ADVANTEST®

ADVANTEST CORPORATION

R3562

Receiver Test Source

Operation Manual

MANUAL NUMBER FOE-8370662D00

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Safety Summary

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

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

- **Warning Labels**

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

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

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

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

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

- **Basic Precautions**

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

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

product.

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

- **Caution Symbols Used Within this Manual**

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

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

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

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

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

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

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

Main Parts with Limited Life

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

- **Hard Disk Mounted Products**

The operational warnings are listed below.

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

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

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

- **Precautions when Disposing of this Instrument**

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

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

Example: fluorescent tubes, batteries

Environmental Conditions

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

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

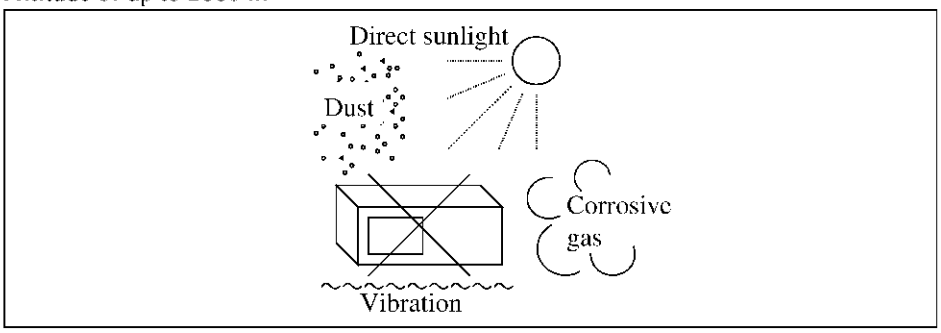


Figure-1 Environmental Conditions

- Operating position

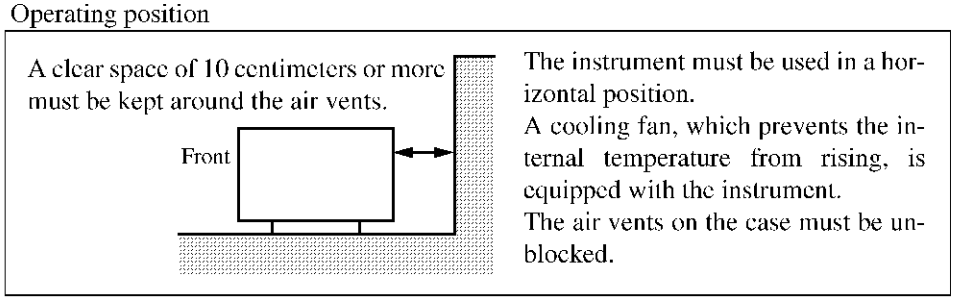


Figure-2 Operating Position

- Storage position

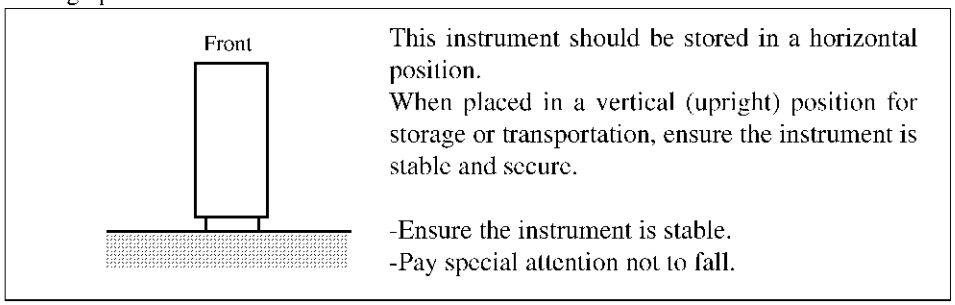


Figure-3 Storage Position

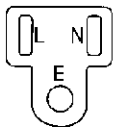
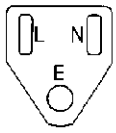
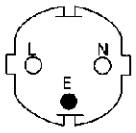
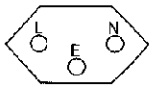
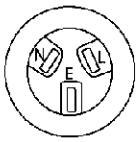
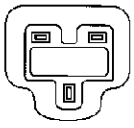
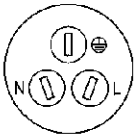
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

