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**ADVANTEST<sup>®</sup>**  
**ADVANTEST CORPORATION**

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***R3465 Series OPT61***  
***CDMA Measurement Option***  
***Operation Manual***

**MANUAL NUMBER FOE-8311244G00**

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***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

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## 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 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

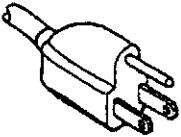
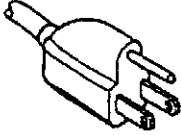
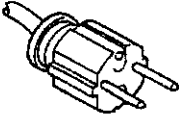
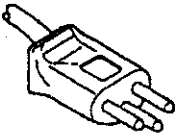
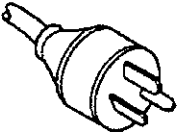
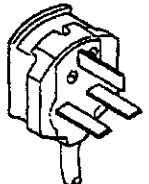




## Table of Power Cable Options

There are six power cable options (refer to following table).

Order power cable options by Model number.

	Plug configuration	Standards	Rating, color and length	Model number (Option number)
1		JIS: Japan  Law on Electrical Appliances	125 V at 7 A Black 2 m (6 ft)	Straight: A01402  Angled: A01412
2		UL: United States of America  CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
3		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
4		SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
5		SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: -----
6		BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417



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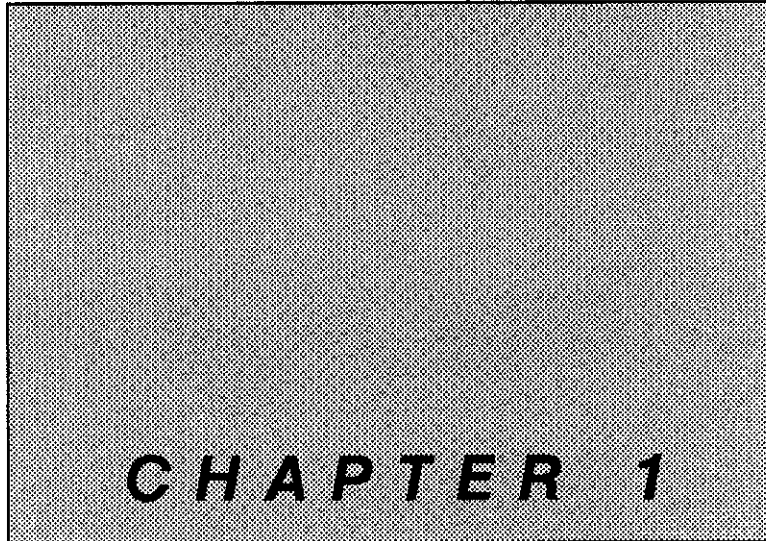
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## Measurement Function

This chapter explains the CDMA measurement option.

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# 1. Switching Standard Measurement Function

In OPT61, it is necessary to switch the system between PDC/PHS/NADC standard measurement (or GSM standard measurement) and CDMA standard measurement. The switching operation is made as a system function operation.

1 Press **LCL** then **Comm. System** keys to display the dialog box in Figure 1-1.

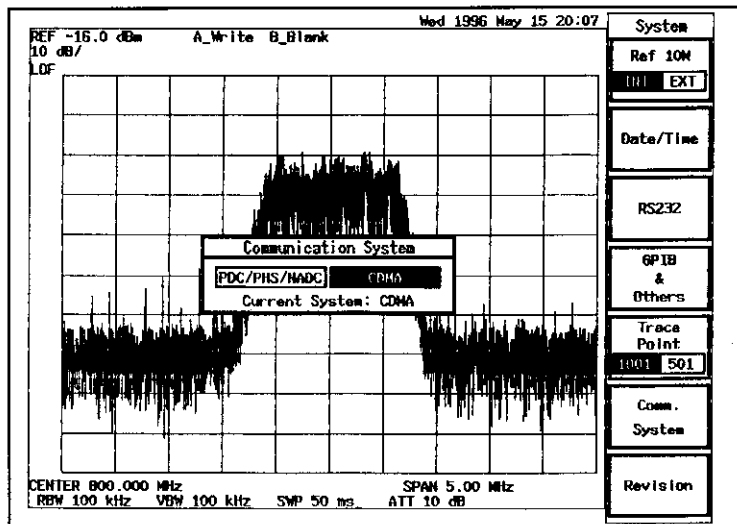


Figure 1-1 Dialog Box

2 Select a communication system (PDC/PHS/NADC (or GSM) or CDMA) with the data knob.

3 Press the **Hz** key or turn the data knob to determine the setting.

Then a box for a confirmation appears. If you want to make the setting effective, select "Confirm". If making it ineffective, select "Cancel" and press the **Hz** key.

4 If the power is turned off once then turned on, the communication system to be measured and the menu for measurement are switched. Then either PDC/PHS/NADC standard measurement (or GSM standard measurement) or CDMA standard measurement becomes executable according to your selection.

**NOTE**

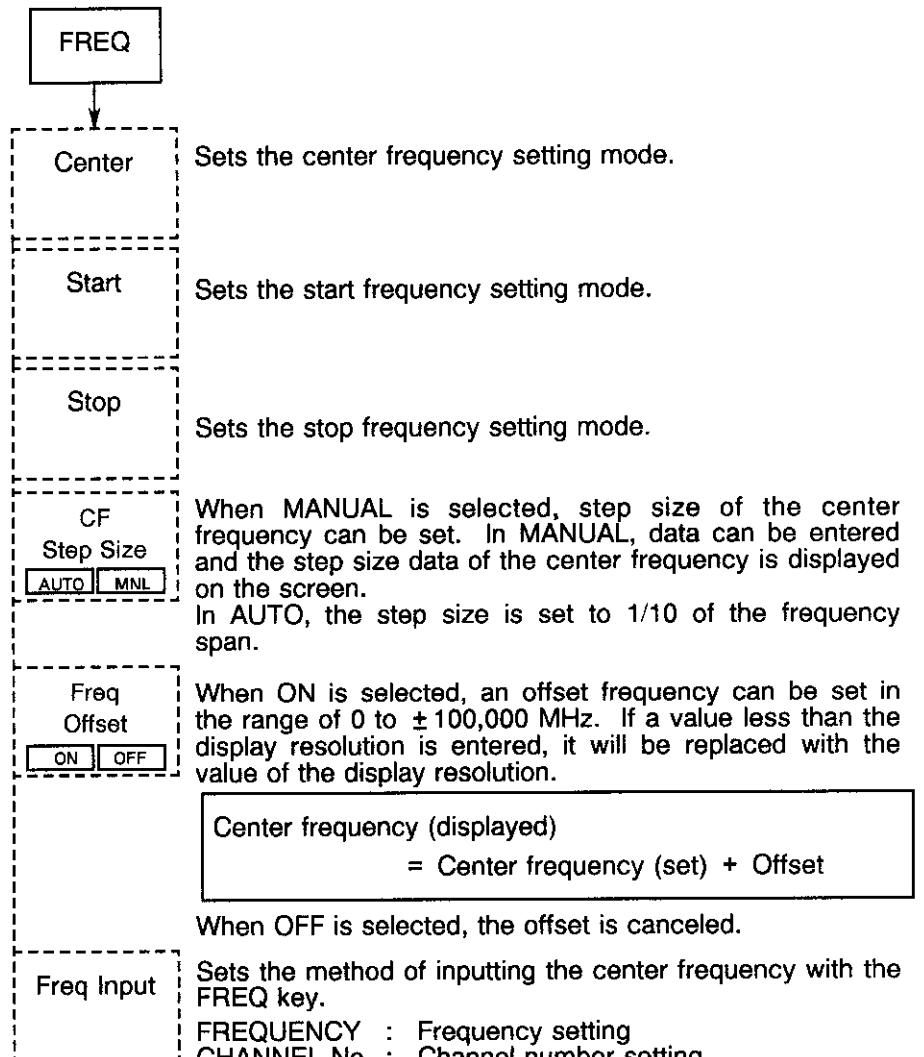
After the system is switched by using Comm. System, always execute a calibration.



## 2. Function under CW Mode

When the CDMA measurement function is set by OPT61, the specifications of the **FREQ** key of the basic key and the **OBW/ACP/HARM/STD** key in the **MEASUREMENT** section differ from the case that **PDC/PHS/NADC** measurement function is set.

### ● Explanation of Center Frequency Menu



**FREQUENCY** : Frequency setting  
**CHANNEL No.** : Channel number setting  
**Channel Offset** : Channel Offset is effective only when **CHANNEL NO.** is selected. The value "Channel Offset + channel number entered" is given as the channel number.

**Frequency Offset** : Frequency Offset is effective only when **CHANNEL NO.** is selected. "Frequency Offset + frequency which is defined by channel number" is given as the center frequency of this instrument.

The correspondence between input channel and center frequency depends on the setting of the communication type and link.

### 3. Functions of MEASUREMENT Section

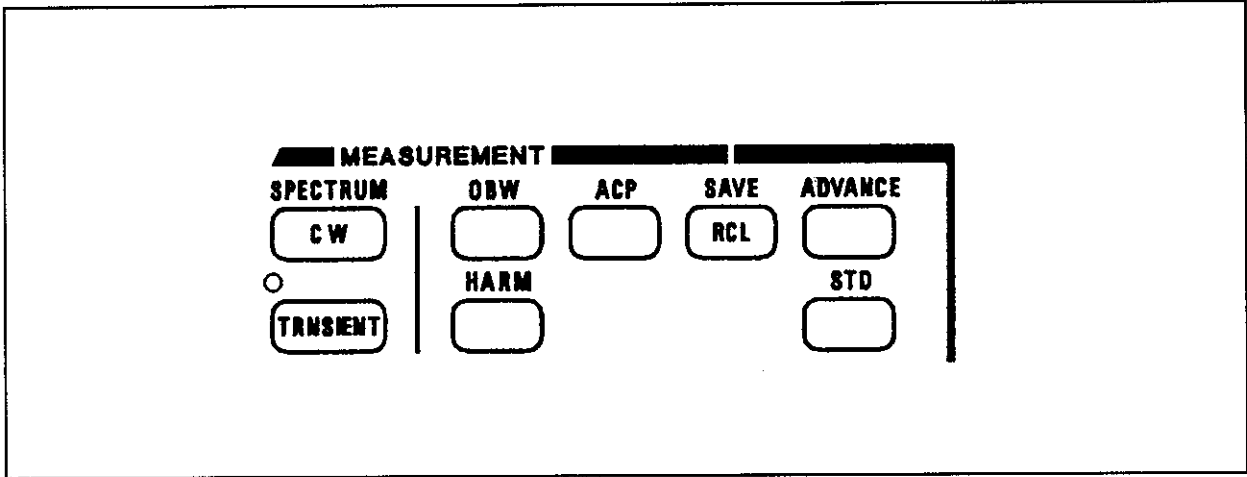


Figure 1-2 Panel Keys in MEASUREMENT Section

#### ■ Explanation of OBW (Occupied Bandwidth) Key

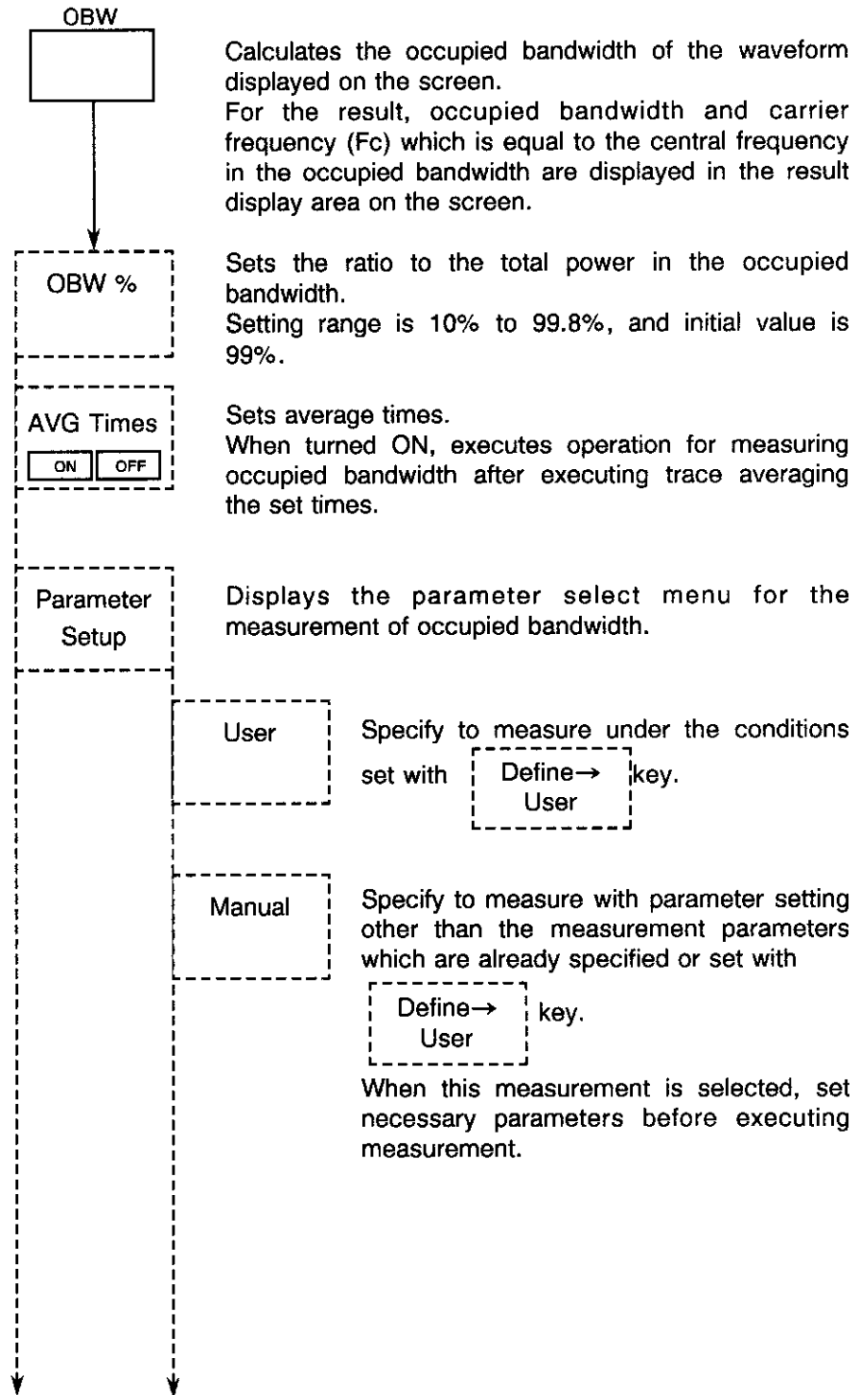
Pressing  key enters OBW measurement mode, halting sweep.

This is the condition waiting for OBW measurement related parameters being input or measurement start command being input.

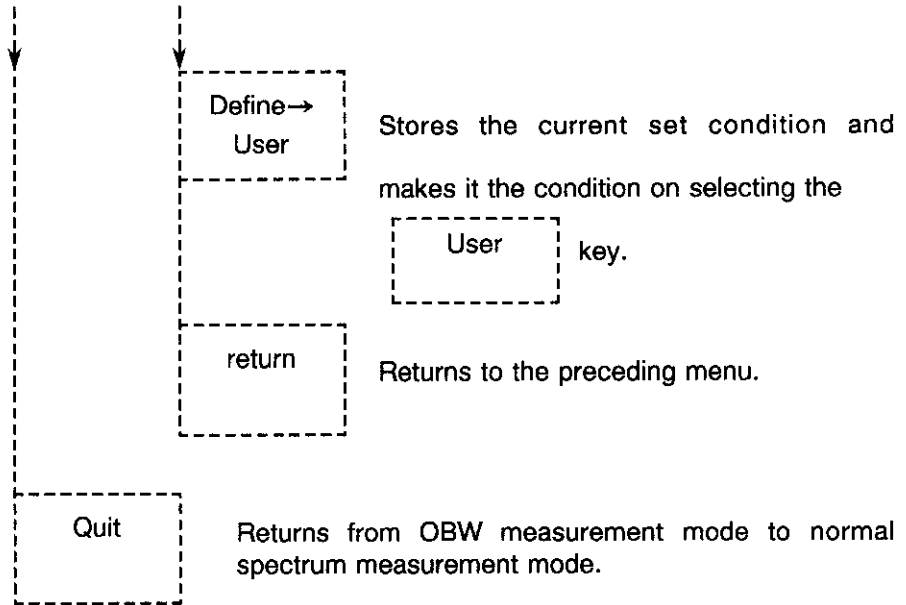
When setup parameters are not necessary to be changed, press  or  key to start measurement.

When measurement has been started with  key, measurement is continued after the end of a measurement.

When measurement has been started with  key, operation stops after the end of a measurement.



3. Functions of MEASUREMENT Section



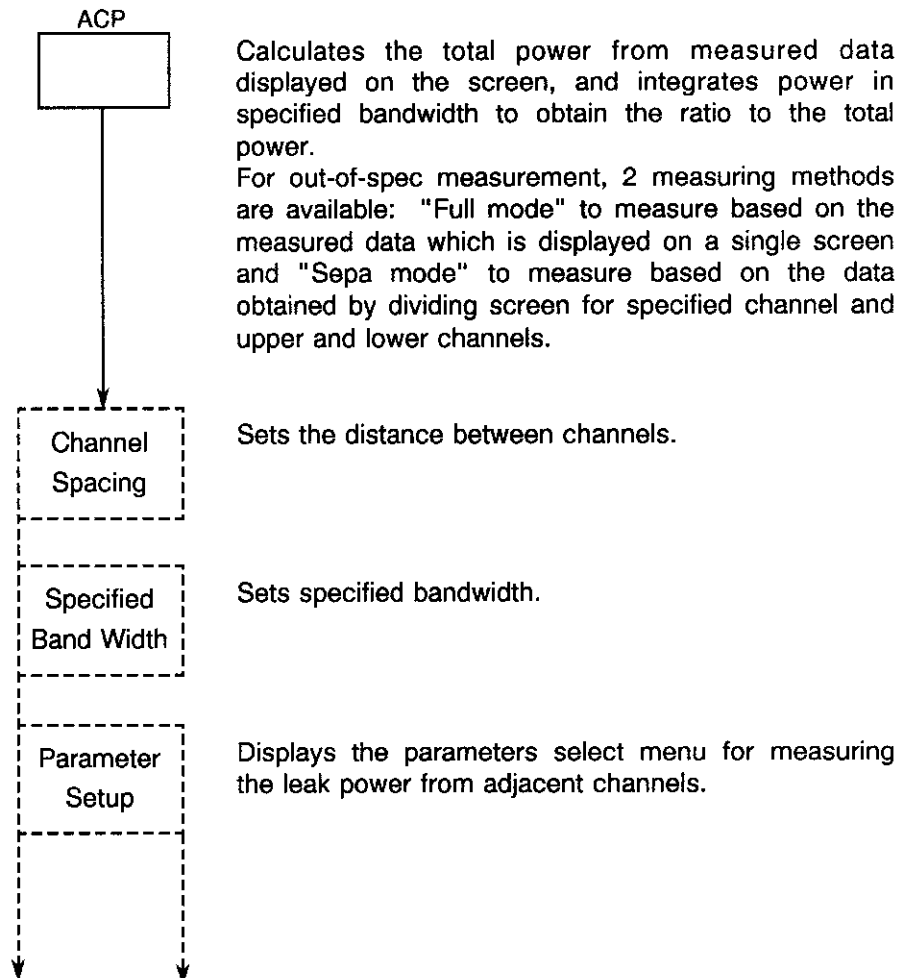
## ■ Explanation of ACP (Adjacent Channels Leakage Power) Key

Pressing  key enters ACP measuring mode, halting sweep.

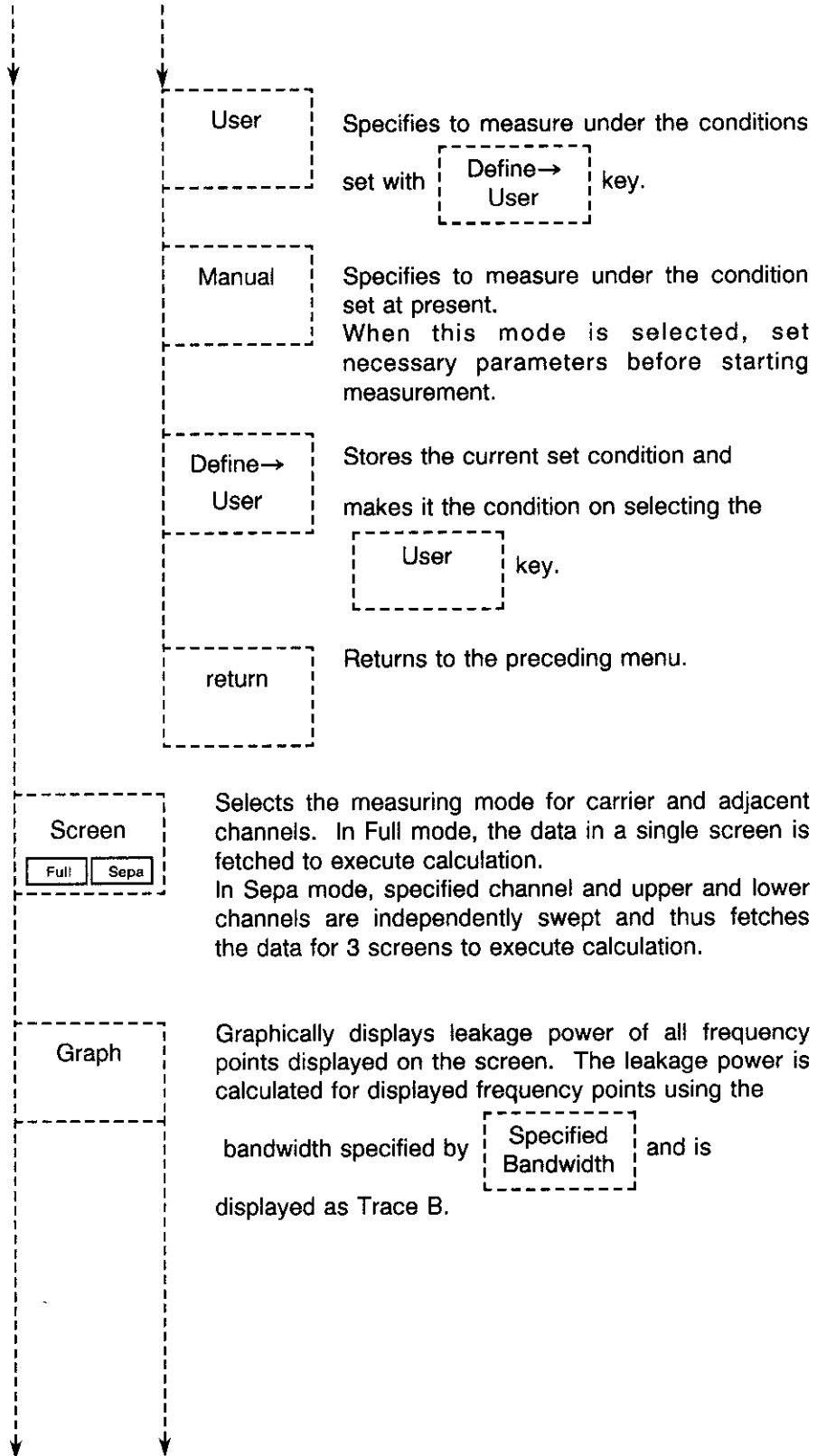
When currently set parameters need not to be changed, press  or  key to start measurement.

