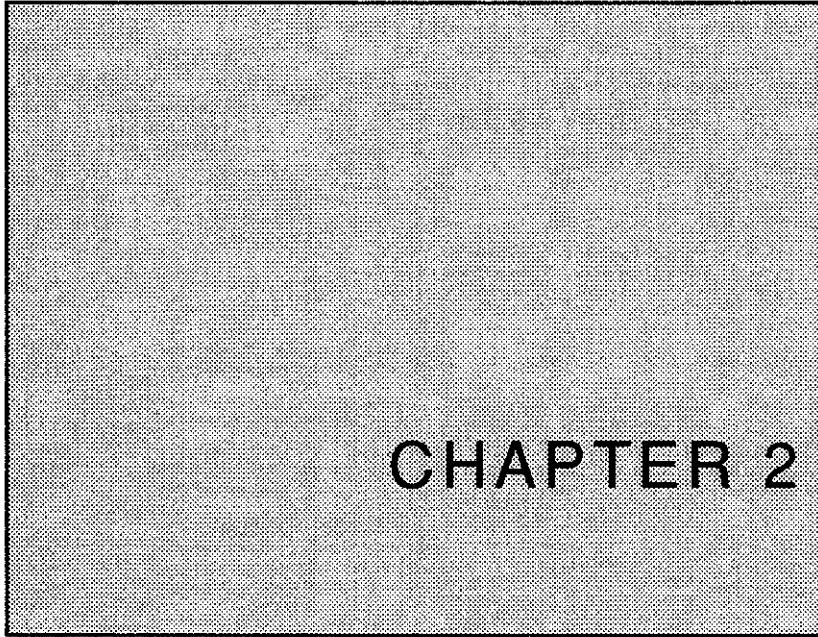


Figure 1-9 Display of User Template Entry

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** to display the marker, the data at each symbol point can be read out.

To set the marker to OFF, press **MARKER** again.



GPIB

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

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1. GPIB Code List

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Function	Listener code	Talker request		Remarks
		Code	Output format	
<u>Condition setting</u>				
<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	
<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)	—	—	
<u>Measurement start/execution</u>				
Executing Graphics display	MODGPH	—	—	
Executing Ramp UP/DOWN measurement	RUPDN	—	—	

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Function	Listener code	Talker request		Remarks
		Code	Output format	
<u>Data output</u>				
I-ch data output	—	GPHI?	ndata, d1, ..., dn	Separator is fixed to CR+LF.
Q-ch data output	—	GPHQ?	ndata, d1, ..., dn	
Degree data output	—	GPHDEG?	ndata, d1, ..., dn	
			ndata: Number of output data d1 to dn: Floating , : Separator (CR+LF)	
Demod data output	—	DEMODO?	n-str, d1\$,...,dn\$ n-str: Number of output character strings d1\$ to dn\$: Character string data (1 data: 10 bits)	
Ramp UP/DOWN Power		RUDPWR?	Level (dBm)	
PASS/FAIL		RUDJDG?	0/1 (0: FAIL, 1: PASS)	
<u>Marker</u>				
Marker ON Marker OFF	GMK ON GMK OFF	GMK?	ON/OFF	
Marker movement (symbol number)	GMKX *	GMKX?	Symbol number	
Marker measurement data (Graphics)	—	GMKIQD?	I, Q, Degree	
Marker measurement data (Ramp UP/DOWN)	—	GMKY?	Level	

2. GPIB Sample Program

The following is a sample program 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)