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

  Pollution Degree 2

Types of Power Cable

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

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

Certificate of Conformity

CE

This is to certify, that

CDMA Test Source/Receiver Test Source

R3561/R3562

instrument, type, designation

complies with the provisions of the EMC Directive 89/336/EEC in accordance with EN61326 and Low Voltage Directive 73/23/EEC in accordance with EN61010.

ADVANTEST Corp.

Tokyo, Japan

ROHDE&SCHWARZ

Engineering and Sales GmbH
Munich, Germany

3561.3562.00

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1 INTRODUCTION

This chapter provides the following information:

- Product description
- A list of standard accessories and power cable options
- Operating environment
- How to verify that the instrument is functioning properly
- About Calibration
- How to clean, store, and transport the instrument

1.1 Product Description

This test source can generate a signal at a chip rate of 3.84 MHZ to evaluate the receiving characteristics of the mobile station communication system in W-CDMA (FDD) mode that are compliant with the third generation partnership project (3GPP).

The main features of this test source are as follows.

- Outputs a reference measurement channel for each rate compliant with the 3GPP standard.
- Outputs signals from the Primary CPICH, Primary SCH, Secondary SCH, P_CCPCH and only one of the DPCH channels.
- Generates signals with TPC information.
- Measures the receiving sensitivity using built-in bit error counters.

Combining this instrument with the R3267 or R3273 series spectrum analyzer (with Option 62 installed) makes it possible to perform an integrated transmission and reception test.

NOTE: ***To manually operate this instrument on an operator panel, use this instrument together with the R3267 or R3273 series spectrum analyzer (with Option 08 installed).***

1.2 Accessories

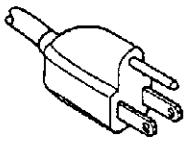
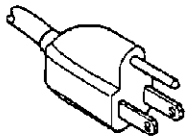
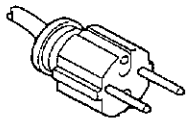
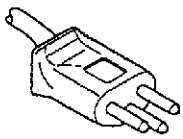
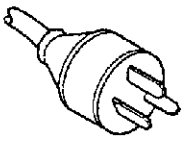
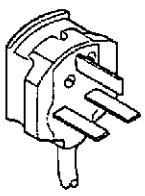
Table 1-1 lists the standard accessories shipped with the instrument. If any of the accessories are damaged or missing, contact a sales representative. Order new accessories by type name.

Table 1-1 Standard Accessories List

Name of accessory	Type name	Quantity	Remarks
Power cable	A01413	1	*1
Input cable	A01037-1500	1	
N-BNC through connector	JUG-201A/U	1	
Power fuse	T6.3A/250V	1	
R3562 Operation manual	ER3562	1	English

* 1: Depends on the type specified when purchasing the instrument.
There are 11 types of power cables available (see Table 1-2).
You can order power cables by model number or by option number.

Table 1-2 Power Cable Options

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	JIS: Japan Law on Electrical Appliances	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

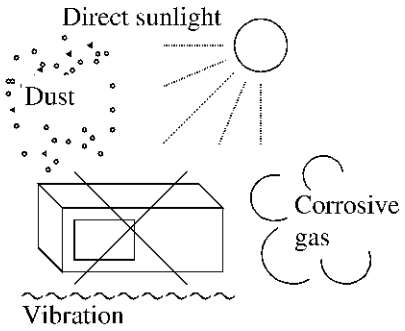
1.3 Operating Environment

This section describes the environmental conditions and power requirements necessary to use the instrument.