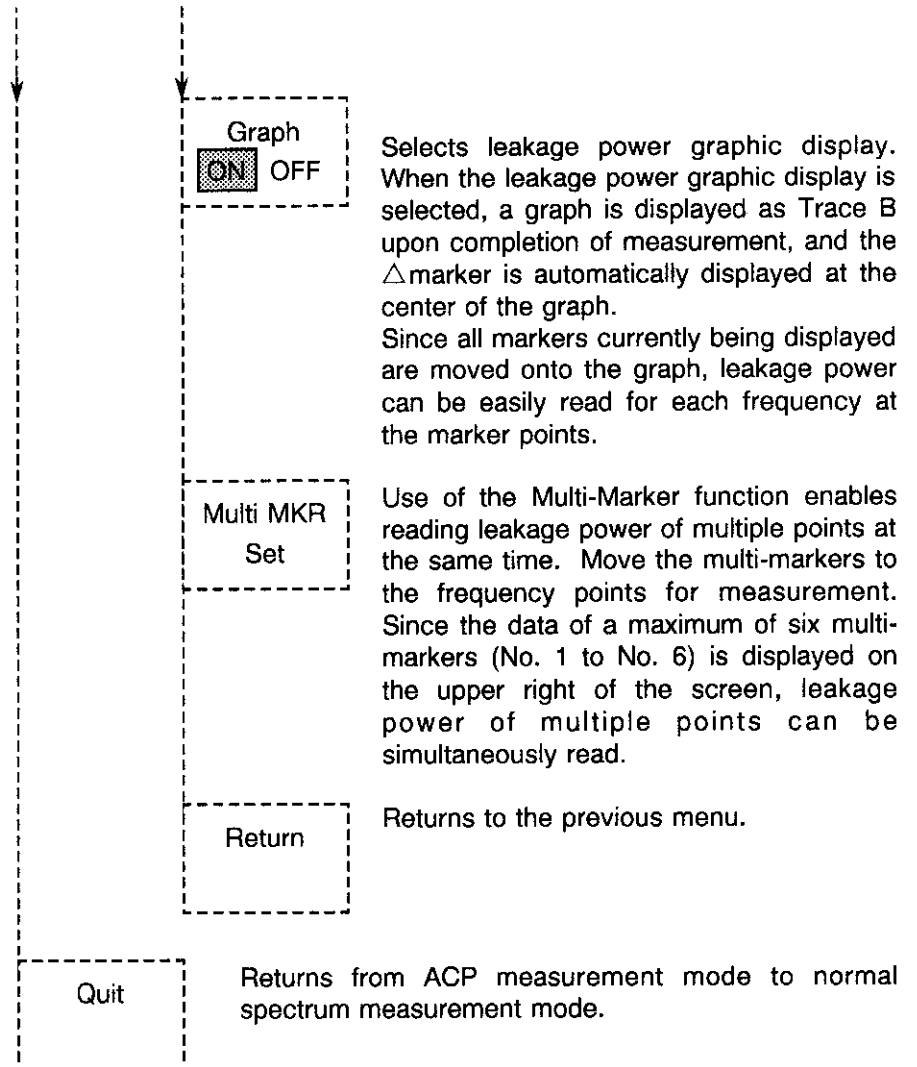
When measurement has been started with  key, measurement is continued after the end of a measurement.

When measurement has been started with  key, operation stops after the end of a measurement.



3. Functions of MEASUREMENT Section





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## ■ HARMONICS (Higher Harmonics) Measuring Function

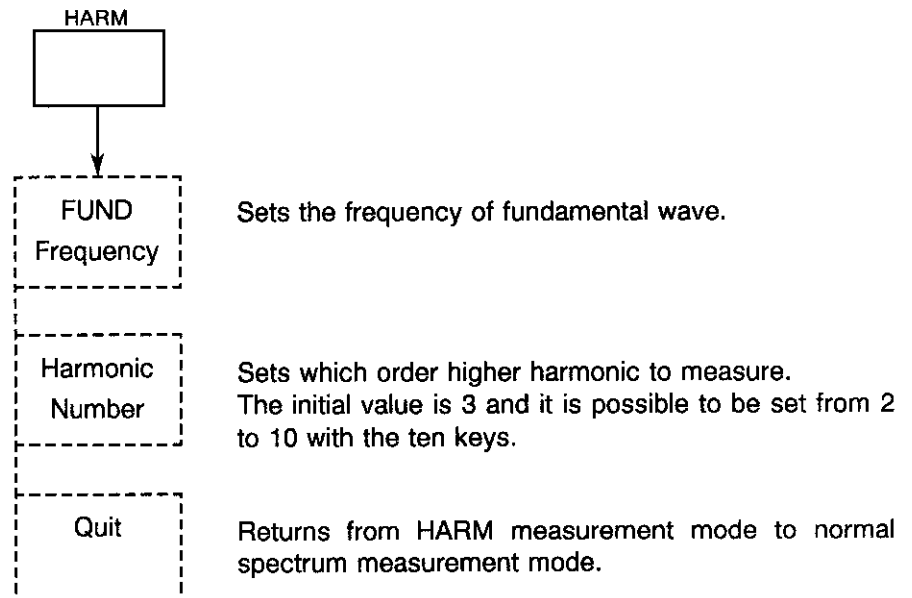
Pressing  key enters higher harmonics measuring mode, halting sweep.

Entering higher harmonics measuring mode automatically sets start/stop frequency according to the parameters preset at selecting the mode.

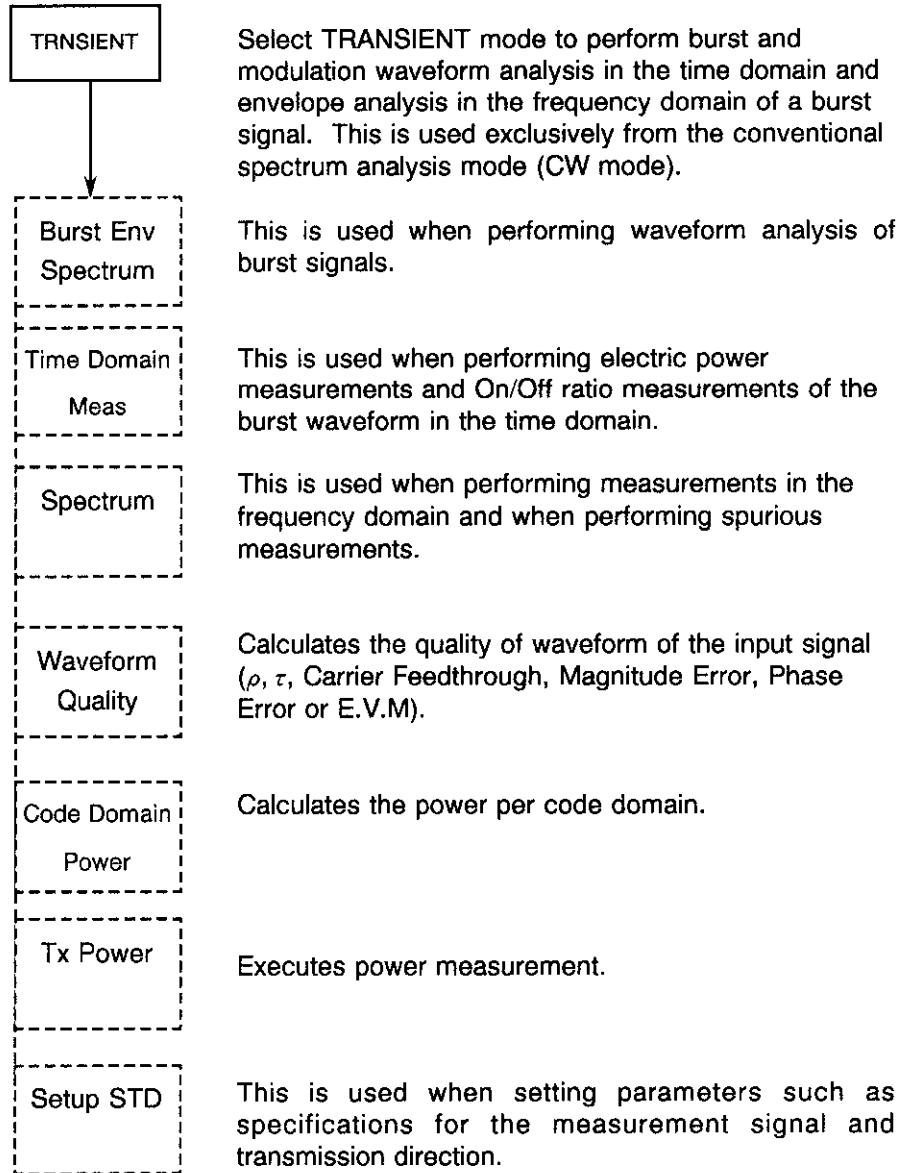
When currently set parameters need not to be changed, press  or  key to start measurement.

When measurement has been started with  key, measurement is continued after the end of a measurement.

When measurement has been started with  key, operation stops after the end of a measurement.



**Function of TRANSIENT Key**



**CAUTION !**

*In general, operations in TRANSIENT mode are performed using soft keys. The following keys which can be used when performing conventional spectrum measurements (in CW mode) cannot be used in this mode.*

**SWEEP, INPUT, FORMAT, WINDOW, →CF, →RL**

*Also, only settings made using numeric values, knobs, and arrow keys can be made for the following keys (the corresponding soft key menu will not be displayed).*

**FREQ, LEVEL, SPAN(\*1), ATT(\*2)**

**(\*1): SPAN can only be used during frequency domain measurements.**

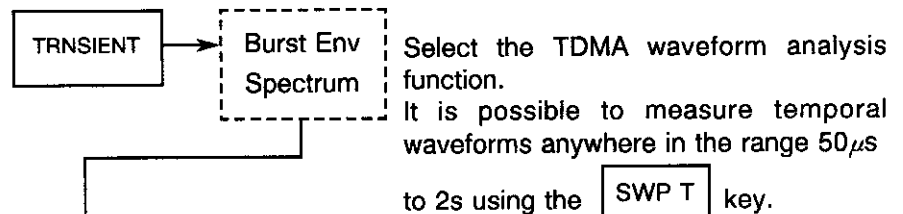
**(\*2): ATT can only be used when the setting is MNL.**

**All measurements are started and stopped using the SINGLE/ REPEAT keys. Be sure that the system is in stop mode when changing measurement parameters.**

**When using the external trigger, input a trigger signal with the TTL level into the external trigger input terminal on the rear panel.**

## ■ TDMA Waveform Analysis and Burst Envelope Waveform Display

### ● TDMA Waveform Analysis Function



A template (limit line) conforming to specifications is automatically displayed, and the burst pulse is judged for Pass/Fail.

#### **NOTE**

**No template will be displayed if the limit line mode is OFF or if a limit line defined by the user is selected but no user definition table data exists.**

**The rising edge position and wave level of the temporal waveform displayed does not necessarily match standard template (limit line) values.**

**In order to use this function efficiently, it is necessary to adjust the horizontal (time axis) positions and vertical (level) positions of the burst pulse and template.**

**This is used to adjust Shift X of the Trigger Position and limit line in the horizontal direction and Shift Y of the limit line in the vertical direction.**

**Once these settings have been made, subsequent measurements can be made without having to make the adjustments again.**

**Also, adjust the setting value of the resolution bandwidth.**

3. Functions of MEASUREMENT Section

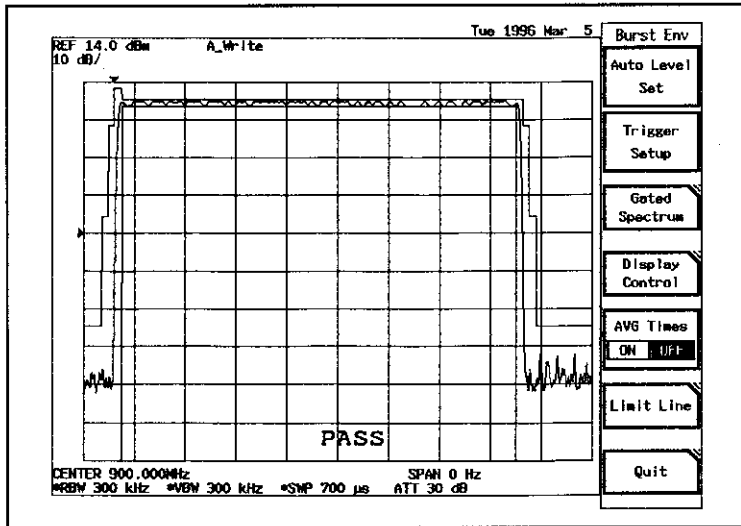


Figure 1-3 Power Template Measurement Screen

Auto Level Set

This is used to set the internal reference level (REF LEVEL), which is used in the time waveform analysis and the frequency waveform analysis, to the optimum value according to the measurement signal.

Trigger Setup

A Dialog Box for trigger settings will appear. It can be used to set trigger source, trigger level, trigger position, and delay time settings.

When making settings, select the parameter to be set using the step key and select the parameter value to be set using the data knob. After parameters have been selected, you can set them by pressing the data knob

or pressing the 

ENTER
Hz

 key.

The Dialog Box will disappear either of these keys is pressed.

Trigger: Selects the trigger source (signal from which synchronization is taken) for controlling the measurement timing for the burst signal or other.

Free Run: Selects asynchronous measurement mode. (Measure using internal measurement timing.)

Video: Selects a measurement mode synchronized with the internal Video signal.

- IF Signal: Selects a measurement mode synchronized with the internal IF signal (21.4 MHz).
- Ext: Selects a measurement mode synchronized with a signal input from an external source (EXT TRIG connector on the rear panel).
- Slope: Select whether to match the sync position with the rising edge (+) of the signal (Video, IF Signal or EXT) or with the falling edge (-) of the signal.
- Trigger Level: Specifies the level position of the trigger source signal (Video, IF Signal or EXT) at which to take synchronization. A trigger level position mark (▶) will be displayed at the left of the display scale. The data can be set by using the data knob or ten-key and pressing the   key.
- Source Monitor: Select whether or not to display the temporal waveform for the trigger source. This is automatically set to OFF whenever the trigger source is changed. (This selection is only available when the trigger source is the IF signal.)
- Trigger Position: Sets the X axis position (time) of the trigger source signal (Video, IF Signal or EXT) at which to synchronize. A trigger position mark ([▼]) will be displayed above the display scale. The data can be set by using the data knob or ten-key and pressing the   key.
- Delay Time: Sets the delay time to be added to the trigger source signal.

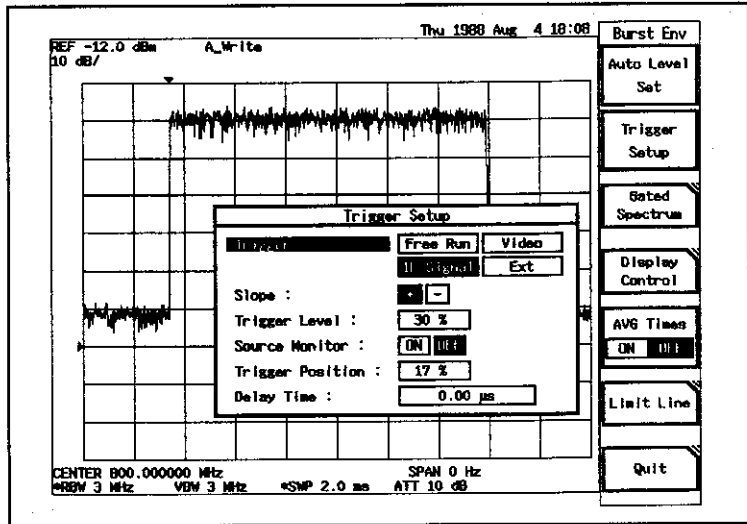


Figure 1-4 Trigger Setup Dialog Box

Gated Spectrum

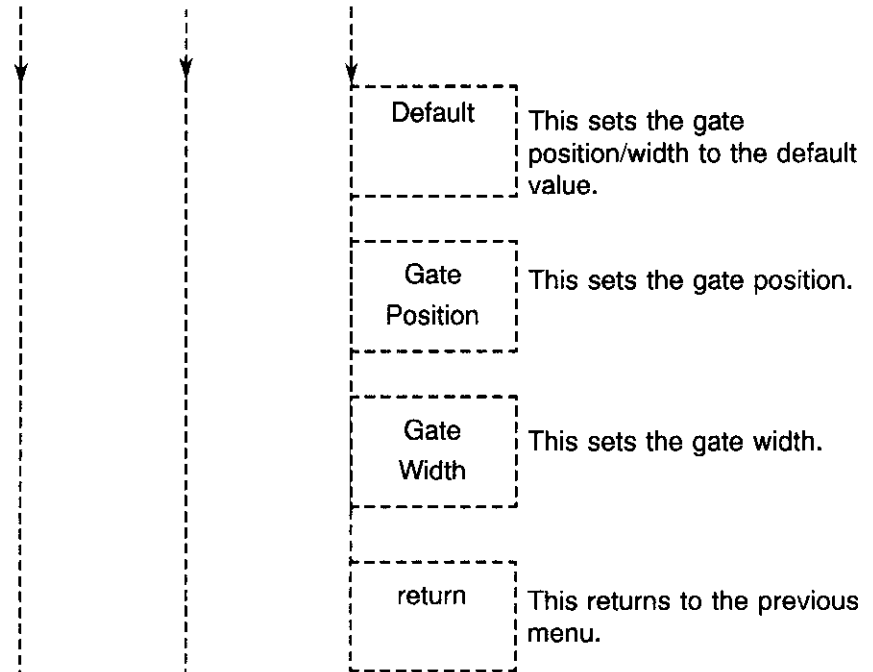
Parameter settings for gated sweep can be made while monitoring the waveform in the time domain or in the frequency domain. In this mode, a split screen display results with the frequency waveform in the upper screen and the temporal waveform in the lower screen.

Save Parameter

This records all gated sweep parameters. Parameters recorded here are used as the gated sweep parameters for the Channel Power measurement. The following parameters are inherited by the Channel Power measurement: Gate Position/Gate Width, Gate Source, Slope, Gate Threshold.

Gate Setup

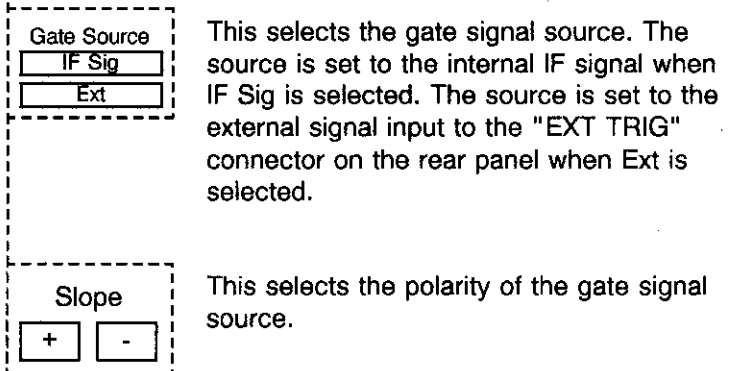
This is used to set the gate position/width to be used for gated sweep.



**NOTE**

*The default value of the gate position/width is set as follows.*

- Gate position = Trigger position
- Gate width = 1.00 msec



3. Functions of MEASUREMENT Section

Gate Threshold

This is used to set the IF signal level anywhere between 0% and 100% when IF Sig is selected as the gate signal source. This setting changes the timing of gate signal generation.

Gated SWP  
 ON  OFF

This alternately sets the sweep mode to gated sweep ON/OFF. Gated sweep results when ON is selected.

**NOTE**

*When gated sweep is selected, sweep for both the frequency waveform and the temporal waveform will appear as if stopped if the parameters set for gated sweep are inappropriate, but sweep can be started when changing to appropriate settings.*

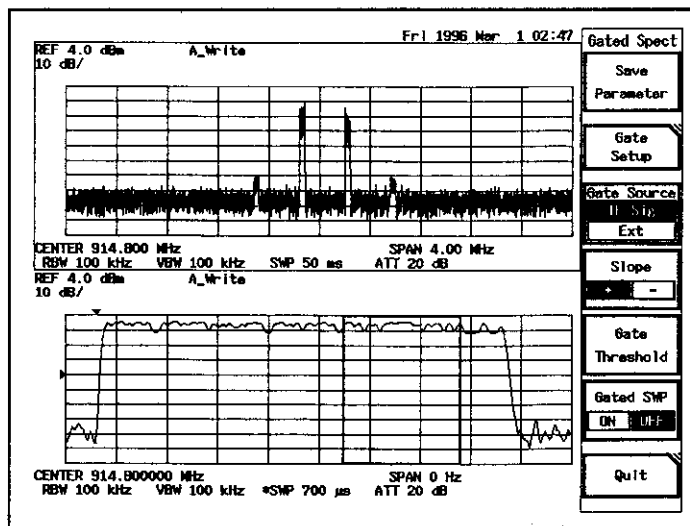


Figure 1-5 Waveform at Gate Sweep OFF



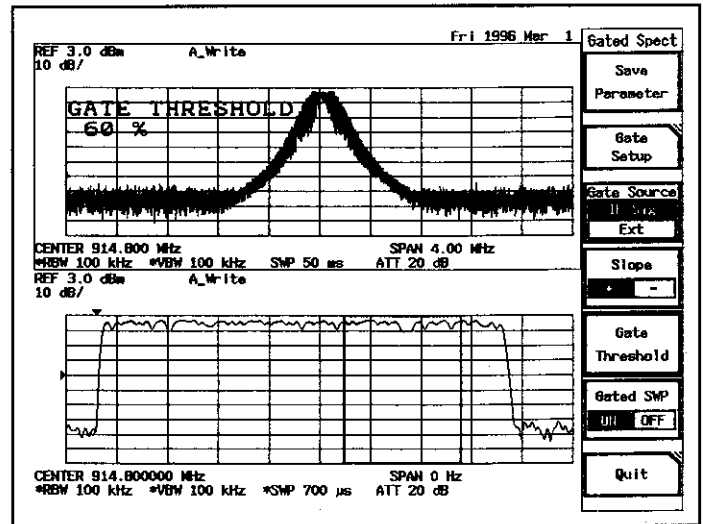


Figure 1-6 Waveform at Gate Sweep ON

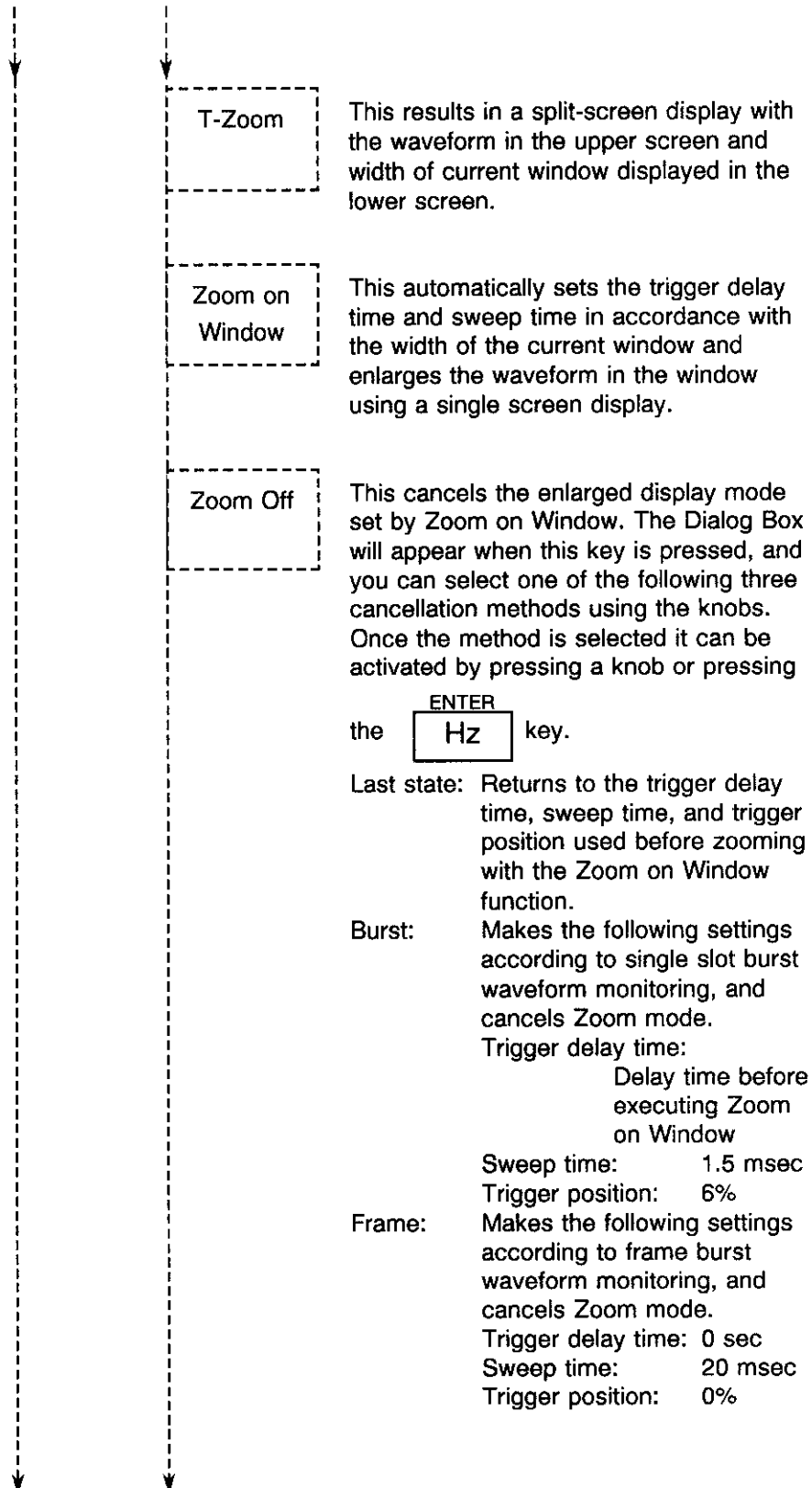
Quit

This exits from gated sweep mode and returns to the menu of the previous level. The split screen display will automatically return to a single screen display once Quit is selected.