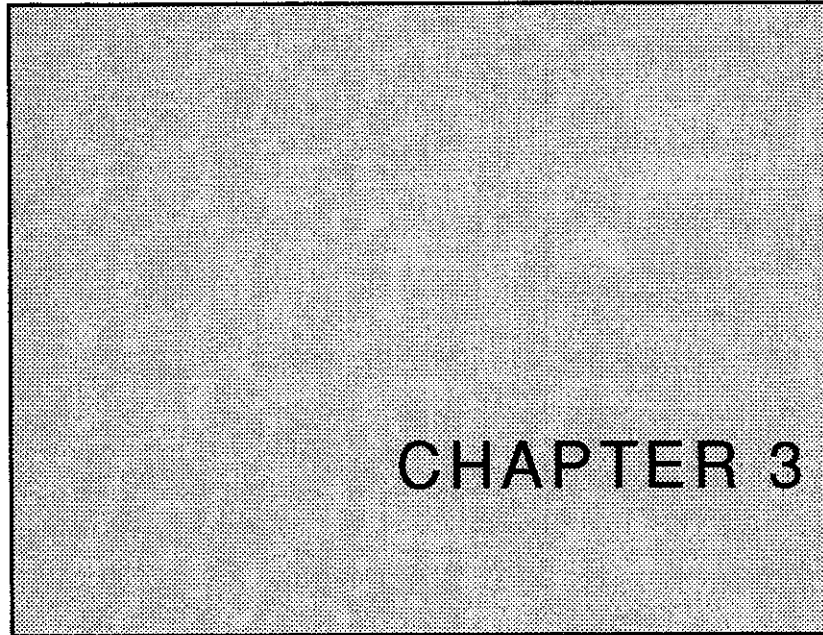
```

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
```

SPECIFICATIONS

This chapter explains the specifications of the constellation measurement function.

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1. Specifications of Constellation Measurement Function 3-2
-

1. Specifications of Constellation Measurement 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

■ Time vs Power display

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

IMPORTANT INFORMATION FOR ADVANTEST SOFTWARE

PLEASE READ CAREFULLY: This is an important notice for the software defined herein. Computer programs including any additions, modifications and updates thereof, operation manuals, and related materials provided by Advantest (hereafter referred to as "SOFTWARE"), included in or used with hardware produced by Advantest (hereafter referred to as "PRODUCTS").

SOFTWARE License

All rights in and to the SOFTWARE (including, but not limited to, copyright) shall be and remain vested in Advantest. Advantest hereby grants you a license to use the SOFTWARE only on or with Advantest PRODUCTS.

Restrictions

- (1) You may not use the SOFTWARE for any purpose other than for the use of the PRODUCTS.
- (2) You may not copy, modify, or change, all or any part of, the SOFTWARE without permission from Advantest.
- (3) You may not reverse engineer, de-compile, or disassemble, all or any part of, the SOFTWARE.

Liability

Advantest shall have no liability (1) for any PRODUCT failures, which may arise out of any misuse (misuse is deemed to be use of the SOFTWARE for purposes other than its intended use) of the SOFTWARE. (2) For any dispute between you and any third party for any reason whatsoever including, but not limited to, infringement of intellectual property rights.

LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.
2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.
3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.
4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:
 - (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest's instructions;
 - (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);
 - (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;
 - (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;
 - (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);
 - (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;
 - (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or
 - (h) any negligent act or omission of the Purchaser or any third party other than Advantest.
5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**
6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**
7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**
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CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

SALES & SUPPORT OFFICES

Advantest Korea Co., Ltd.

22BF, Kyobo KangNam Tower,
1303-22, Seocho-Dong, Seocho-Ku, Seoul #137-070, Korea
Phone: +82-2-532-7071
Fax: +82-2-532-7132

Advantest (Suzhou) Co., Ltd.

Shanghai Branch Office:
Bldg. 6D, NO.1188 Gumei Road, Shanghai, China 201102 P.R.C.
Phone: +86-21-6485-2725
Fax: +86-21-6485-2726

Shanghai Branch Office:
406/F, Ying Building, Quantum Plaza, No. 23 Zhi Chun Road,
Hai Dian District, Beijing,
China 100083
Phone: +86-10-8235-3377
Fax: +86-10-8235-6717

Advantest (Singapore) Pte. Ltd.

438A Alexandra Road, #08-03/06
Alexandra Technopark Singapore 119967
Phone: +65-6274-3100
Fax: +65-6274-4055

Advantest America, Inc.

3201 Scott Boulevard, Suite, Santa Clara, CA 95054, U.S.A
Phone: +1-408-988-7700
Fax: +1-408-987-0691

ROHDE & SCHWARZ Europe GmbH

Mühldorfstraße 15 D-81671 München, Germany
(P.O.B. 80 14 60 D-81614 München, Germany)
Phone: +49-89-4129-13711
Fax: +49-89-4129-13723

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