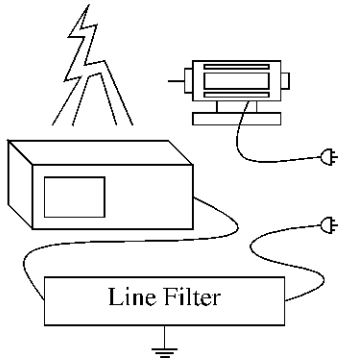
1.3.1 Environmental Conditions

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

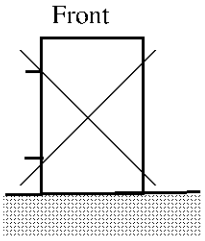
- Ambient temperature: 0°C to +50°C (operating temperature)
- Relative humidity: 85% or less (without condensation)
- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- A low noise area
  Although the instrument has been designed to withstand a certain amount of noise riding on the AC power line, it should be used in an area of low noise. Use a noise cut filter when ambient noise is unavoidable.
- An area allowing unobstructed air flow
  There is an exhaust cooling fan on the rear panel and exhaust vents on both sides and the bottom (toward the front) of the instrument. Never block the fan and these vents.
  Keep the rear panel 10 centimeters away from the wall. In addition, do not install the instrument upright with the rear panel down. The resulting internal temperature rise will affect measurement accuracy.



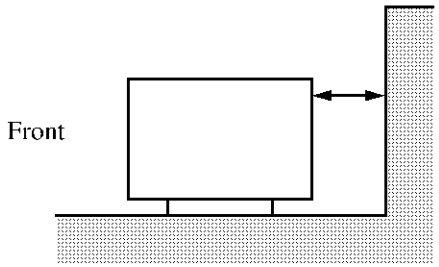
- Avoid operation in the following areas.



- Use a noise cut filter when there is a large amount of noise riding on the power line.



- Do not install the instrument upright with the rear panel down.



- Keep the rear panel 10 centimeters away from the wall

Figure 1-1 Operating Environment

The R3562 can be used safely under the following conditions:

- Altitude of up to 2000 m
- Installation Categories II
- Pollution Degree 2

1.3.2 Power Requirements

The power supply specifications of the instrument are listed in Table 1-3.

Table 1-3 Power Supply Specifications

	100 VAC Operation	200 VAC Operation	Remarks
Input voltage range	90 V to 132 V	198 V to 250 V	Automatically switches between input levels of 100 VAC and 200 VAC.
Frequency range	48Hz to 66Hz		
Power consumption	300 VA or below		

CAUTION: ***To prevent damage, operate the instrument within the specified input voltage and frequency ranges.***

1.3.3 Power Fuse

CAUTION:

1. ***When a fuse blows, there may be some problem with the instrument. Contact a sales representative before replacing the fuse.***
2. ***For fire prevention, use only fuses with the same rating and same type.***

CAUTION: ***Before replacing the power supply fuse, be sure to turn the power supply switch off and disconnect the power cable from the outlet.***

The power fuse is placed in the fuse holder which is mounted on the rear panel. A spare fuse is located in the fuse holder.
To check or replace the power fuse, use the following procedure:

1. Press the **POWER** switch (on the front panel) to the OFF position.
2. Press the **MAIN POWER** switch (on the rear panel) to the OFF position.
3. Disconnect the power cable from the AC power outlet.
4. Turn the fuse holder cap on the rear panel counterclockwise approximately 90° using a slotted head screwdriver to remove the fuse.
5. Check (and replace if necessary) the power fuse and put it back in the fuse holder.