Display Control

This is used for an enlarged split-screen display (T-Zoom) of the time scale using windows, to switch the waveform display of the time scale where the window is open, and to switch horizontal axis scales.

3. Functions of MEASUREMENT Section



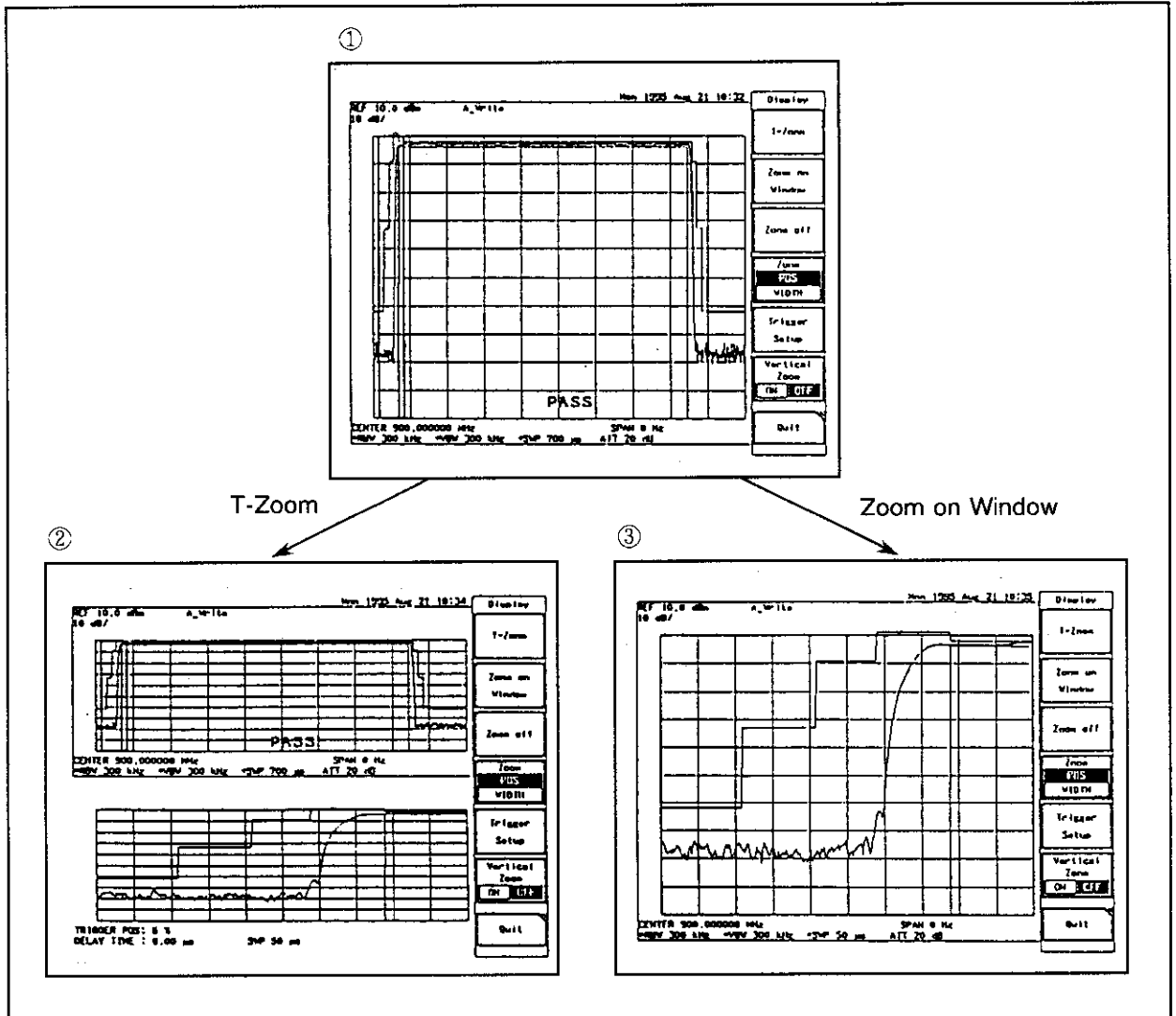
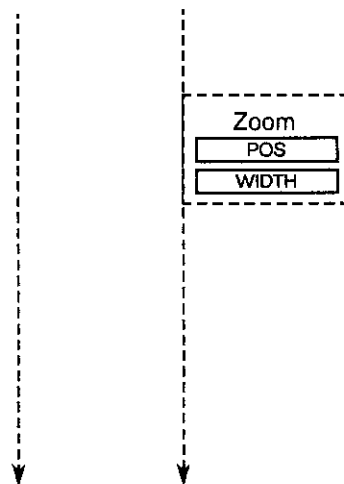
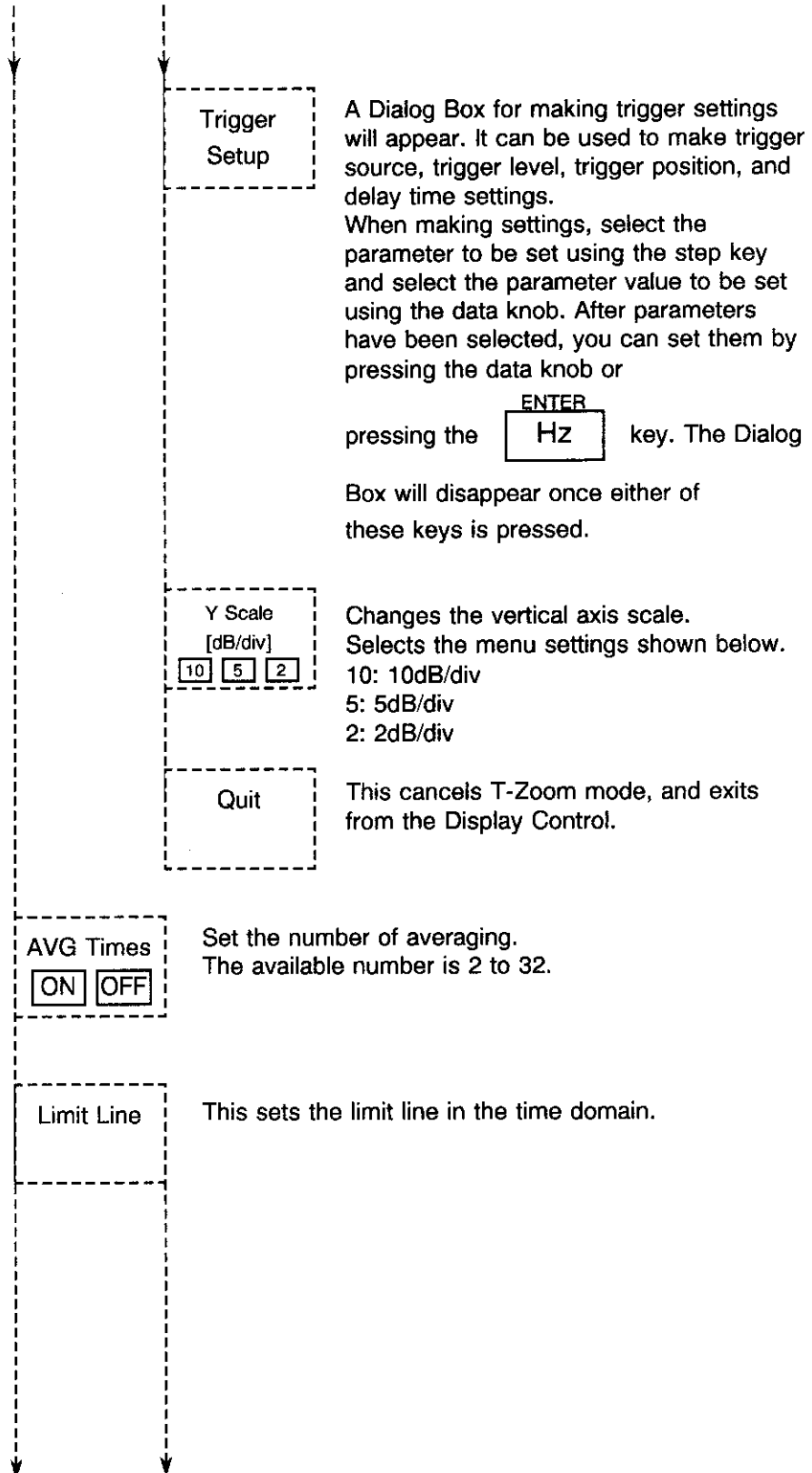


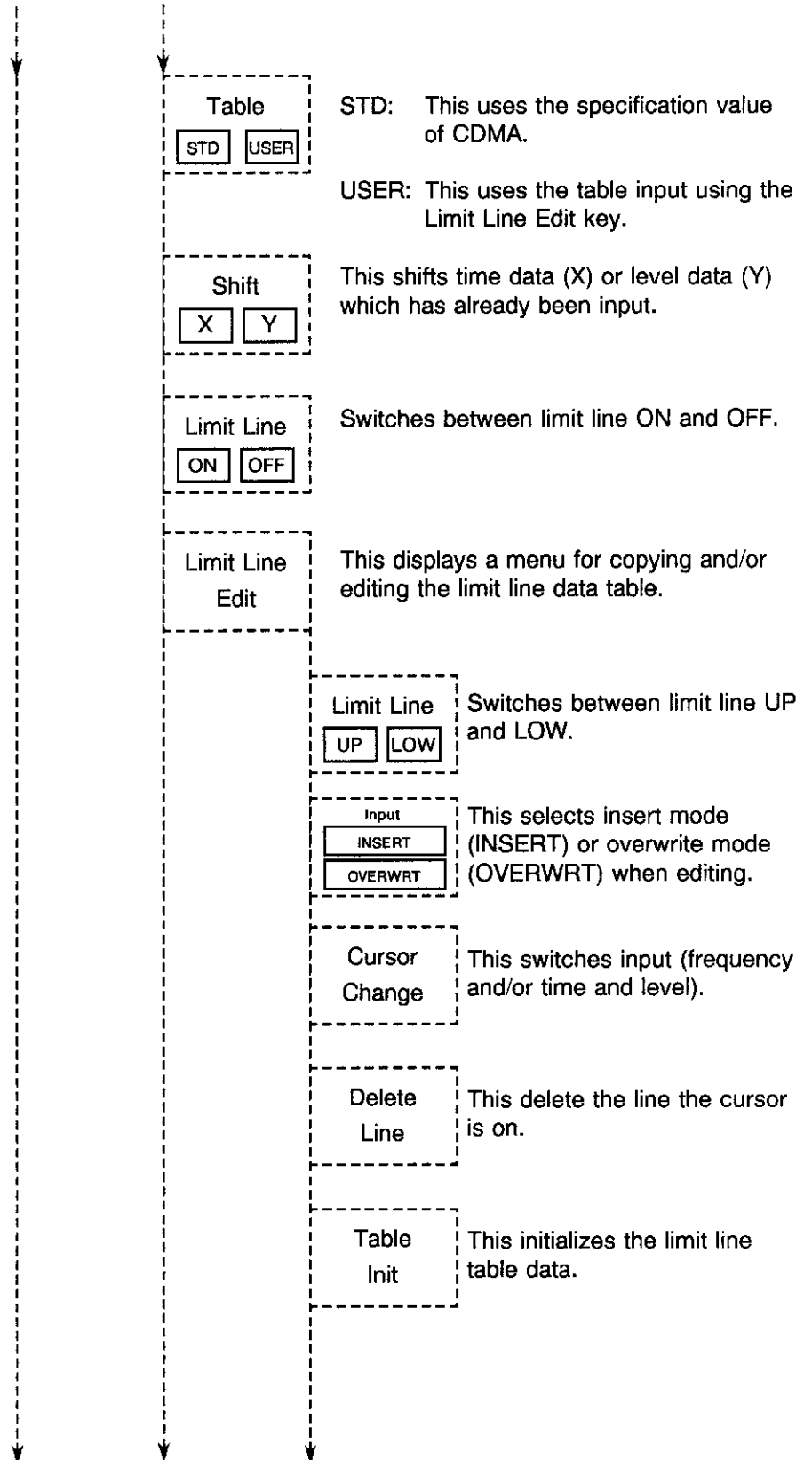
Figure 1-7 Expansion of Display Using Window



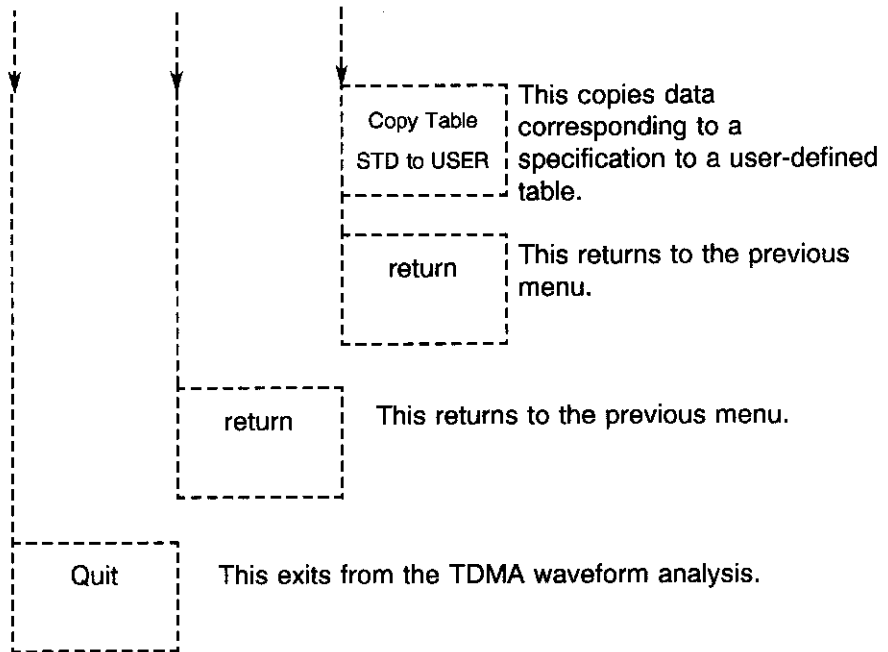
This allows the window position to be changed when POS is selected, and allows window width to be changed when WIDTH is selected. Delay time and sweep time for the lower screen when in T-Zoom mode, and the delay time and sweep time when enlarged under Window to Span mode are set at that time. Window width can be set between 50 $\mu$ sec and 2 sec.

3. Functions of MEASUREMENT Section

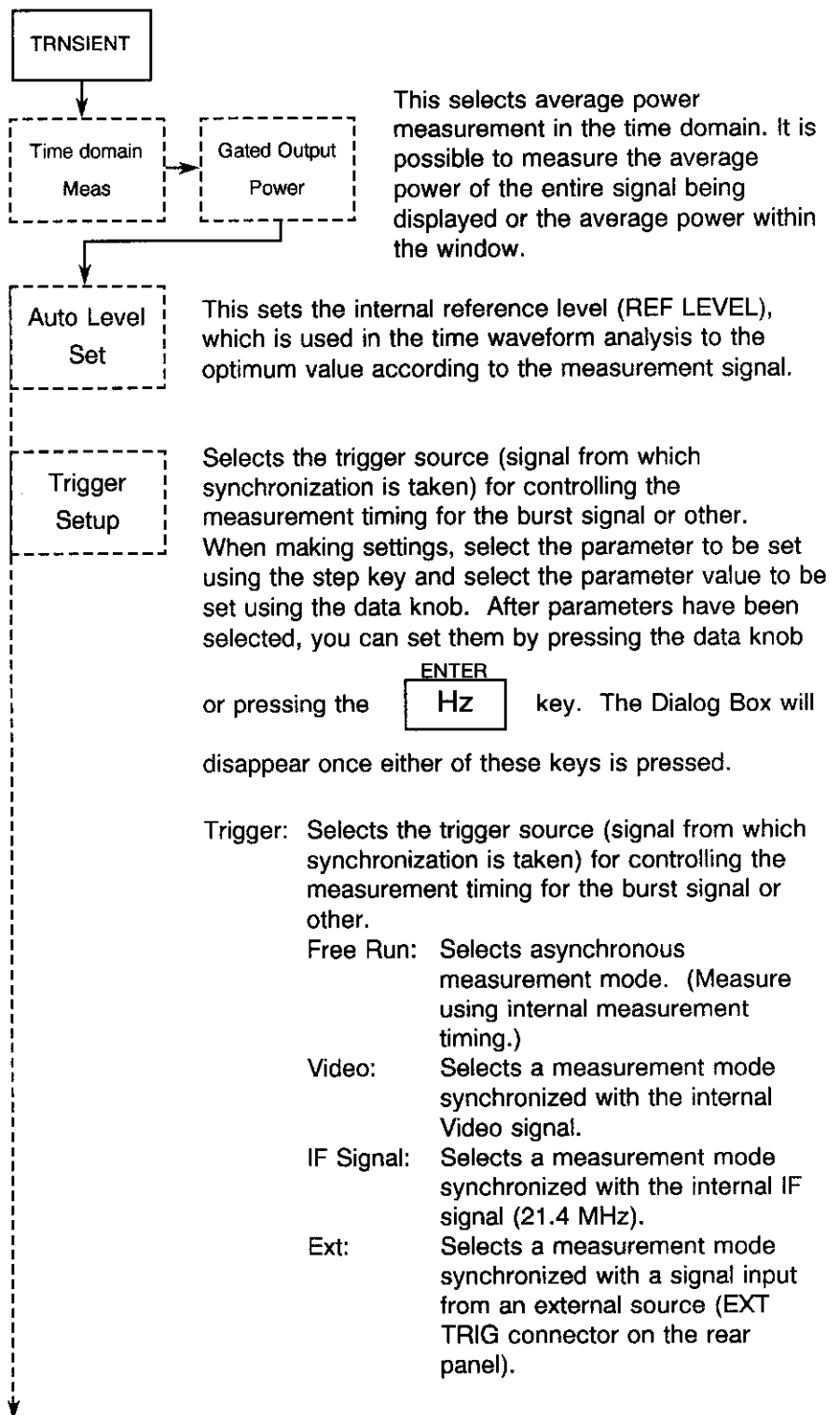




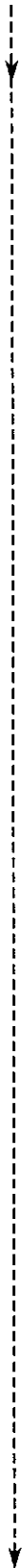
3. Functions of MEASUREMENT Section



● Average Power Measurement in the Time Domain



3. Functions of MEASUREMENT Section



**Slope:** Select whether to match the sync position with the rising edge ( + ) of the signal (Video, IF Signal or EXT) or with the falling edge ( - ) of the signal.

**Trigger Level:** Specifies the level position of the trigger source signal (Video, IF Signal or EXT) at which to synchronize. A trigger level position mark (▶) will be displayed to the left of the display scale.

The data can be set by using the data knob or ten-key and pressing the

ENTER  
Hz key.

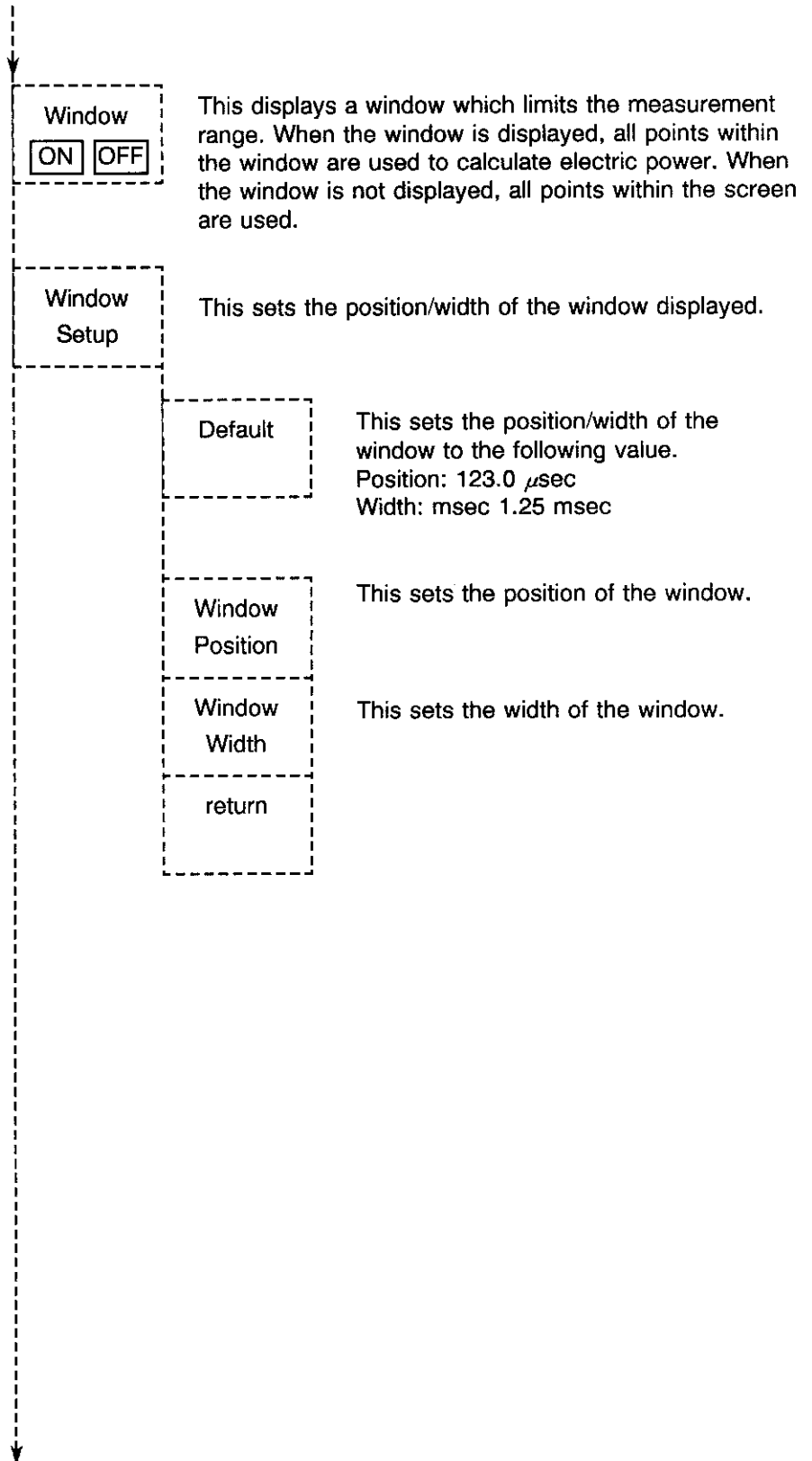
**Source Monitor:** Select whether or not to display the waveform for the trigger source. This is automatically set to OFF whenever the trigger source is changed. (This selection is only available when the trigger source is the IF signal.)

**Trigger Position:** Sets the X axis position (time) of the trigger source signal (Video, IF Signal or EXT) at which to synchronize. A trigger position mark (▼) will be displayed above the display scale. The data can be set by using the data knob or ten-key and pressing the

ENTER  
Hz key.

**Delay Time:** Sets the delay time to be added to the trigger source signal.





**AVG Times**  
 ON  OFF

This sets the average processing count for making the average power measurement. The count can be set from 2 to 32.

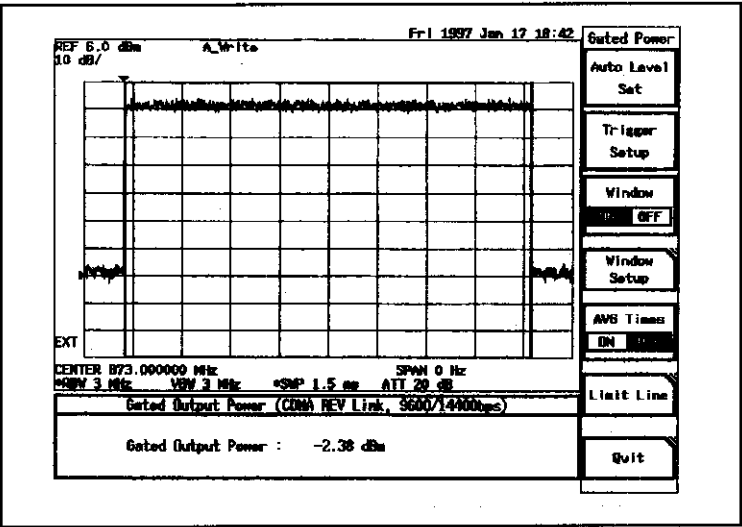


Figure 1-8 Sample of Power Time domain Measurement

**Limit Line**

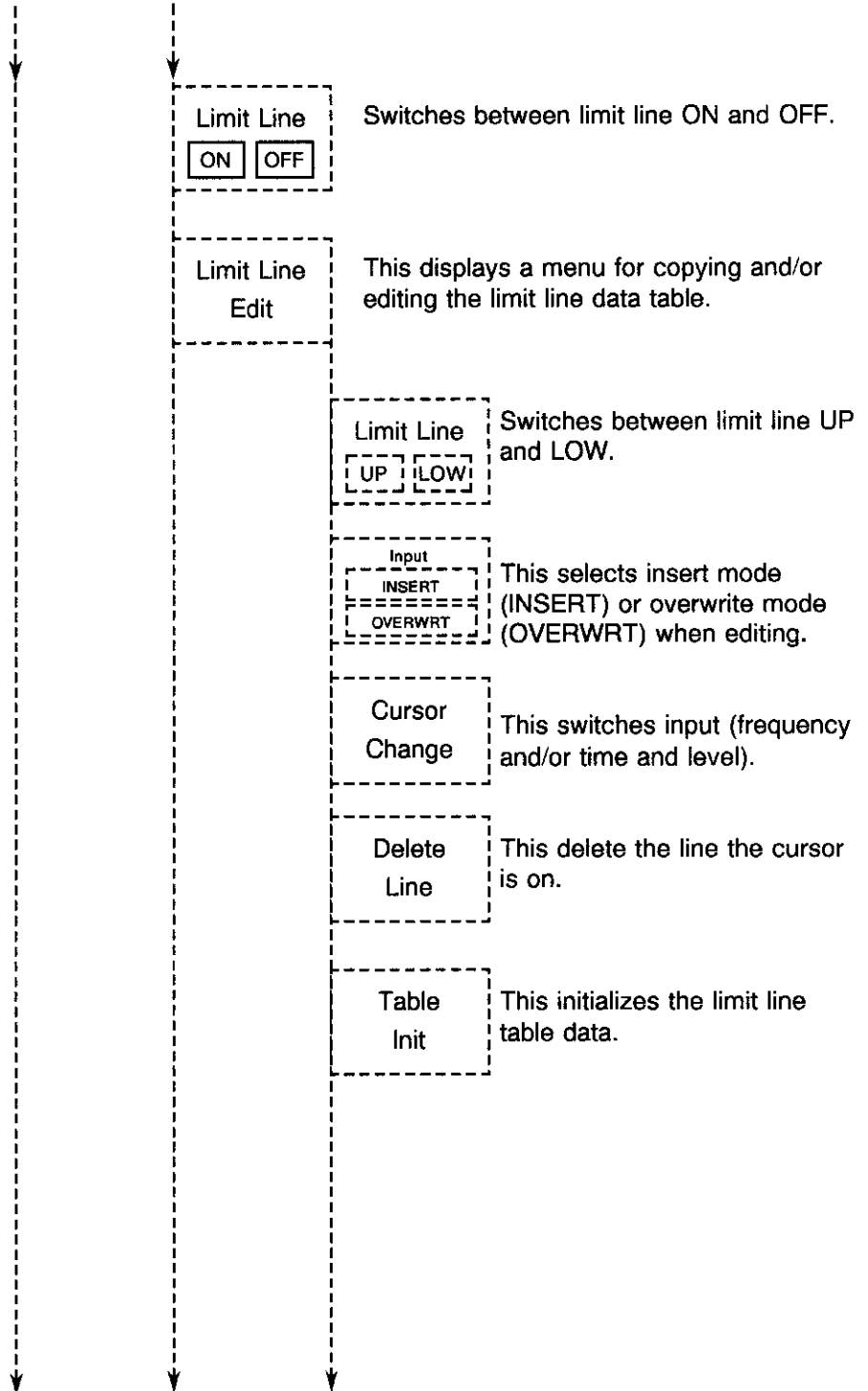
This sets the limit line in the time domain.

**Table**  
 STD  USER

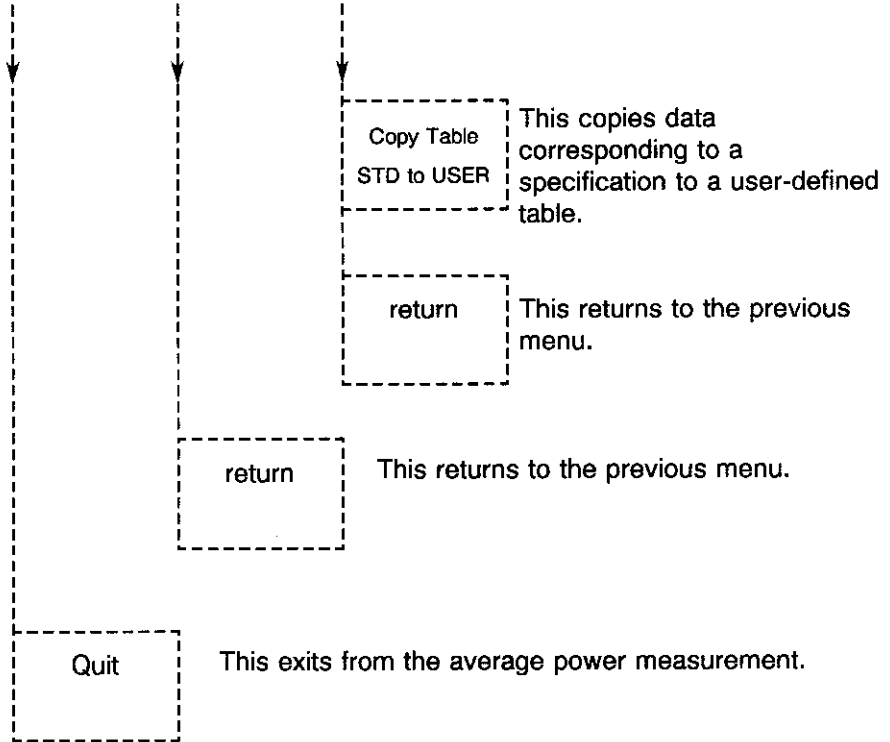
**STD:** This uses the specification value of CDMA.  
**USER:** This uses the table input using the Limit Line Edit key.

**Shift**  
 X  Y

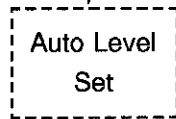
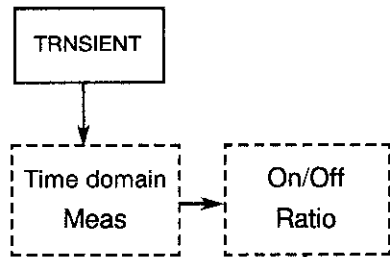
This shifts time data (X) or level data (Y) which has already been input.



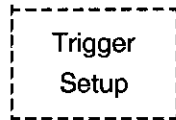
3. Functions of MEASUREMENT Section



● On/Off Ratio Measurement of the Burst Signal in the Time Domain



This is used to set the reference level automatically. If only press this key, the setting is performed.



A Dialog Box for trigger settings will appear. It can be used to set trigger source, trigger level, trigger position, and delay time settings.

When making settings, select the parameter to be set using the step key and select the parameter value to be set using the data knob. After parameters have been selected, you can set them by pressing the data knob

or pressing the 

ENTER Hz
-------------

 key.

The Dialog Box will disappear once either of these keys is pressed.

**Trigger:** Selects the trigger source (signal from which synchronization is taken) for controlling the measurement timing for the burst signal or other.

**Free Run:** Selects asynchronous measurement mode. (Measure using internal measurement timing.)

**Video:** Selects a measurement mode synchronized with the internal Video signal.

**IF Signal:** Selects a measurement mode synchronized with the internal IF signal (21.4 MHz).

3. Functions of MEASUREMENT Section

	Ext:	Selects a measurement mode synchronized with a signal input from an external source (EXT TRIG connector on the rear panel).
	Slope:	Select whether to match the sync position with the rising edge ( + ) of the signal (Video, IF Signal or EXT) or with the falling edge ( - ) of the signal.
	Trigger Level:	Specifies the level position of the trigger source signal (Video, IF Signal or EXT) at which to synchronize. A trigger level position mark (▶) will be displayed to the left of the display scale. The data can be set by using the data knob or ten-key and pressing the <div style="display: inline-block; border: 1px solid black; padding: 2px; text-align: center;">ENTER Hz</div> key.
	Source Monitor:	Select whether or not to display the waveform for the trigger source. This is automatically set to OFF whenever the trigger source is changed. (This selection is only available when the trigger source is the IF signal.)
	Trigger Position:	Sets the X axis position (time) of the trigger source signal (Video, IF Signal or EXT) at which to synchronize. A trigger position mark ([▼]) will be displayed above the display scale. The data can be set by using the data knob or ten-key and pressing the <div style="display: inline-block; border: 1px solid black; padding: 2px; text-align: center;">ENTER Hz</div> key.
	Delay Time:	Sets the delay time to be added to the trigger source signal.
	AVG Times	Sets the average times.
	<div style="display: inline-block; border: 1px solid black; padding: 2px;">ON</div> <div style="display: inline-block; border: 1px solid black; padding: 2px;">OFF</div>	
	Quit	This exits from the On/ Off ratio measurement.

● Occupied Bandwidth Measurement Function in the Frequency Domain

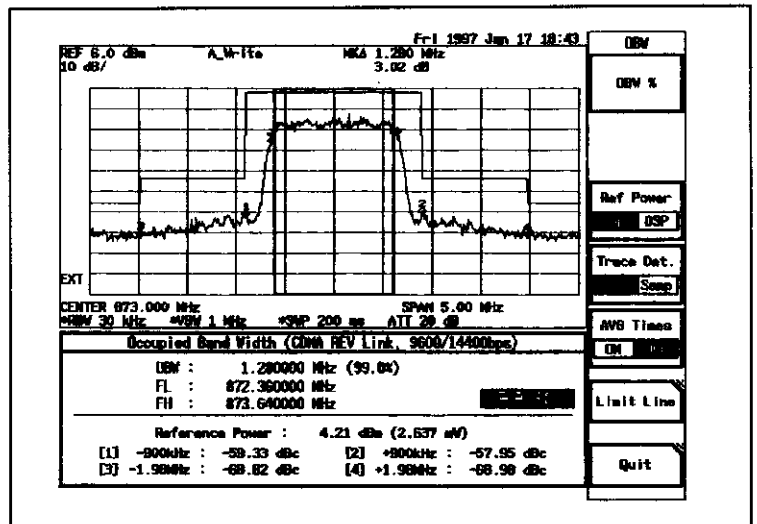
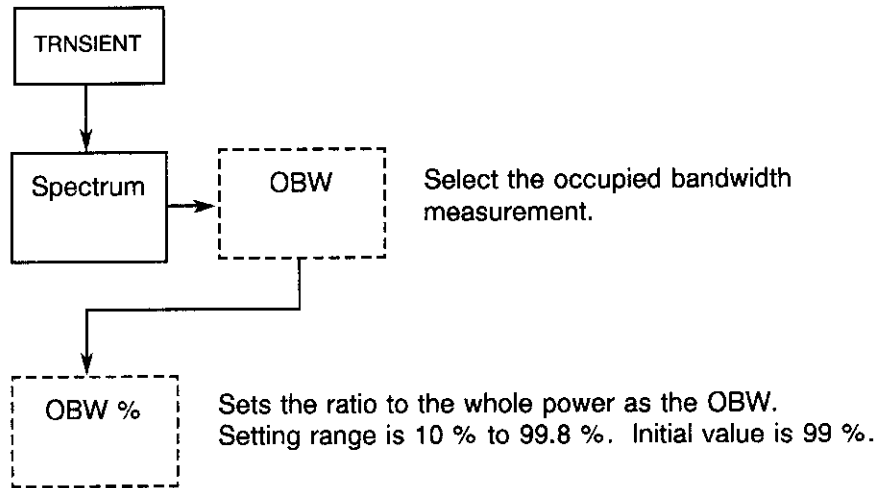
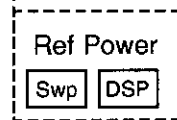


Figure 1-9 Sample of OBW Measurement

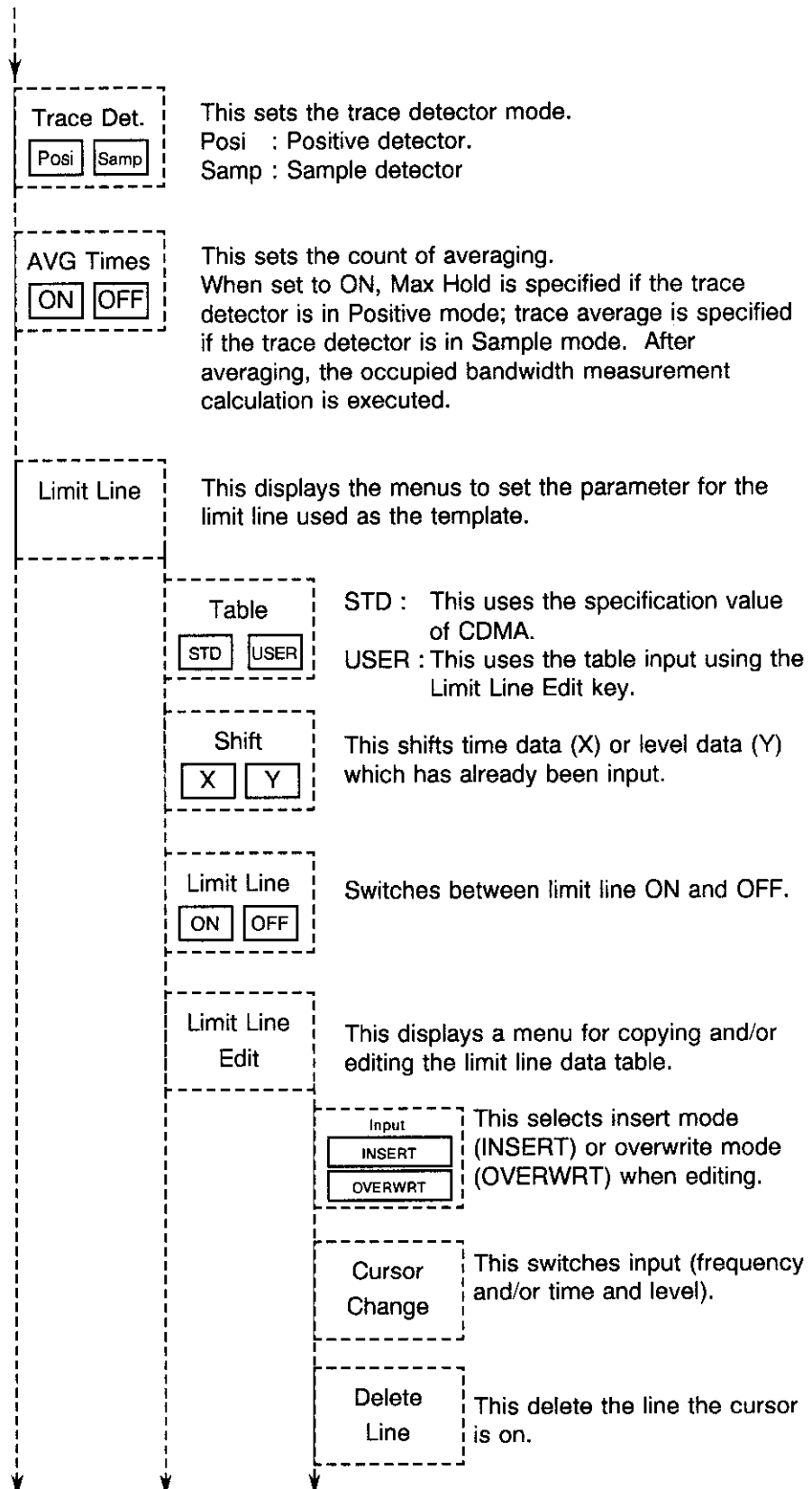


This sets the measurement method of reference power for drawing a template.

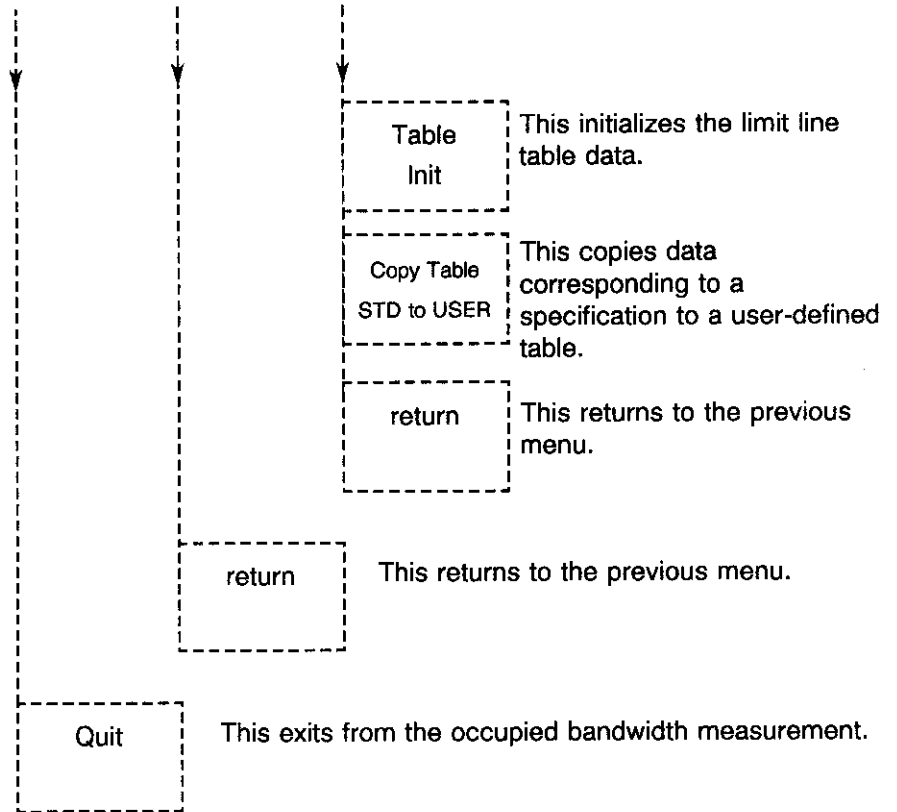
Swp: Calculates power by integrating in the 1.2288MHz band of the sweep waveform. When the trace detector has been set to Posi or Samp, power is calculated from the waveform swept in Positive or Sample mode, respectively.

DSP: Calculates power by the DSP using the zero span.

3. Functions of MEASUREMENT Section

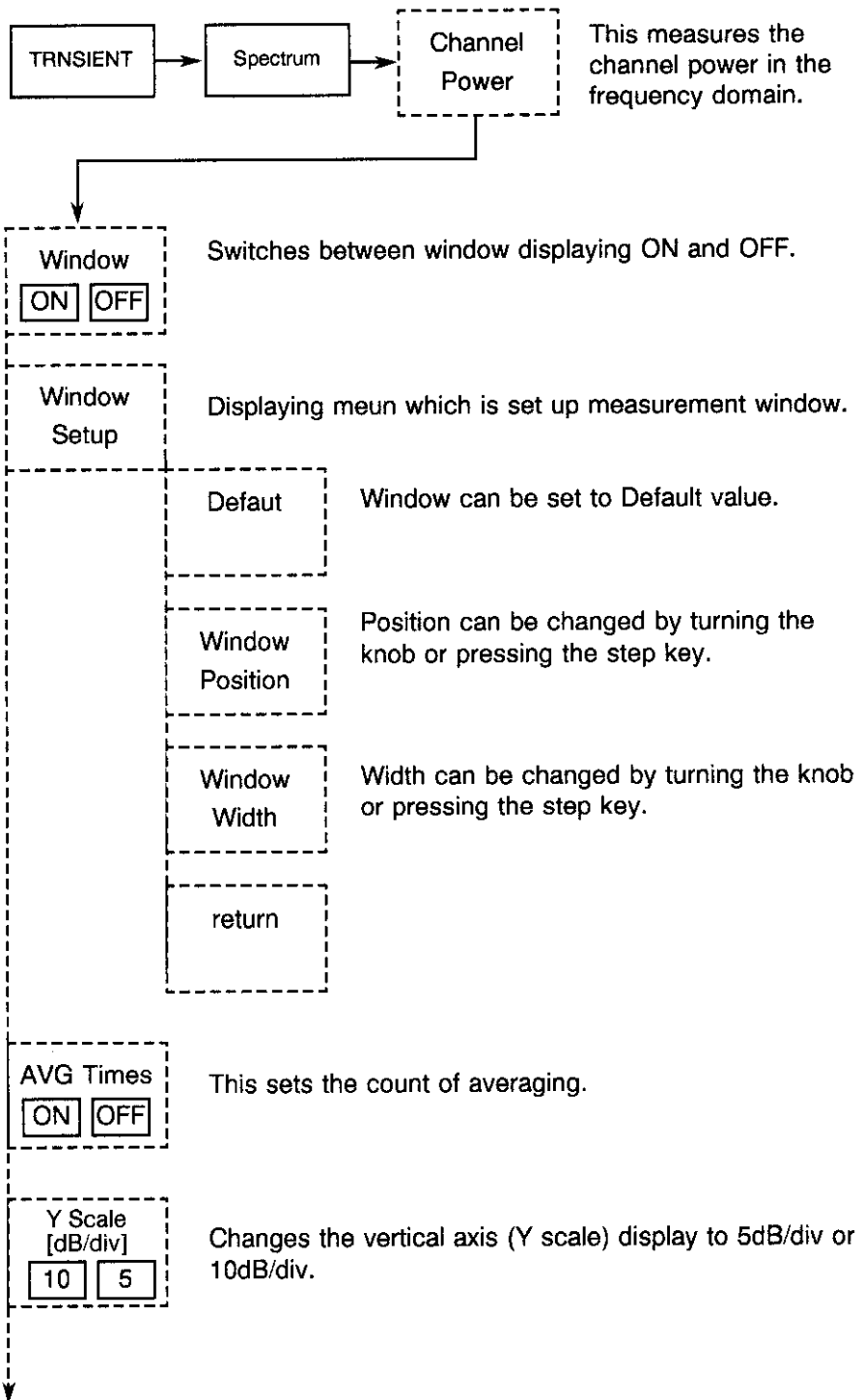






3. Functions of MEASUREMENT Section

● Power Measurement Function in the Frequency Domain



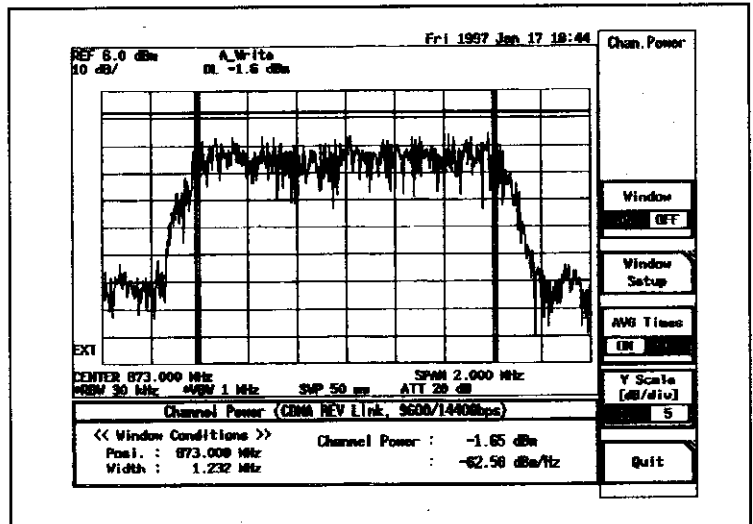


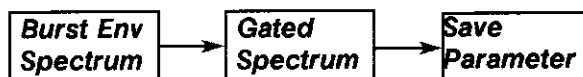
Figure 1-10 Sample of Channel Power Measurement

Quit

This exits from the channel power measurement.