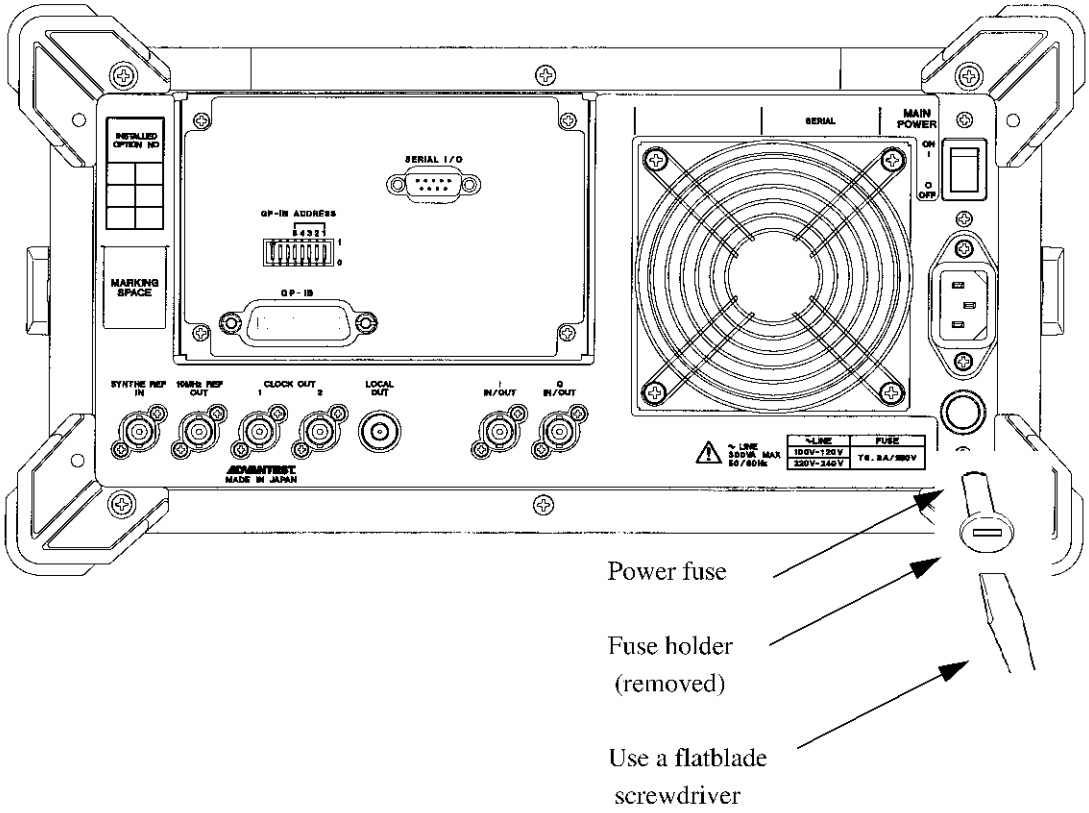


Figure 1-2 Replacing the Power Fuse

1.3.4 Power Cable

CAUTION:

1. ***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 (See Table 1-2).***
2. ***Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. Grounding will be defeated if you use an extension cord which dose not include a safety ground terminal.***
3. ***Turn the MAIN POWER switch (on the rear panel) and the POWER switch (on the front panel) off prior to connecting the power cable.***

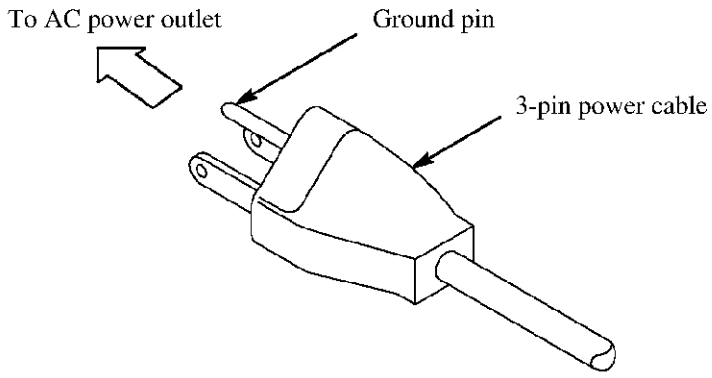


Figure 1-3 Power Cable

1.4 System Checkout

This section describes the Selftest which must be performed when operating the instrument for the first time. Follow the procedure below:

Connecting the instrument to the AC power source

1. Check to see that the **POWER** switch (on the front panel) and the **MAIN POWER** switch (on the rear panel) are turned off.