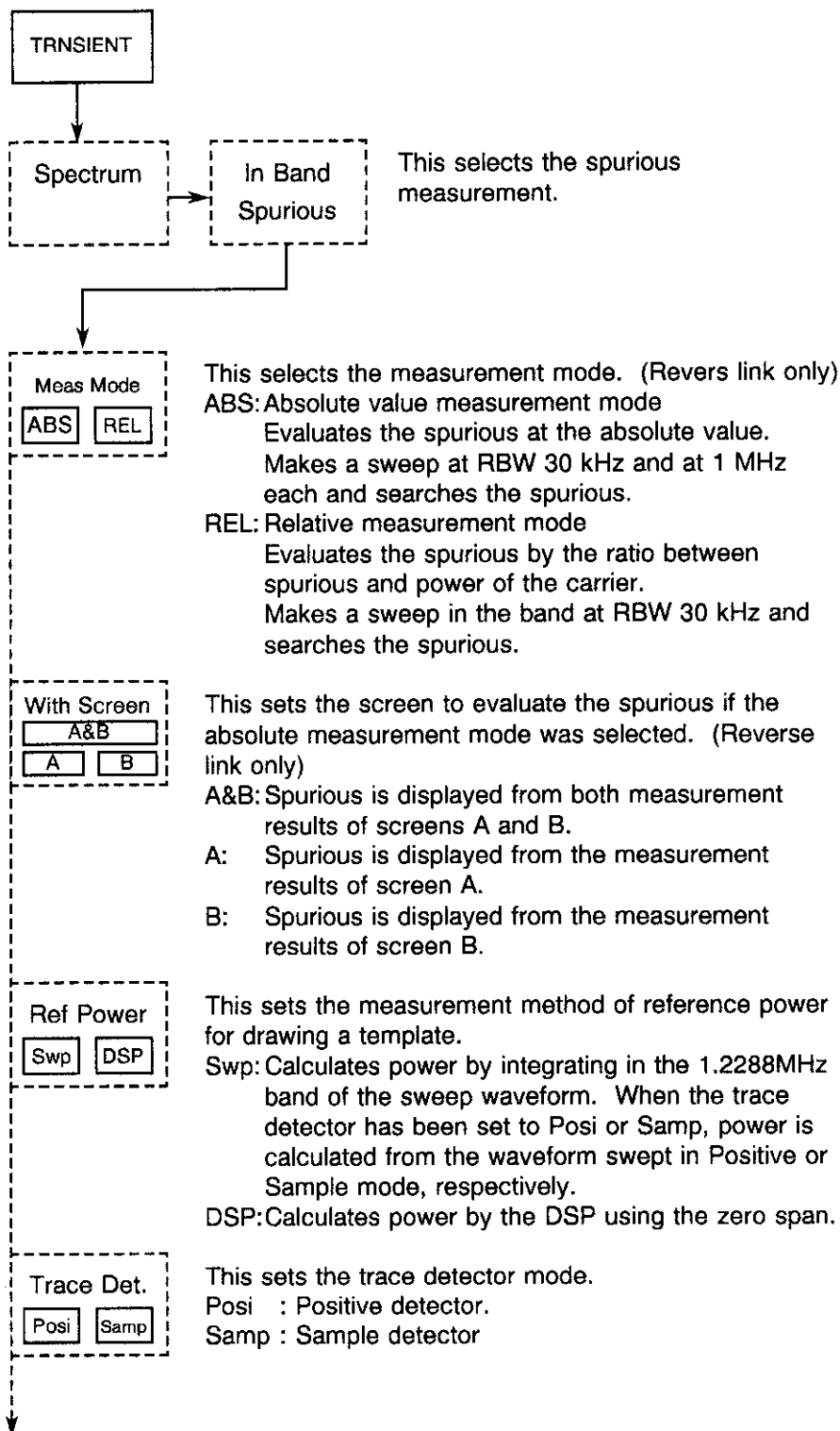
**NOTE**

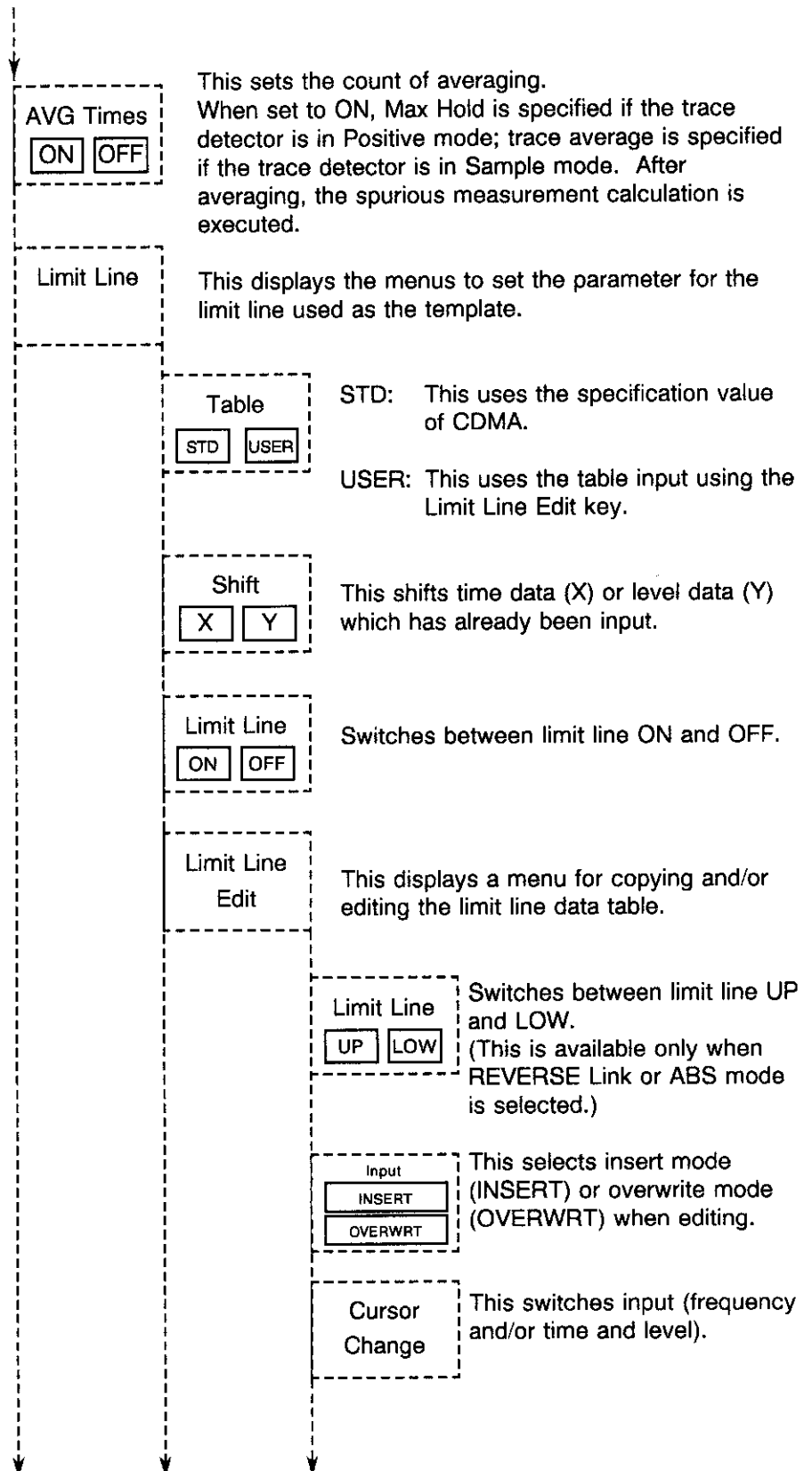
When the burst signal is set from the STD menu (Rate is other than 9800/14400), the gate sweep is executed with the parameter set by the following and the power is measured in the frequency domain by the sample detector.



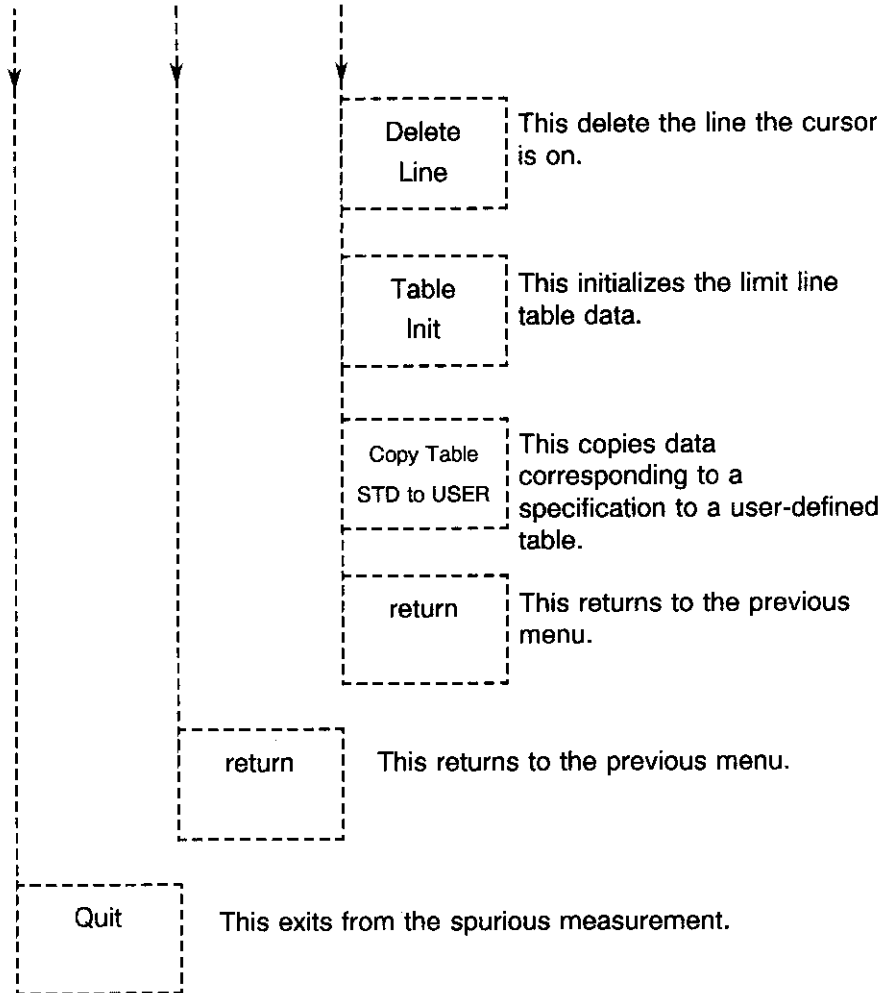
3. Functions of MEASUREMENT Section

● Spurious Measurement Function





3. Functions of MEASUREMENT Section



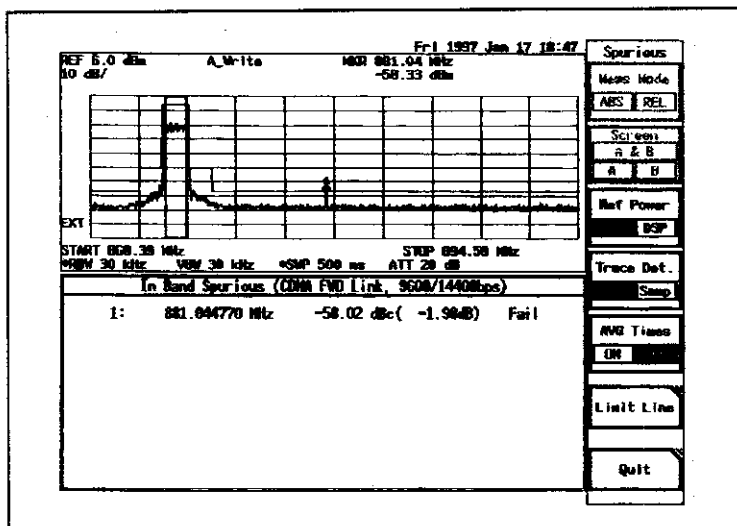


Figure 1-11 Sample of Spurious Measurement Result

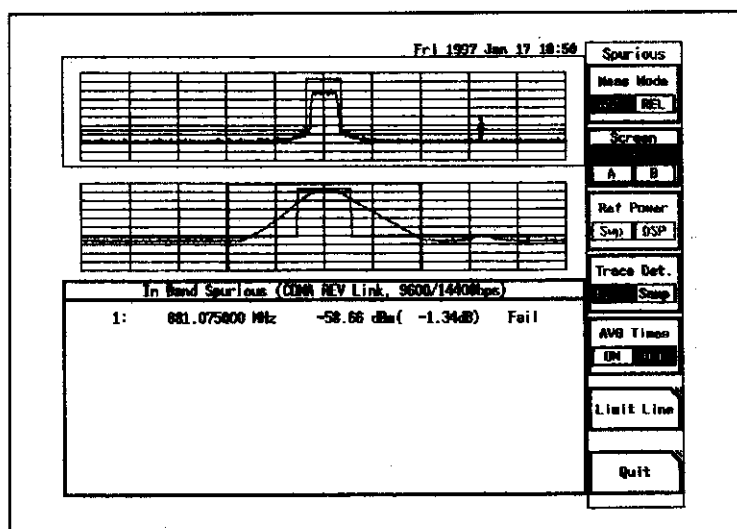


Figure 1-12 Sample of Absolute Mode Measurement

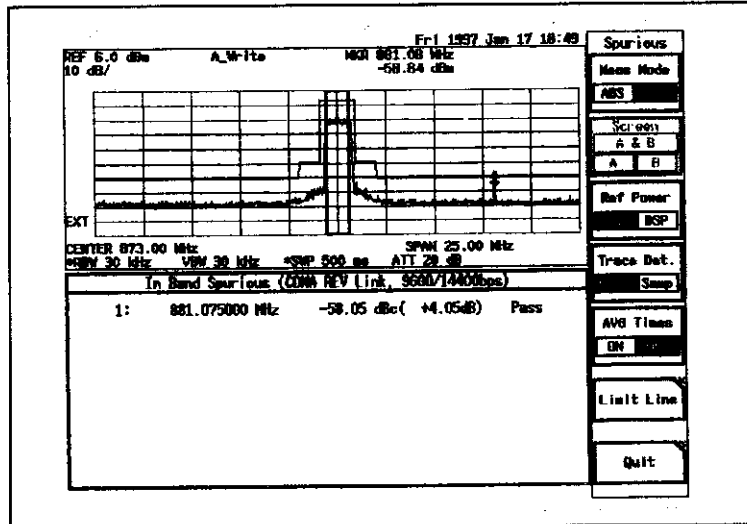


Figure 1-13 Sample of Relative Mode Measurement

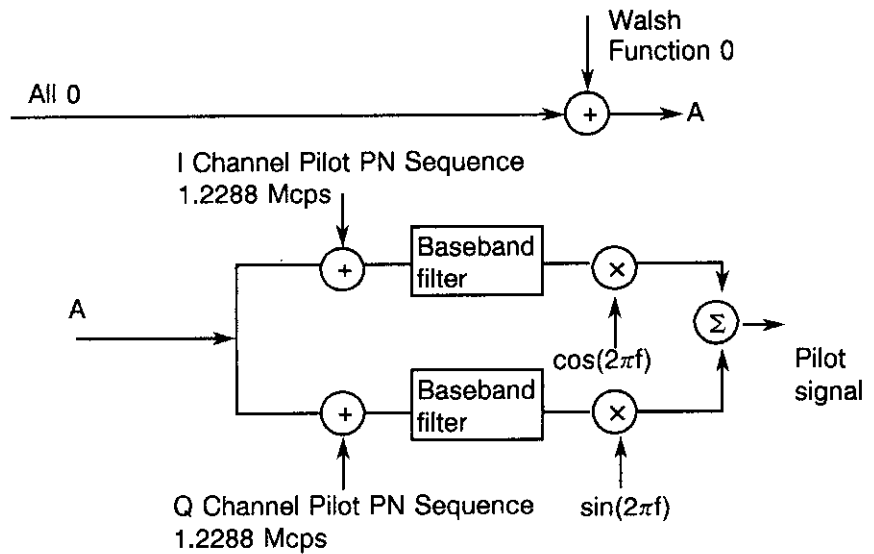


● **Waveform Quality Measurement of Modulation Signal**

The signal to be measured in Pilot mode assumes the following signals.

(1) In Forward Link mode

The Pilot signal output from the BS is assumed to be the object.

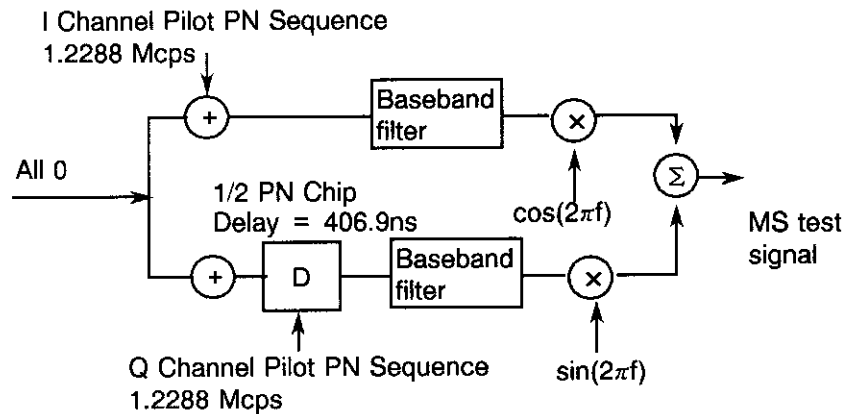


The trigger signal placed at the head of I/Q Channel Pilot PN Sequence is input to R3465 as the external trigger signal. The time drift between the trigger signal and the head of I/Q Channel Pilot PN Sequence, obtained from the Pilot signal input to R3465, is calculated as  $\tau$ . R3465 allows measuring  $\tau$  in the range of  $\pm 90$  chips and  $\rho$  in the range between  $64 \times 5$  and  $64 \times 25$  chips.

3. Functions of MEASUREMENT Section

(2) In Reverse Link mode

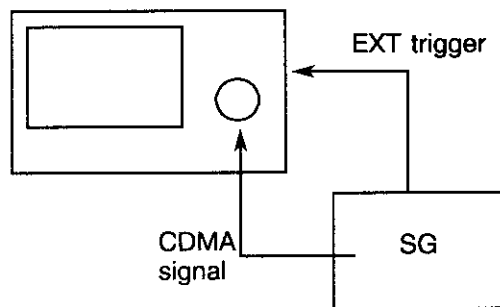
The test signal output from the MS is assumed to be the object.



The trigger signal placed at the head of I/Q Channel Pilot PN Sequence is input to R3465 as the external trigger signal. The time drift between the trigger signal and the head of I/Q Channel Pilot PN Sequence, obtained from the Pilot signal input to R3465, is calculated as  $\tau$ .

R3465 allows measuring  $\tau$  in the range of  $\pm 50$  chips and  $\rho$  in the range between 615 and 800 chips.

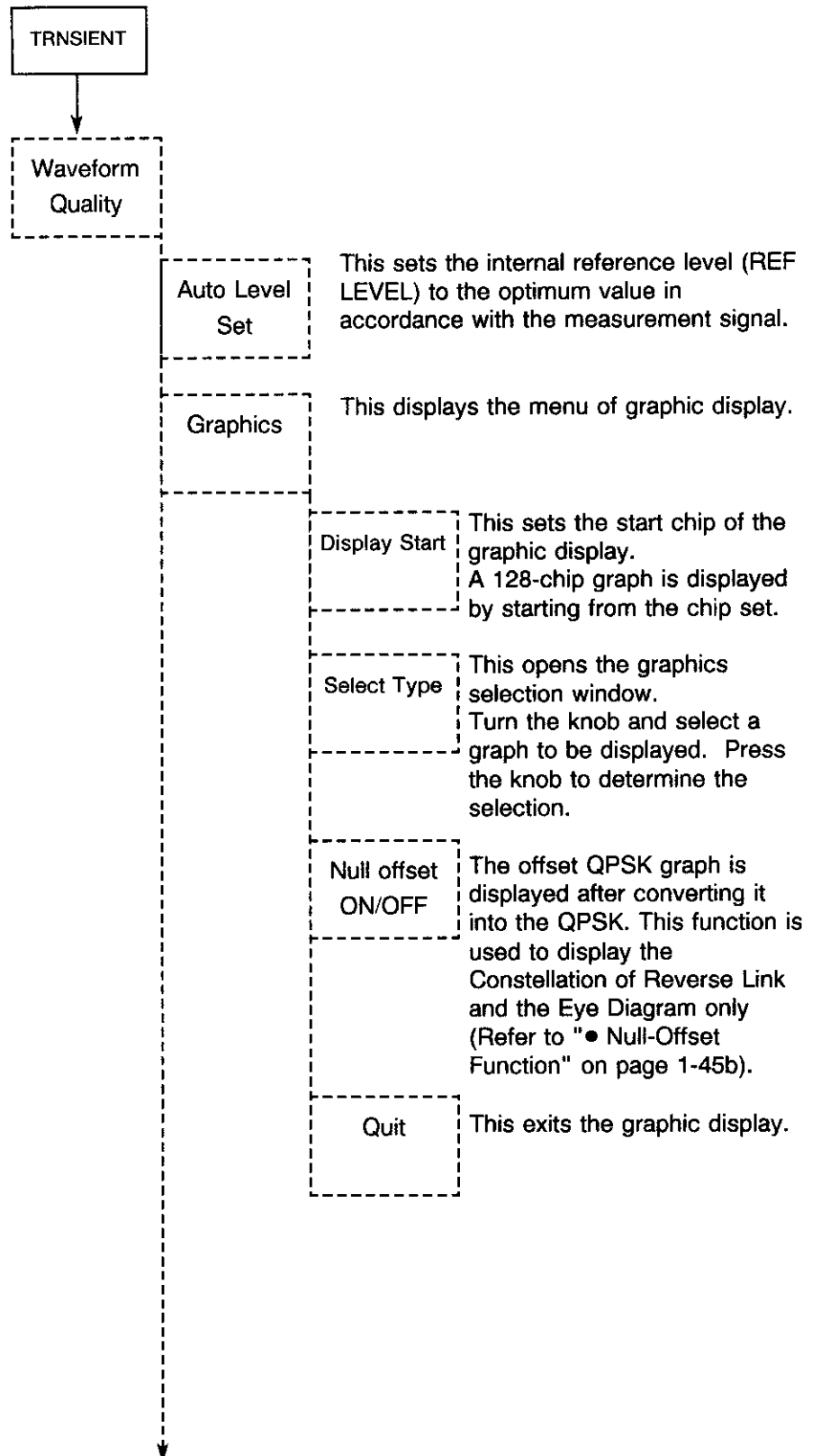
To measure  $\tau$  more precisely, calibration should be made as follows. When the value  $\tau$  obtained there is set as  $\tau_{Offset}$ , the delay of signals can be compensated.



Set  $\tau_{Offset}$  to 0 and output the CDMA signal from the SG. Execute the measurement. Multiply -1 by the measured  $\tau$  and set the solution as  $\tau_{Offset}$ .

**NOTE**

*The measurement can be made even if Ext trigger is not provided. However, the value  $\tau$  cannot be measured there. For details on settings, refer to the explanation of "Parameter Setup" on page 1-44.*



3. Functions of MEASUREMENT Section

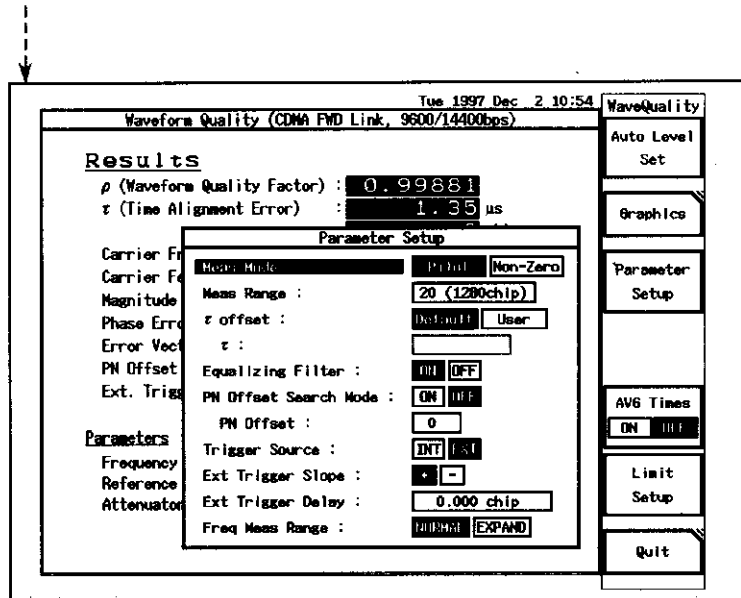


Figure 1-14 Parameter Setting Dialog Box

Parameter Setup

This sets parameters for measurement. To set the parameter, select an item with the step key and select a value with the data knob. The value selected is determined by pressing the data knob or

pressing the 

ENTER Hz
-------------

 key.

**Meas Mode:**

Select the measurement mode.  
 Pilot: Measures a signal containing all-zero data.  
 Non Zero: Measures a signal containing non-zero data, but cannot measure  $\tau$ .

**Meas range:**

The measurement range can be entered by chips.  
 The measurement range can be entered by chips if Reverse Link was selected from the STD menu.  
 Or, it can be entered by  $64^n$  if Forward Link was selected.

$\tau$ offset: The time difference between the external trigger and the head of the PN signal can be compensated in the object path of the measurement.

$\tau$ : Compensation value can be entered.  
For details, refer to the explanation of method of compensating  $\tau$ .

**Equalizing Filter:**  
ON/OFF of the equalizing filter can be set (only in the Forward Link mode).  
When BTS output signal is passing through the Equalizing Filter, set the Filter to ON in the R3465 (see "About Equalizing Filter" page 1-48a for detail).

**PN offset Search Mode:**  
In the usual measurement, the head of the input signal's PN pattern must be synchronized with the trigger. When this condition is not satisfied, set this mode to ON.

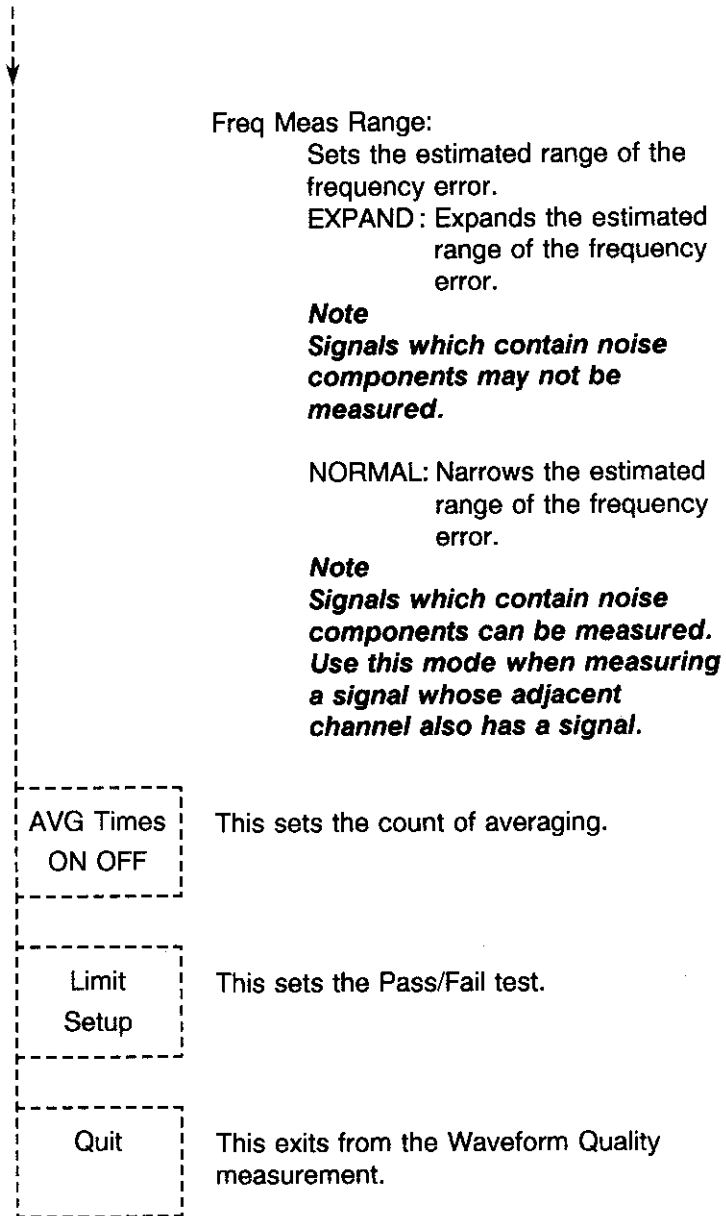
**PN Offset:**  
The synchronous point of PN sequence can be set.  
The setup is available only when PN Offset Search mode is OFF.

**Trigger Source:**  
The timing to read the signal for the measurement can be set.  
This mode can be selected only when PN offset Search Mode was set to ON. If that was OFF, this mode is fixed to EXT.

**EXT Trig Slope:**  
The edge of the external trigger can be set.  
+: Trigger is made at the rising signal.  
-: Trigger is made at the falling signal.

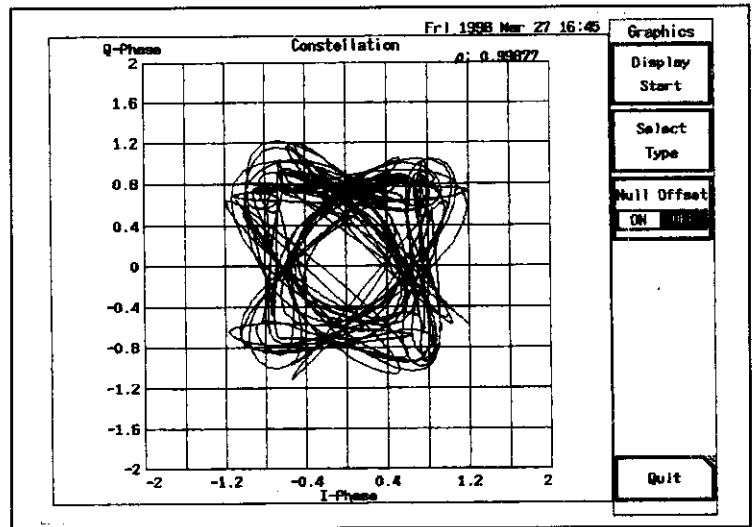
**EXT Trigger Delay:**  
When a delay was developed between the external trigger and the signal (the head of PN), the delay can be compensated. noise components can be measured.

3. Functions of MEASUREMENT Section

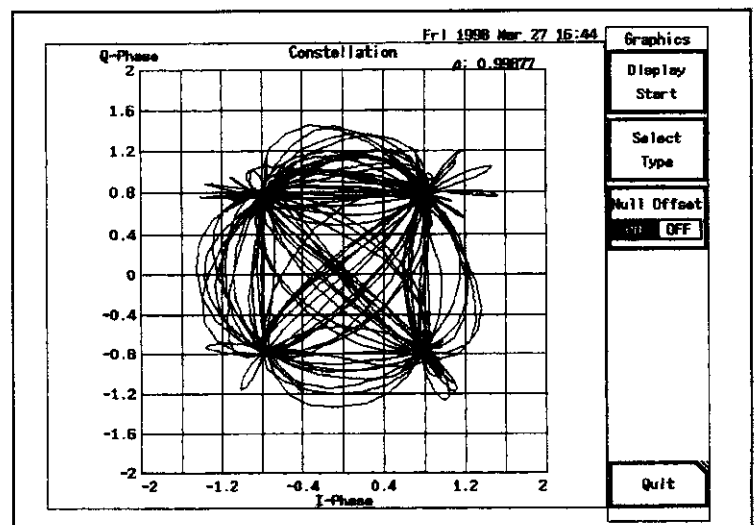


● Null-Offset Function

- (1) A Constellation of Reverse Link example using the Offset QPSK is shown below.  
The symbol points cannot converge on one point.

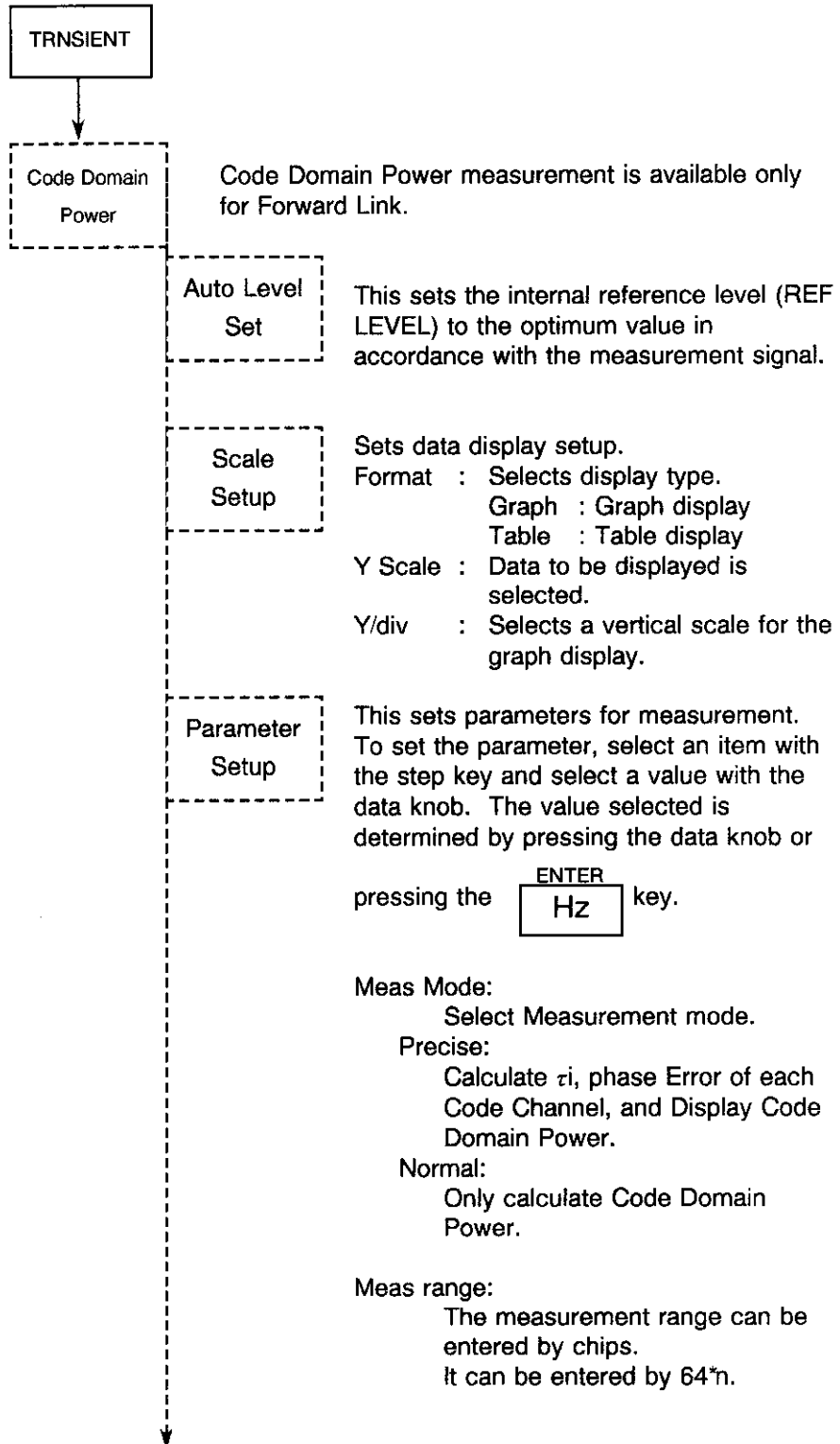


- (2) Therefore, the offset using the Offset QPSK is cancelled, and then this signal is passed through a filter whose characteristics are the inverse of the base band filter based on IS-95. Using this technique, a Constellation using the QPSK, whose symbol points converge on one point, can be obtained.



**Note**  
A graph whose symbol points converge on a point cannot be obtained by simply canceling the offset using the Offset QPSK because of the inter-symbol interference of a base band filter based on IS-95.

● Code Domain Power Measurement Function





$\tau$ offset: The time difference between the external trigger and the head of the PN signal can be compensated in the object path of the measurement.

$\tau$ : Compensation value can be entered.  
For details, refer to the explanation of method of compensating  $\tau$ .

Equalizing Filter:  
ON/OFF of the equalizing filter can be set.  
When BTS output signal is passing through the Equalizing Filter, set the Filter to ON in the R3465 (see "About Equalizing Filter" page 1-48a for detail).

Threshold:  
Set the demodulation threshold for Precise-mode measurement.  
Input the ratio to the whole power.

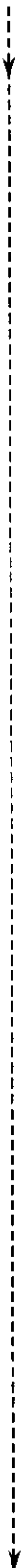
**Note**  
**Set the threshold to the level higher than the noise level.**

PN offset Search Mode:  
In the usual measurement, the head of the input signal's PN pattern must be synchronized with the trigger. When this condition is not satisfied, set this mode to ON.

PN Offset:  
Set synchronous point of PN sequence.  
The setup is available only when Forward Link or PN Offset Search mode is OFF.

Trigger Source:  
The timing to read the signal for the measurement can be set.  
This mode can be selected only when PN offset Search Mode was set to ON. If that was OFF, this mode is fixed to EXT.

3. Functions of MEASUREMENT Section



EXT Trig Slope:

The edge of the external trigger can be set.

- + : Trigger is made at the rising signal.
- : Trigger is made at the falling signal.

EXT Trigger Delay:

When a delay was developed between the external trigger and the signal (the head of PN), the delay can be compensated.

Phase Unit:

Selects the phase unit to be used when measuring the relative phase between the Pilot channel and other channels.

- degree : degree display
- m rad : m Radian display

Freq Meas Range:

Sets the estimated range of the frequency error.

EXPAND : Expands the estimated range of the frequency error.

**Note**

**Signals which contain noise components may not be measured.**

NORMAL: Narrows the estimated range of the frequency error.

**Note**

**Signals which contain noise components can be measured. Use this mode when measuring a signal whose adjacent channel also has a signal.**

Power Unit:

Sets the unit when displaying the absolute power at the marker.

- dBm : Sets the dBm for the unit.
- W : Sets the watt for the unit.

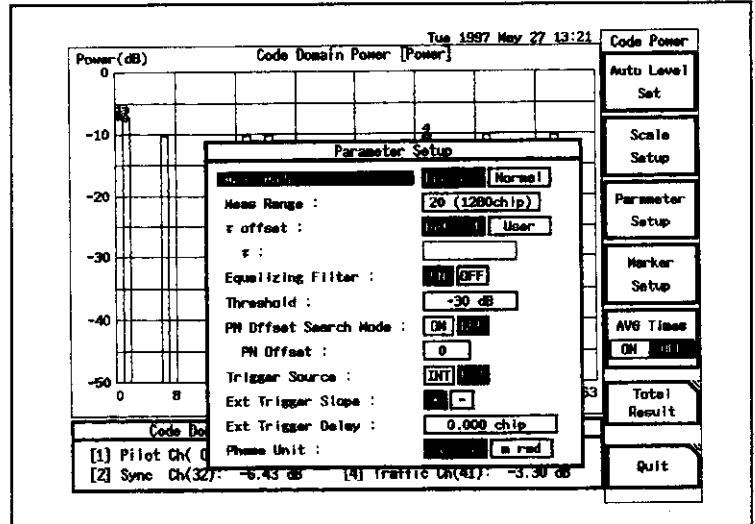


Figure 1-15 Code Domain Measurement Setting Menu

**NOTE**

*Make sure that the Threshold level is below the active channel level and above the noise level.  
 If the setting is incorrect, the Precise mode measurement can not be performed.*

● **About Equalizing Filter**

According to IS-95 7.1.3.1.11.2 Phase Characteristics, the base station must equalize the signal phase outputs using the Equalizing Filter. This is defined by the following formula.

$$H(w) = k \frac{w^2 + j\alpha w w_0 - w_0^2}{w^2 - j\alpha w w_0 - w_0^2}$$

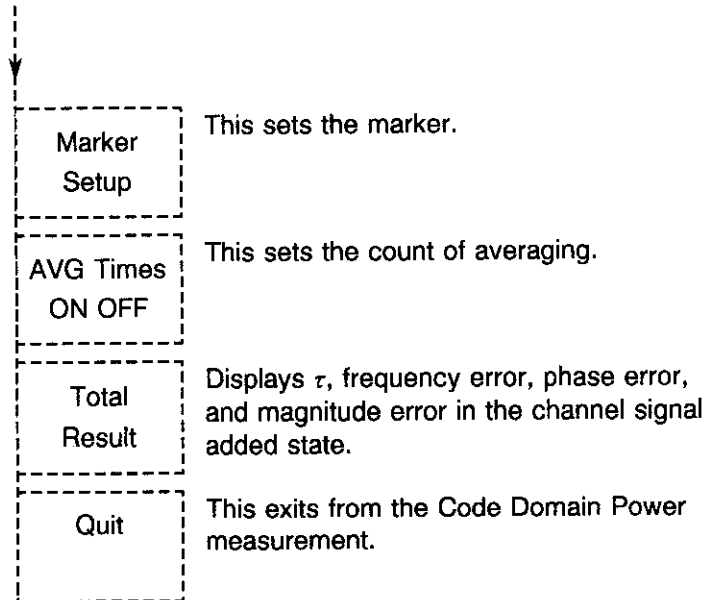
K : Arbitrary gain  
 j :  $\sqrt{-1}$   
 $\alpha$  : 1.36  
 $w_0$  :  $2\pi \times 3.15 \times 10^5$   
 w : Radian frequency

When a signal sent from the base station passes through the Equalizing Filter, the R3465 can analyze the waveform using a filter with the inverted characteristics of the Equalizing Filter.

To do this, set the Equalizing Filter setting in the Parameter Setup soft menu to ON.

To analyze a signal which is not passing through the Equalizing Filter, set the Filter to OFF.

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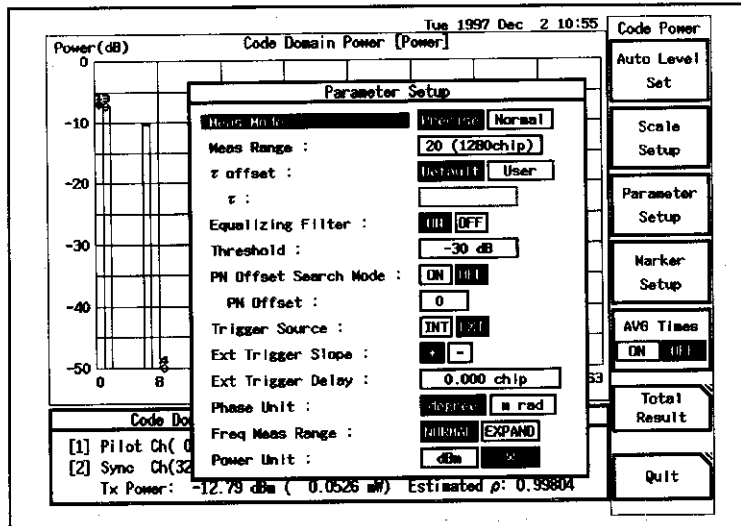


Figure 1-15 Code Domain Measurement Setting Menu

**NOTE**

*Make sure that the Threshold level is below the active channel level and above the noise level. If the setting is incorrect, the Precise mode measurement can not be performed.*

● **About Equalizing Filter**

According to IS-95 7.1.3.1.11.2 Phase Characteristics, the base station must equalize the signal phase outputs using the Equalizing Filter. This is defined by the following formula.

$$H(w) = k \frac{w^2 + j\alpha w w_0 - w_0^2}{w^2 - j\alpha w w_0 - w_0^2}$$

K : Arbitrary gain  
 j :  $\sqrt{-1}$   
 $\alpha$  : 1.36  
 $w_0$  :  $2\pi \times 3.15 \times 10^5$   
 w : Radian frequency

When a signal sent from the base station passes through the Equalizing Filter, the R3465 can analyze the waveform using a filter with the inverted characteristics of the Equalizing Filter.

To do this, set the Equalizing Filter setting in the Parameter Setup soft menu to ON.

To analyze a signal which is not passing through the Equalizing Filter, set the Filter to OFF.

● **Displaying the Absolute Power**

The absolute power which is displayed in the code domain power measurement function is the power of the symbol point, and does not necessarily coincide with the power measured by the power meter or the Tx Power measurement mode.

The code domain power is defined at symbol points, therefore, the absolute power displayed on this instrument is the power of the symbol points.

● **About the Estimated  $\rho$**

The sum of the  $\rho$  values of all the active Walsh channels (a Walsh channel whose  $\rho$  is greater than the threshold value is considered active) and the pilot channel is displayed. You can estimate the waveform quality by examining this displayed value.

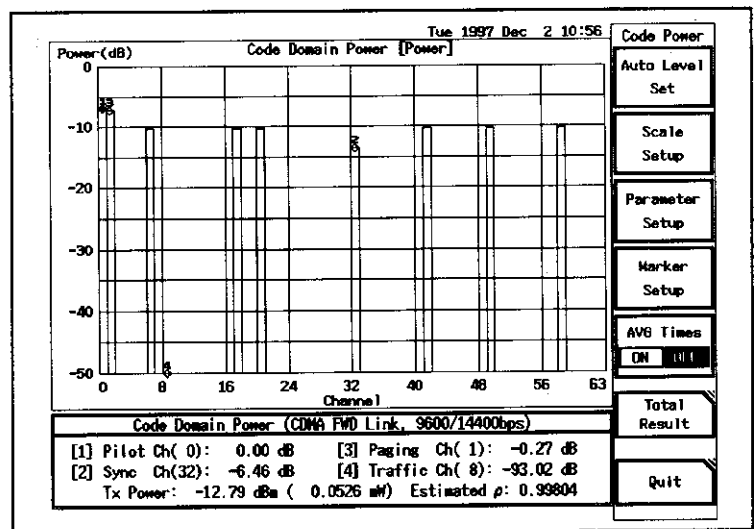
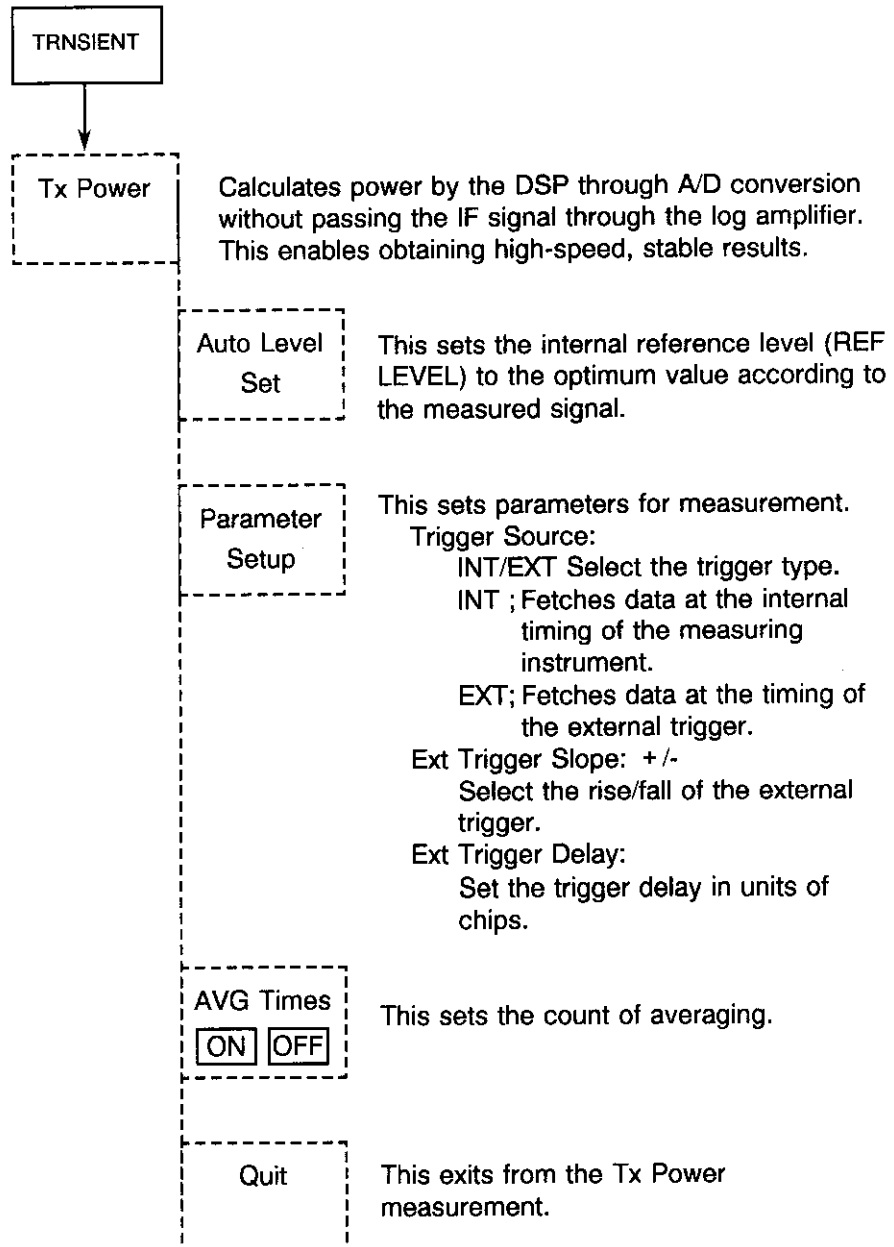


Figure 1-15a Measurement Example of the Code Domain Power

● Tx Power Measurement Functions





## ■ Standard Setting

The frequency band, the direction, the chip rate and so on of the signal to be measured can be set.

Type: CDMA (800 MHz)    CDMA (1.8 GHz)    CDMA (1.9 GHz)  
         Japan (800MHz)    China (800MHz)

The CDMA band can be set. This decides the band of the spurious measurement. This band setting is necessary to calculate the frequency from the channel number.

Link: FORWARD/REVERSE

The direction of the signal can be selected.

Rate: 9600/14400, 4800/7200, 2400/3600, 1200/1800

The rate of the signal can be set. The sweep time of the spectrum measurement is decided according to the rate.

Offset Level:

The offset value of the reference level can be set in the range of  $\pm 100$  dB. To set the offset value, the numeric keypad and the data knob can be used.

Freq. Input:

FREQUENCY/CHANNEL NO.

It can be set that the center frequency of the measurement unit is entered by the frequency or by the channel number.

Channel Offset:

Channel Offset is effective only when CHANNEL NO. is selected. The value "Channel Offset + channel number entered" is regarded as the channel number.

Frequency Offset :

Frequency Offset is effective only when CHANNEL NO. is selected.

"Frequency Offset + frequency which is defined by channel number" is given as the center frequency of this instrument.

Cont. Auto Level Set : ON/OFF

ON or OFF can be set to execute measurement with executing or not executing auto-leveling. This key is effective only in the "Waveform Quality", "Code Domain Power" and "Tx Power" measurement.

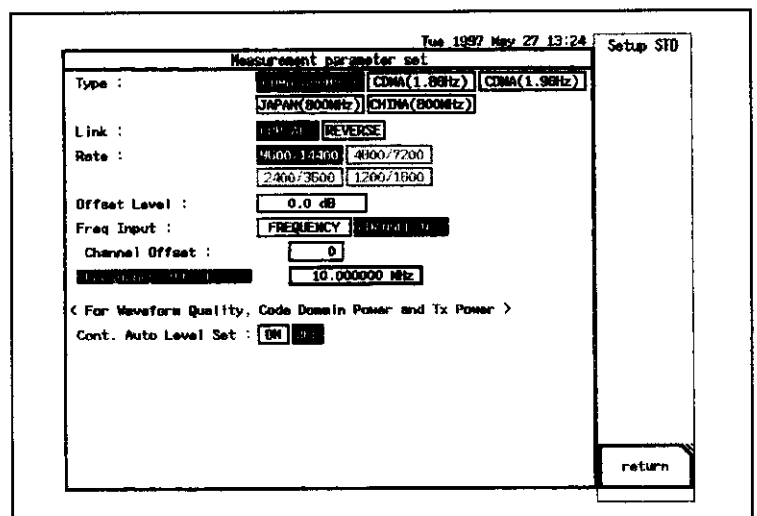


Figure 1-16 Standard Setting Menu

## 4. Caution on the Recall Function

When R3465 is turned on just after the communication system is changed with using "Comm. System", R3465 is started at the factory-shipped initial setting screen. The file or the register under the communication system (PDC/PHS/NADC (or GSM) versus CDMA) cannot be recalled. (If recalled, an error message "Communication system unmatched." is displayed on the screen.)

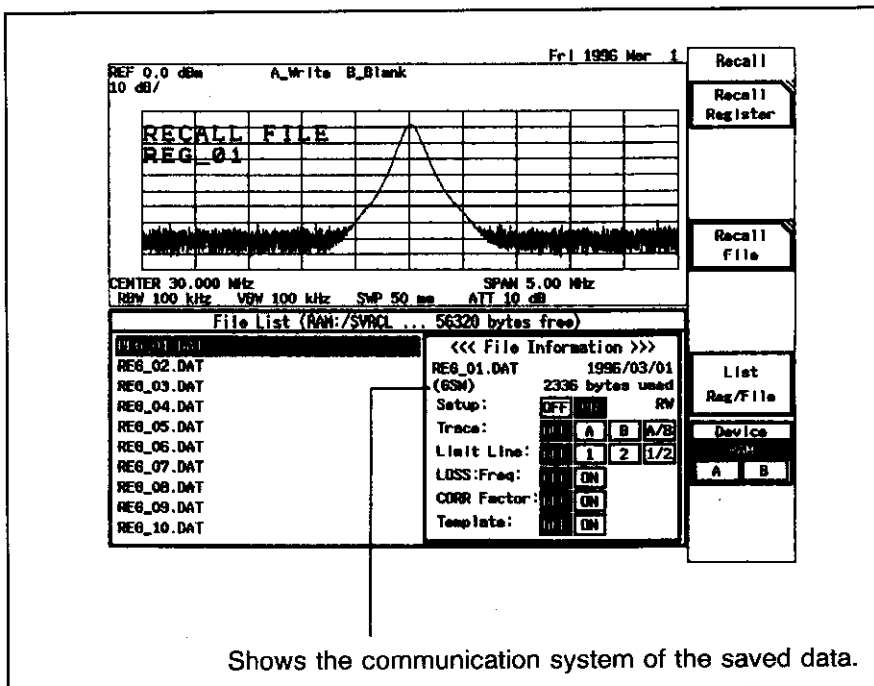
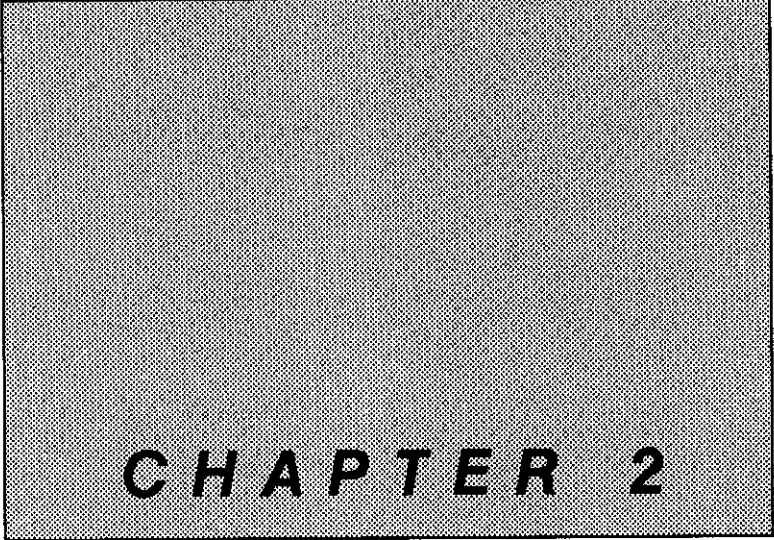


Figure 1-17 Recall Screen



# GPIB

This chapter describes GPIB code lists.

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## CONTENTS

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1. GPIB Code Lists ..... 2-2

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# 1. GPIB Code Lists

Function	Listener code	Talker request	
		Code	Output format
Standard Operation mode CW TRANSIENT	SETFUNC CW SETFUNC TRAN	SETFUNC?	0 : CW 1 : TRANSIENT
Communication system CDMA	MODTYP CDMA800M MADTYP CDMA1700M MODTYP CDMA1900M MODTYP CDMAJAPAN MODTYP CDMACHINA	MODTYP?	0 : PDC 1 : PHS 2 : NADC 3 : GSM 4 : DCS1800 5 : DCS1900 6 : CDMA (800MHz band) 7 : CDMA (1.8GHz band) 8 : CDMA (1.9GHz band) 9 : DECT 10 : CDMA (JAPAN) 11 : CDMA (CHINA)
Link FORWARD REVERSE	LINK FWD LINK REV	LINK?	0 : FORWARD 1 : REVERSE
Rate 9600/14400 4800/7200 2400/3600 1200/1800 (9600/1400 fixed for LINK FWD)	RATE 9600 RATE 4800 RATE 2400 RATE 1200	RATE?	0 : 9600/14400 1 : 4800/7200 2 : 2400/3600 3 : 1200/1800
CH Setup CF Setup Channel Offset Frequency Offset	CH* CHOFS* CHFOFS*	CH? CHOFS? CHFOFS?	Integer (Channel No.) Integer (Offset, Channel) Integer (Offset frequency)
Auto Level  Execution (Except Burst Env, Gated Out Power and On/Off Ratio) Execution (Burst Env, Gated Out Power and On/Off Ratio) Auto Level On Auto Level Off	AUTOLVL  AUTOWFL  ALS ON ALS OFF		
Level offset	RO *	RO?	Level

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
<b>Measurement conditions</b> Source   FREE VIDEO IF EXT Slope    + - Level (Effective for TRGSRC VIDEO/IF) Position Source Monitor   ON OFF Delay Time	TRGSRC FREE TRGSRC VIDEO TRGSRC IF TRGSRC EXT TRGSLP RISE TRGSLP FALL TRGLVL* TRGPOS* TRGMON ON TRGMON OFF TRGDT*	TRGMON? TRGDT?	0 to 100% 0 to 100% 0 : OFF 1 : ON Time
<b>Gated Spectrum</b> Gate Position Width Default Source IF Signal EXT Trigger Slope    + - Threshold Save Parameters Gate Sweep   ON OFF	TGTPOS* TGTWID* TGTDEF TGTSRC IF TGTSRC EXT TGTSLP RISE TGTSLP FALL TGTTHD* TGTSV TGTSWP ON TGTSWP OFF	TGTPOS? TGTWID? TGTSRC? TGTTHD? TGTSWP?	Time Time 0 : IF Signal 2 : EXT Trigger 0 : OFF to 100% 0 : OFF 1 : ON
<b>Display Control</b> Window   Position Width T-Zoom ON Reset Zoom on Window Return to Last Span Span to 1 Burst Span to 1 Frame Vertical Zoom   ON OFF Y Scale [dB/div]10dB/ 5dB/ 2dB/	DCPOS* DCWID* DCZOM DCRST DCHZOM ON DCHZOM OFF DCHZOM BURST DCHZOM FRAME DCVZOM ON DCVZOM OFF DCVDIV P10DB DCVDIV P5DB DCVDIV P2DB	DCPOS? DCWID? DCVDIV?	Time Time 0 : 10dB/div 1 : 5dB/div 2 : 2dB/div

1. GPIB Code Lists

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Gated Output Power Window ON OFF Default Position Width	TWDO ON TWDO OFF TWDEF TWLX* TWDX*	TWDO?  TWLX? TWDX?	0 : OFF 1 : ON  Time Time
OBW OBW % Ref. Power Sweep DSP Trace Det. Positive Sample	COBWPER* COBWPEF SWP COBWREF DSP COBWDET POS COBWDET SMP	COBWPER? COBWREF?  COBWDET?	10.0 to 99.8 % 0 : Sweep 1 : DSP 0 : Positive Detector 1 : Sample Detector
Channel Power Window Default Position Width Y Scale [dB/div]10dB/ 5dB/	CPWDEF CPWLX* CPWDX* CPWDIV P10DB CPWDIV P5DB	 CPWLX? CPWDX? CPWDIV?	 frequency frequency 0 : 10dB/div 1 : 5dB/div
In Band Spurious Meas Mode ABS REL (Effective for "LINK REV") Screen A&B A B (Effective for "LINK REV" and "SPRMOD ABS") Ref. Power Sweep DSP Trace Det. Positive Sample	SPRMOD ABS SPRMOD REL  SPRSCRN AB SPRSCRN A SPRSCRN B  SPRREF SWP SPRREF DSP  SPRDET POS SPRDET SMP	SPRMOD?  SPRSCRN?   SPRREF?  SPRDET?	0 : ABSOLUTE 1 : RELATIVE  0 : A&B 1 : A 2 : B  0 : Sweep 1 : DSP  0 : Positive Detector 1 : Sample Detector

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Waveform Quality			
Display Start	DISPSTT*	DISPSTT?	0 to 1472chip
Parameter Setup			
Meas Mode Pilot	WMMOD PILOT	WMMOD?	0 : Pilot
Non-Zero	WMMOD NZERO		1 : Non-Zero
Meas Range	WMRNG*	WMRNG?	FORWARD : 5 to 25 (320 to 1600 chip) REVERSE : 615 to 800 chip
$\tau$ offset DEFAULT	WTOFS DFLT	WTOFS?	0 : DEFAULT
USER	WTOFS USER		1 : USER
$\tau$ offset value	WTOFSDT*	WTOFSDT?	Time -100.0 to 100.0 $\mu$ s
Equalizing Filter			
OFF	WEQFLT OFF	WEQFLT?	0 : OFF
ON	WEQFLT ON		1 : ON
PN Offset Search Mode			
OFF	WPNMOD OFF	WPNMOD?	0 : OFF
ON	WPNMOD ON		1 : ON
PN Offset	WPNOFS*	WPNOFS?	0 to 511
Trig Source INT	WTRGSRC INT	WTRGSRC?	0 : INT
EXT	WTRGSRC EXT		1 : EXT
EXT Trig Slope +	WTRGSLP RISE	WTRGSLP?	1 : +
-	WTRGSLP FALL		0 : -
EXT Trig Delay	WTRGDLY*	WTRGDLY?	-16384 to 16384chip, 0.125 resolution
Freq Meas Range Normal	WFRRNG	WFRRNG?	0 : NORM
Expand			1 : EXP
Code Domain Power			
Parameter Setup			
Limit Steup			
Type STD	WLMTYP STD	WLMTYP?	
USER	WLMTYP USER		0 : STD
Judgement ON	WLMJDG ON	WLMJDG?	1 : USER
OFF	WLMJDG OFF		0 : OFF
Limit ( $\rho$ )	WLMRHO*	WLMRHO?	1 : ON
	(Effective for "WLMTYP USER")		(0.0001 to 1.0000)

1. GPIB Code Lists

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Graph type Selection			
Constellation	WFGTYP CON	WFGTYP?	0 : Constellation
Constellation (Linear)	WFGTYP CONLIN		1 : Constellation (Linear)
Constellation (Dot)	WFGTYP CONDOT		2 : Constellation (Dot)
I Channel Eye Diagram	WFGTYP ICHEYE		3 : I Channel Eye Diagram
Q Channel Eye Diagram	WFGTYP QCHEYE		4 : Q Channel Eye Diagram
Magnitude Error	WFGTYP MAGERR		5 : Magnitude Error
Phase Error	WFGTYP PHAERR		6 : Phase Error
Err. Vect. Mag. vs Chip	WFGTYP EVM		7 : E.V.M vs Chip
Null Offset			
OFF	NULOFS OFF	NULOFS?	0 : OFF
ON	NULOFS ON		1 : ON
Code Domain Power			
Format Graph	CFMT GRP	CFMT?	0 : Graph
Table	CFMT TBL		1 : Table
Y Scale $\rho$	CYSCL RHO	CYSCL?	0 : $\rho$
Power	CYSCL POW		1 : Power
$\tau$	CYSCL TAU		2 : $\tau$
Phase	CYSCL PHA		3 : Phase
Y Scale/div 20/div	CPDIV P20DB	CPDIV?	0 : 20/div
10/div	CPDIV P10DB		1 : 10/div
5/div	CPDIV P5DB		2 : 5/div
1/div	CPDIV P1DB		3 : 1/div
0.5/div	CPDIV P05DB		4 : 0.5/div
0.25/div	CPDIV P025DB		5 : 0.25/div
Parameter Setup			
Meas Mode Precise	CMMOD PREC	CMMOD?	0 : Precise
Normal	CMMOD NORM		1 : Normal
Meas Range	CMRNG*	CMRNG?	5 to 25 (320 to 1600 chip)
$\tau$ offset Default	CTOFS DFLT	CTOFS?	0 : DEFAULT
User	CTOFS USER		1 : USER
$\tau$ offset value	CTOFSDT*	CTOFSDT?	Time -100.0 to 100.0 $\mu$ s
Equalizing Filter			
OFF	CEQFLT OFF	CEQFLT?	0 : OFF
ON	CEQFLT ON		1 : ON
Threshold	CTHRSH*	CTHRSH?	Level (-40 to -10dB)
PN Offset Search Mode			
OFF	CPNMOD OFF	CPNMOD?	0 : OFF
ON	CPNMOD ON		1 : ON



(cont'd)

Function	Listener code	Talker request	
		Code	Output format
PN Offset Trig Source INT EXT EXT Trig Slope   + - EXT Trig Delay Phase Unit Freq Meas Range   Normal Expand Switches between the units	CPNOFS* CTRGSRC INT CTRGSRC EXT CTRGSLP RISE CTRGSLP FALL CTRGDLY* CPHUNT DEG CPHUNT RAD CFRRNG CDPUNT	CPNOFS? CTRGSRC? CTRGSLP? CTRGDLY? CPHUNT? CPHUNT? CFRRNG? CDPUNT?	0 to 511 0 : INT 1 : EXT 1 : + 0 : - -16384 to 16384chip, 0.125 resolution 0 : degree 1 : m rad 0 : NORM 1 : EXP 0 : W 1 : DBM
Marker Setup Paging Channel Traffic Channel	PAGECH* TRFCCH*	PAGECH? TRFCCH?	Channel (0 to 63) Channel (0 to 63)
Tx Power Parameter Setup Trig Source INT EXT EXT Trig Slope + - EXT Trig Delay	TTRGSRC INT TTRGSRC EXT TTRGSLP RISE TTRGSLP FALL TTRGDLY*	TTRGSRC? TTRGSLP? TTRGDLY?	0 : INT 1 : EXT 1 : + 0 : - -16384 to 16384chip
Average Burst Env. Spectrum Gated Output Power On/Off Ratio OBW Channel Power In Band Spurious Waveform Quality Code Domain Power Tx Power	TAVGBST* CAVGGAT* CAVGRAT* CAVGOBW* CAVGCHP* CAVGSPR* CAVGWF* CAVGCDP* CTXAVG*	TAVGBST? CAVGGAT? CAVGRAT? CAVGOBW? CAVGCHP? CAVGSPR? CAVGWF? CAVGCDP? CTXAVG?	1 : OFF to 32 1 : OFF to 100 1 : OFF to 100 1 : OFF to 999 1 : OFF to 999 1 : OFF to 999 1 : OFF to 32 1 : OFF to 32 1 : OFF to 32

1. GPIB Code Lists

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Limit line Type selection ※1 Burst Env. Spectrum Gated Output Power OBW In Band Spurious FORWARD Link REVERSE/ABS (UP) REVERSE/ABS (LOW) REVERSE/REL STD USER Shift X Shift Y Limit Line ON ※2 OFF Table data ※3 data input data delete	TLMTYP TM1 TLMTYP TM2 TLMTYP FR1 TLMTYP FR2 TLMTYP FR3 TLMTYP FR4 TLMTYP FR5 LMCPSL STD LMCPSL USR TLMSFT* TLMASFT* TLMT ON TLMT OFF TLMIN*, * TLMDEL	TLMSFT? TLMASFT? TLMT?	Frequency/Time Level 0 : OFF 1 : ON Frequency/Time, Level
PASS/FAIL Judgment ON OFF Judgment result Judgment result (details) Read out FAIL point UPPER side LOWER side	PFC ON PFC OFF	PFC? PFJ? OPF? FPU? FPL?	0 : OFF 1 : ON 0 : FAIL 1 : PASS 0 : PASS 1 : UPPER FAIL 2 : LOWER FAIL 3 : UPPER&LOWER FAIL 4 : ERROR The number of Fail <CR + LF> + Frequency/Time Leve< CR + LF > (repeat the number of Fail) ※Maximum 256 points Same as the UPPER side

- ※1 Beforehand, the type selection is necessary before the setup of STD/USER, Shift X/Y and other is carried out.
- ※2 According to the proceeding of the each measurement execution, the setup condition of ON/OFF status in advance is changed occasionally, therefore, carry out "SI" command (the same measurement execution) after setup condition of ON/OFF is set in the measurement mode.
- ※3 When input or delete of the table data is carried out, TM1 is UPPER limit line and TM2 is LOWER limit line for the type selection.

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Measurement start Burst Env. Spectrum Gated Output Power On/Off Ratio OBW Channel Power In Band Spurious Waveform Quality (Graph) Code Domain Power (Graph) Total Result ※ Tx Power The measurement execution of the same item.	PWRTIME GATEPOW RATIO COBW CCHPOW CINBSPP WFQUA WFGPH CDPGPH CDPRES CTXPOW SI		Result of the numerical value  Result of the numerical value
Read out the measurement result Burst Env. Spectrum  Gated Output Power  On/Off Ratio  OBW  (d1 and d2 values can be read with "CTXPOW?" when "COBWREF DSP" is set.)		GATEPOW?  RATIO?  COBW?  COBWCP?	Judgment for Pass/fail  double d1 d1 : Level (dBm)  double d1, d2 d1 : Level (dB) d2 : Level (dBm)  double OBW, FL, FH OBW : frequency (Hz) FL : frequency (Hz) FH : frequency (Hz)  double d1, d2, a1, a2, a3, a4 d1 : Level (dBm) d2 : Level (W) a1 : -1st Level (dBc) a2 : +1st Level (dBc) a3 : -2nd Level (dBc) a4 : +2nd Level (dBc)

※The CDPRES command is used to display results (graph) of the measurement, executed by the CDPGPH command, in numerals. The measurement is not executed by this CDPRES command. To execute the measurement, execute the SI command after the CDPRES command.

1. GPIB Code Lists

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Channel Power		CCHPOW?	double d1, d2 d1 : Level (dBm) d2 : Level (dBm/Hz)
In Band Spurious		CINBSPR?	n < CR + LF > + f1, l1, m1 < CR + LF > (repeat n) n : number (integer) f1 : frequency (Hz) l1 : Level (dBm) m1 : margin Level (dB)
Maximum value output per part ① -1.98M to -750k (-1.98M to -900k) ② +750k to +1.98M (+900k to +1.98M) ③ -1.98M or less ④ +1.98M or more		CINBMAX?	n1, f1, l1, ... n4, f4, l4 (4-set output) n1 : 0: ineffective (without data) 1: effective (with data) f1 : frequency (Hz) l1 : Level (dBm)

(cont'd)

Function	Listener code	Talker request		
		Code	Output format	
Waveform Quality	All result output	WFQUA?	d1, d2, ... d9	
	$\rho$	WFRHO?	d1	
	$\tau$	WFTAU?	d2, d3	
	Carr. Freq. Error	WFCFER?	d4	
	Carrier Feedthrouh	WFIQOFS?	d5	
	Magnitude Error	WFMAG?	d6	
	Phase Error	WFPHSE?	d7	
	Err. Vect. Magnitude	WFMOD?	d8	
	PN Offset	WFPNOFS?	d9	
			d1 : $\rho$ d2 : Time (sec) d3 : Integer (chip) d4 : Frequency (Hz) d5 : Level (dBc) d6 : % rms d7 : degree rms d8 : % rms d9 : chip	
Code Domain Power	All result output	CDPRES?	d1, d2, ... d8	
	$\tau$	CDPTAU?	d1, d2	
	Carr. Freq. Error	CDPCFER?	d3	
	Carrier Feedthrouh	CDPIQOFS?	d4	
	Magnitude Error	CDPMAG?	d5	
	Phase Error	CDPPHSE?	d6	
	Err. Vect. Magnitude	CDPMOD?	d7	
	PN Offset	CDPPNOFS?	d8	
				d1 : Time (sec) d2 : chip d3 : Frequency (Hz) d4 : Level (dBc) d5 : % rms d6 : degree rms d7 : % rms d8 : chip
		Channel Marker Output	CMKLVL?	d1, d2, d3, d4 d1 : Pilot Ch (dB) d2 : Sync Ch (dB) d3 : Paging Ch (dB) d4 : Traffic Ch (dB)

1. GPIB Code Lists

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Tx Power		CTXPOW?	double d1, d2 d1 : Level (dBm) d2 : Level (W)
Estimated $\rho$		CDPRHO?	d1 : $\rho$
Read out the graph result			
Constellation			
Constellation (Linear)		[WFRHO?]	d1 : $\rho$ (Real number)
Constellation (Dot)		GPHI?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : phases (Real number)
X data (I-Phase)			
Y data (Q-Phase)		GPHQ?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : phases (Real number)
I Channel Eys Diagram		[WFRHO?]	d1 : $\rho$ (Real number)
X data (chip)		GPHCHIP?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : chip (Integer)
Y data (I-Phase)		GPHI?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : phases (Real number)
Q Channel Eye Diagram		[WFRHO?]	d1 : $\rho$ (Real number)
X data (chip)		GPHCHIP?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : chip (Integer)
Y data (Q-Phase)		GPHQ?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : phases (Real number)
Magnitude Error		[WFMAG?]	d1 : % rms
X data (chip)		GPHCHIP?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : chip (Integer)
Y data (%)		GPHERR?	n < CR/LF > + d1 < CF/LF > + .....dn < CR/LF > n : number (Integer) d1 to dn : % (Real number)

(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Phase Error X data (chip)  Y data (degree)  Error Vector Magnitude X data (Chip)  Y data (Error %)		[WFPHSE?]	d1 : degree rms
		GPHCHIP?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : chip (Integer)
		GPHDEG?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : degree (Real number)
		[WFMOD?]	d1 : % rms (Real number)
		GPHCHIP?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : chip (Integer)
		GPHERR?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : % (Real number)
Code Domain Power Measurement result readout  X data (Channel)  Y data ( $\rho$ )  Y data (Power)  Y data ( $\tau$ )		CODPOW?	d1, d2, d3, d4, d5 d1 : Level (dB) d2 : $\rho$ d3 : Time (sec) d4 : $\theta$ (degree/m rad) d5 : Level (W/dBm)
		GPHCH?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : channel (Integer)
		GPHRHO?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : $\rho$ (Real number)
		GPHPOW?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : Level (Real number)
		GPHTAU?	n<CR/LF> + d1<CF/LF> + ....dn<CR/LF> n : number (Integer) d1 to dn : $\tau$ (sec)

1. GPIB Code Lists

(cont'd)

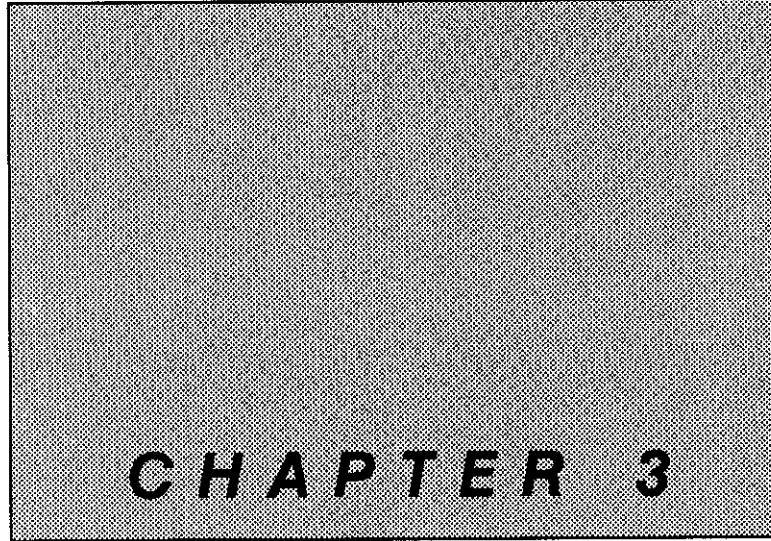
Function	Listener code	Talker request	
		Code	Output format
Y data (Phase)		GPHPHA?	n <CR/LF> + d1 <CF/LF> + .....dn <CR/LF> n : number (Integer) d1 to dn : $\theta$ (degree/m rad)
Y data (Walsh Power)		GPHWSH?	n <CR/LF> + d1 <CF/LF> + .....dn <CR/LF> n : Number (Integer) d1 to dn : Level (W/dBm)
Graph marker Marker ON OFF	GMK ON GMK OFF	GMK?	0: OFF 1: ON
Constellation Constellation (Linear) Constellation (Dot) Chip No.	GMKCHIP*	GMKCHIP?	Disp Start to Disp Start + 127
Marker X data (I) Marker Y data (Q)		GMKI? GMKQ?	Phases ( $\pm 2.0$ ) Phases ( $\pm 2.0$ )
I Channel Eye Diagram chip No.	GMKCHIP*	GMKCHIP?	Disp Start to Disp Start + 127
Marker Y data (I)		GMKI?	Phases ( $\pm 2.0$ )
Q Channel Eye Diagram chip No.	GMKCHIP*	GMKCHIP?	Disp Start to Disp Start + 127
Marker Y data (Q)		GMKQ?	Phases ( $\pm 2.0$ )
Magnitude Error chip No.	GMKCHIP*	GMKCHIP?	Disp Start to Disp Start + 127
Marker Y data		GMKERR?	%
Phase Error chip No.	GMKCHIP*	GMKCHIP?	Disp Start to Disp Start + 127
Marker Y data		GMKDEG?	degree



(cont'd)

Function	Listener code	Talker request	
		Code	Output format
Error Vector Magnitude Chip No.	GMKCHIP*	GMKCHIP?	Disp Start to Disp Start + 127
Marker Y data		GMKERR?	%
Code Domain Power Channel No.	GMKCH*	GMKCH?	Channel (0 to 63)
Marker Y data		GMKRHO?	$\rho$ (0.0 to 1.0)
Marker Y data (Power)		GMKPOW?	Level (dB)
Marker Y data ( $\tau$ )		GMKTAU?	$\tau$ (sec)
Marker Y data (Phase)		GMKPHA?	Phase (degree/m rad)
Marker Y data (Walsh Power)		GMKWWSH?	Level (W/dBm)





## SPECIFICATIONS

This chapter describes CDMA Option Specifications.

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# 1. Specifications

Conform to IS95 CDMA. Forward Link, Reverse Link.

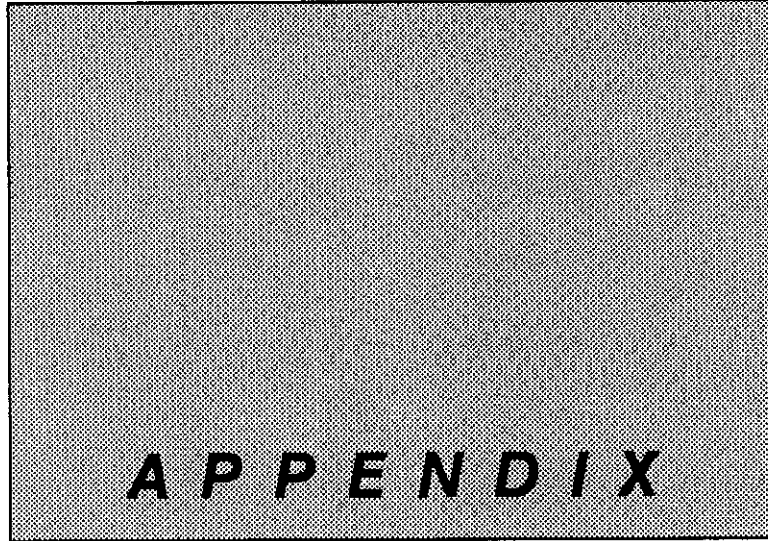
(1) Channel number input			
IS-95 channel	1	to	799
	990	to	1023
1.8 GHz Band	0	to	1300
1.9 GHz Band	1	to	1199
Japan	1	to	799
	801	to	1039
	1041	to	1199
China	0	to	1000
	1329	to	2047

Channel offset can be set.

- (2) Level Offset available.
- (3) Channel Power (integrated 1.2288 MHz)
- (4) Occupied Bandwidth  
 The OBW percentage is variable.  
 Template display. (after calculate power, then draw template)  
 Standard template, User template available.  
 PASS/FAIL function.
- (5) Spurious Emissions (in Band)
  - ① Forward Link  
 Template display. (after calculate power, then draw template)  
 Standard template, User template available.  
 PASS/FAIL function.
  - ② Reverse Link Absolute Mode  
 Template display.  
 Standard template, User template available.  
 PASS/FAIL function.
  - ③ Reverse Link relative Mode  
 Template display. (after calculate power, then draw template)  
 Standard template, User template available.  
 PASS/FAIL function.
- (6) Waveform Quality.
  - ① Forward link
    - $\rho < \pm 0.0015$
    - $\tau < \pm 300\text{nsec}$
    - Carrier Frequency Error  $< \pm (10\text{Hz} + \text{Carrier Frequency} \times \text{Reference Frequency accuracy})$
    - Constellation, I-eye, Q-eye, Magnitude Error-chip, Phase Error-chip, E.V.M-Chip Graph Available

- ② Reverse link
  - $\rho < \pm 0.003$
  - $\tau < \pm 300\text{nsec}$
  - Carrier Frequency Error  $< \pm (10\text{Hz} + \text{Carrier Frequency X Reference Frequency accuracy})$
  - Constellation, I-eye, Q-eye, Magnitude Error-chip, Phase Error-chip, E.V.M-Chip Graph Available
  
- (7) Code Domain Power
  - When measure "Base Station Test Model" of IS97,
  - Precise Mode (Measure at 64\*20 chip)
    - $\rho < \pm 0.001$
    - Power  $< \pm 0.1\text{dB}$  (at  $\tau_i = 0$ )
    - $\tau < \pm 300\text{nsec}$
    - Carrier Frequency Error  $< \pm (10\text{Hz} + \text{Carrier Frequency X Reference Frequency accuracy})$
    - $\tau_i < \pm 10\text{nsec}$
    - $\Delta\theta_i < \pm 0.57\text{degree}$
  - Normal Mode (Measure at 64\*20 chip)
    - $\rho < \pm 0.001$
    - Power  $< \pm 0.1\text{dB}$
    - $\tau < \pm 300\text{nsec}$
    - Carrier Frequency Error  $< \pm (10\text{Hz} + \text{Carrier Frequency X Reference Frequency accuracy})$
  
- (8) Gated Output Power
  - (2msec Sweep, 3MHz RBW, 0 Span)
  - Template display. (after calculate power, then draw template)
  - Standard template, User template available.
  - PASS/FAIL function.
  
- (9) On/Off ration
  - (5msec Sweep 3MHz RBW, 0 Span)
  
- (10) Burst Env Spectrum
  - Time Zoom function.
  - Gated Sweep setting Function.
  - Pretrigger, Trigger delay available.
  
- (11) Tx Power Measurement (calculation by the DSP)
  - (After automatic calibration)
  - Measurement accuracy:  $\pm 0.8\text{dB}$  (15°C to 35°C)
  - $\pm 1.0\text{dB}$  (0°C to 50°C)
  
- (12) 21.4MHz IF Output
  - When opt61 is added, this output can not be used.





**A P P E N D I X**

In this appendix, you will find menu lists and list of messages.

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**CONTENTS**

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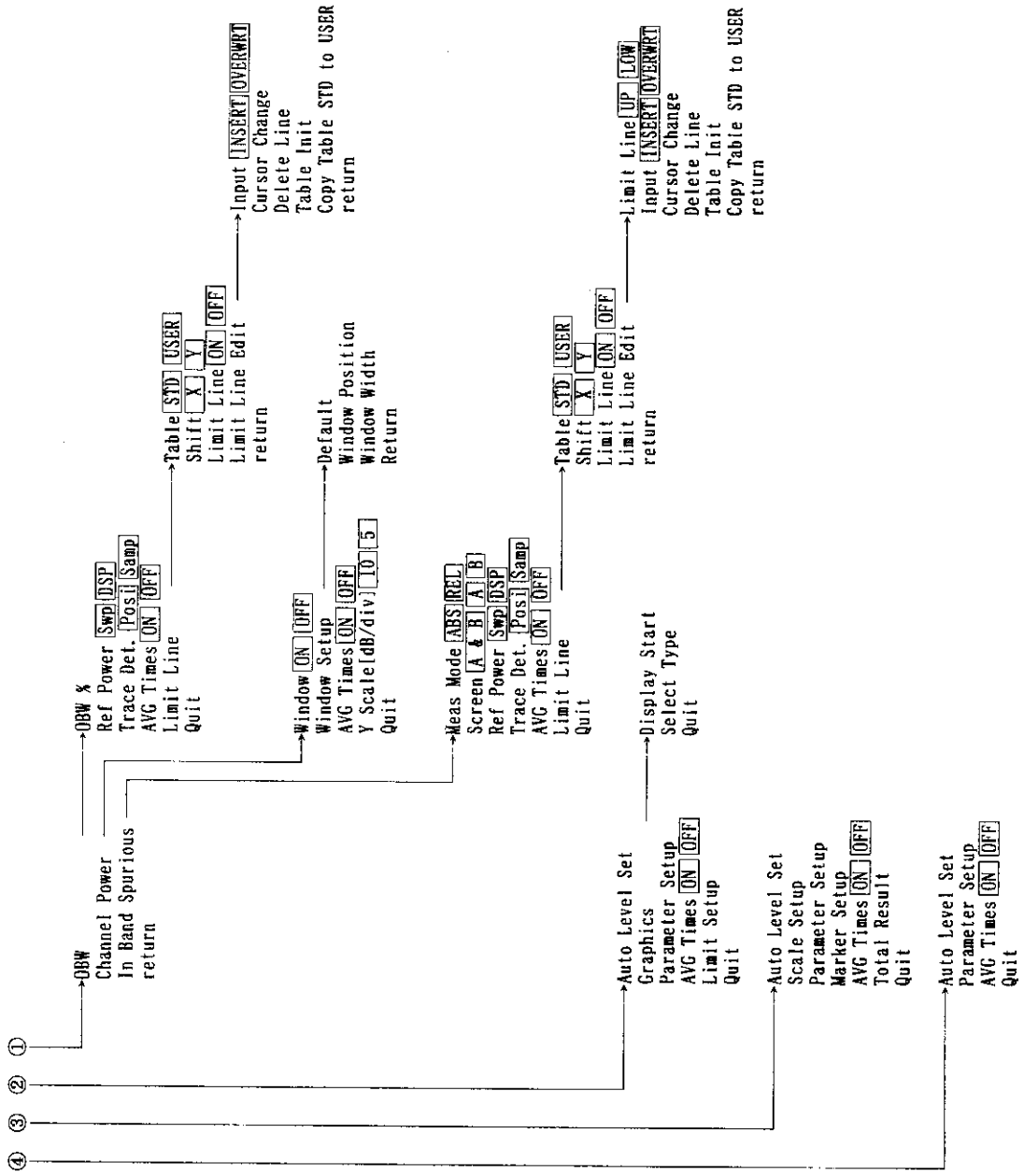
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# 1. Menu Lists







## 2. List of Messages

Message	Explanation	Error No.
Sound demodulation is working. Please turn off the Sound mode. [CW 1/2]	Sound demodulation is working.	1
Span is set 0 Hz. Please change a span.	It is set in Zero span.	5
Power Measure is working. Please turn off each item. [CW->Power Meas]	Power Measure is working.	9
Signal Track is working. Please turn off Signal Track. [Marker 1/3]	Signal Track is working.	10
Noise/Hz is working. Please quit the Noise/Hz. [CW 2/2]	Noise/Hz is working.	11
Only dBm and dBuV is useful while Noise/Hz is been working.	It is not possible to select because Noise/Hz is been working.	12
Counter is working. Please turn off the Counter. [CW 1/2]	Counter is working.	13
$\Delta$ MKR is not active. Please activate the $\Delta$ MKR. [Marker 1/3]	The delta marker is not active.	14
Not available in Multi Screen. Please reset Multi Screen mode. [Window 1/1]	It is not possible to execute in Multi Screen mode.	17
View or Blank trace is selected. Please select Write mode. [Format->Trace A]	It is not possible to execute in View/Blank.	18
Trigger source is not Video. Please select Video trigger. [Sweep->Trigger Source]	Trigger source is not Video.	19

Message	Explanation	Error No.
MKR is not on Trace A. Please execute Trace MKR Move. [Marker 3/3]	The marker is not on Trace A.	20
Calculated power is out of range.	The calculated power is out of range.	25
Edit table is opened. Please return to execute menu.	It is not possible to execute in the Edit mode.	26
Frequency table is empty. Please edit a table and execute.	There are no table data.	27
Calibration signal was not detected. Please check CAL OUT signal.	There is no CAL signal connected.	28
Trace Average is working. Please turn Average off. [Format-> Trace A]	Trace average is working.	39
Trace Point is set to 501. Please change mode to 1001. [SYS 1/1]	Trace 501 Point mode is set.	41
Not available while Zooming.	It is not possible to execute while Zooming.	42
No trace data. Please start a measure.	Trace data is not displayed. Start the measurement.	43
Attenuator is MANUAL mode. Please select AUTO mode.	Attenuator is set to the MANUAL mode. Change the mode to Auto, then execute the measurement.	44
Cannot execute function. Because Link is FORWARD Link. Please check STD menu.	FOREWAERD Link is selected, therefore, the function cannot be carried out. Select REVERSE Link in the STD setup menu.	50
Cannot execute function. Because Link is REVERSE Link. Please check STD menu.	REVERSE Link is selected, therefore, the function cannot be carried out. Select FOREWAERD Link in the STD setup menu.	51
Now, Sweeping. Please stop the sweep.	The function cannot be carried out during sweep. Carried out the sweep after stop.	52

## 2. List of Messages

Message	Explanation	Error No.
Meas mode is RELATIVE. Please select ABSOLUTE mode.	When RELATIVE mode is selected of the measurement mode, the function cannot be carried out. Select ABSOLUTE mode.	53
Center freq. is out of band. Please change center frequency into band.	Carrier frequency is out of the band in the CDMA standard. Set up into the band again.	55
Cannot execute function. Because PN Offset Search is ON.	PN Offset Search Mode in the parameter setup is selected to turn ON, therefore, the function cannot be carried out.	56
Cannot execute function. Because Meas Mode is Precise or PN Offset Search Mode is ON.	Precise mode of the measurement mode in the parameter setup or PN Offset Search Mode is selected to turn ON, therefore, the function cannot be carried out.	57
No margin for filtering.	There's no margin for filtering in trigger position.	200
Trigger occurs in a slot.	Trigger is in a slot.	204
Multiple TSC was detected.	Plural Training sequence code were detected.	220
Printer is not ready. Please check a printer setting.	It is not possible to print. Please check the printer setting.	300*
Printer cable problem. Please check a cable or connection.	The printer cable is defective. Please check the cable or connection.	301*
Printer is not active.	The printer is not active.	302*
Plotter cable problem or plotter is not active.	The plotter cable is defective or the plotter does not operate.	303*
INPUT ATT: Calibration failure.	It is a failure of the Calibration.	400
IF STEP AMP: Calibration failure.	It is a failure of the Calibration.	401
LOG LINEARITY: Calibration failure.	It is a failure of the Calibration.	402

Message	Explanation	Error No.
TOTAL GAIN: Calibration failure.	It is a failure of the Calibration.	403
RBW SWITCHING: Calibration failure.	It is a failure of the Calibration.	404
AMPTD MAG: Calibration failure.	It is a failure of the Calibration.	405
Calibration data is not enough. Please execute CAL ALL.	It is not possible to execute because source calibration data is missing.	406
HS ADC: Calibration failure.	It is a failure of the Calibration.	407
MOD DSP: Calibration failure.	It is a failure of the Calibration.	408
NORMAL ADC: Calibration failure.	It is a failure of the Calibration.	409
Illegal parameters.	The specified parameters are illegal.	600
Illegal file or device name.	The file or device name is illegal.	601
Software version unmatched.	Software version is unmatched.	602
Cannot format a device.	The memory card cannot be initialized.	603
Cannot rename a file in RAM disk.	The file name in RAM disk cannot be changed.	604
Broken saved block data.	The saved data is lost.	605
Device already exists.	The device already has been selected.	606
Device not found.	There are no devices.	607
Device not ready.	The device cannot be referred.	608
Directory not found.	There are no directories.	609
File already exists.	The file already exists.	610
File not found.	There are no files.	611
Invalid BPB. Please format a card.	BPB is invalid. The card needs to be initialized.	612

2. List of Messages

Message	Explanation	Error No.
Cannot delete a file. (read-only file)	It is not possible to delete because it is a read-only file.	613
No disk space.	Card/Disk capacity is full.	614
Read-only file.	It is the read-only file.	615
Read-only media.	It is the read-only media.	616
Read-only volume.	The card is in the write protection.	617
Invalid boot sector signature.	The boot sector signature cannot be recognized.	618
CRC error.	CRC error occurred.	619
Any trouble in DSP or AD module.	DSP or AD module has some trouble.	620
Broken Freq-Correction data. Please report to qualified service person.	An error of the frequency characteristic correction data occurred.	621*
Handshake error occurred to TBC. Please report to qualified service person.	A handshake error occurred.	622*
Handshake error occurred to DSP. Please report to qualified service person.	A handshake error occurred.	623*
Cannot detect Mod. DSP board. Please report to qualified service person.	Connection error has occurred.	624*
File or register empty.	It is impossible to recall a file or a register that is empty.	634
Communication system unmatched.	The communication system is improper.	635
Time Out ! No Trigger detected.	Trigger is not detected.	700
System Error. Cannot allocate memory.	Cannot allocate memory space.	701
Input level is out of range. Please check Reference level.	Input level is out of allowable range.	702

Message	Explanation	Error No.
Burst signal is not detected. Please check Burst length.	Burst signal cannot be detected.	703
Cannot demodulate.	Cannot demodulate.	704
Trigger timing is not proper.	Trigger timing is not proper.	707
Signal Type is set to CONTINUOUS. Please set BURST in STD menu.	Continuous wave was detected.	709
No graph data. Please execute measure.	The graphic data is not existed, therefore, carried out the measurement.	712
Cannot execute measure. Because $\rho$ is too low.	The $\rho$ value is too small, therefore, the measurement cannot be carried out.	713
System error ! System clock does not work.	System error occurred. System clock stopped.	714
Cannot measure low crestfactor signal. Please 7dB up Reference Level.	No sine wave can be measured in Tx Power measurement. Increase the reference level by 7dB before measurement.	715
Cannot converge equation. Please adjust threshold.	Threshold setup for the Code Domain Power measurements (in the Precise mode) is not set properly. Set the threshold so that it is greater than the noise level.	722
Auto Level completed !	Auto level completed.	801*
Auto Level failed !	Auto level failed.	802*

**NOTE**

*It is possible to read error numbers by using the GPIB query, "ERRNO?", but impossible to read codes marked by (\*).*





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