2. Connect the power cable provided to the AC power supply connector on the rear panel.

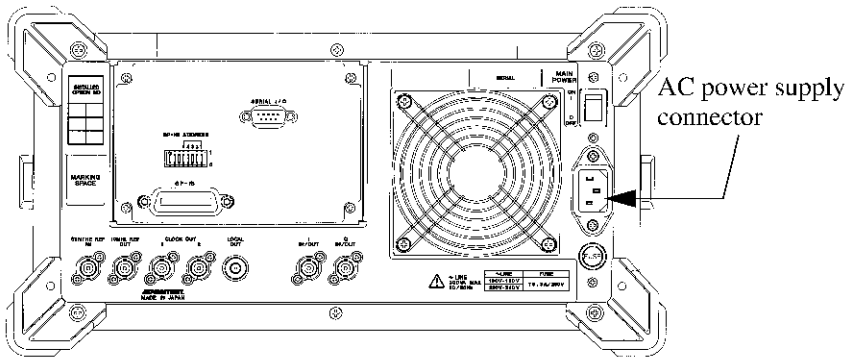


Figure 1-4 Connecting the Power Supply Cable

3. Connect the power cable to the outlet.

CAUTION: ***To prevent damage, operate the instrument within specified input voltage and frequency ranges.***

Turning the power supply on and performing the self-test

4. Turn on the **MAIN POWER** switch (on the rear panel).

5. Turn on the **POWER** switch (on the front panel).

   The power supply can be turned on only after both the **POWER** and **MAIN POWER** switches are turned on.
   The self-test is performed and all indicators on the front panel are lit.
   Upon completion of the self-test, an alarm sounds and all indicators, except POWER, REMOTE, and RF OUT go out.

   In addition, the fan starts rotating and the POWER indicator on the **POWER** switch is lit.

NOTE: The power supply can be turned on only after both the POWER and MAIN POWER switches are turned on.

CAUTION:

1. *If an error is detected during the self-test, an sounds and all indicators remain lit (refer to Section 3.7 (3), "Self-Test").*
2. *When the self-test is complete, the instrument enters into a normal operating state, but the SYNTHE UNLOCK indicator flashes or lights up depending on the conditions set for the instrument. If this occurs, make sure the set conditions are correct (refer to Section 3.8 (1), "SYNTHE REF IN").*

CAUTION: If the fan stops rotating while the instrument is operating, for any reason, an alarm sounds, indicating that the fan has stopped. When the alarm sounds, turn both the POWER and MAIN POWER switches off and disconnect the power cable from the outlet. If the instrument is used while the fan is stopped, the performance of the instrument cannot be guaranteed.

1.5 About Calibration

When you want to calibrate the R3562, please contact a sales representative.

Desirable Period	One year

1.6 Cleaning, Storing and Transporting the Instrument

1.6.1 Cleaning

Remove dust from the outside of the instrument by wiping or brushing the surface with a soft cloth or small brush. Use a brush to remove dust from around the panel keys. Hardened dirt can be removed by using a cloth which has been dampened in water containing a mild detergent.

CAUTION:

1. ***Do not allow water to get inside the instrument.***
2. ***Do not use organic cleaning solvents, such as benzene, toluene, xylene, acetone or similar compounds, since these solvents may damage the plastic parts.***
3. ***Do not use abrasive cleaners.***

1.6.2 Storing

Store the instrument in an area which has a temperature from -20°C to +60°C. If you plan to store the instrument for a long period (more than 90 days), put the instrument in a vapor-barrier bag with a drying agent and store the instrument in a dust-free location out of direct sunlight.

1.6.3 Transporting

When you ship the instrument, use the original container and packing material. If the original packaging is not available, use the following repackaging guidelines:

1. To allow for cushioning, use a corrugated cardboard container that is at least 15 centimeters larger than those of the instrument.
2. Surround the instrument with protective sheeting.
3. Cushion the instrument on all sides with packing material.
4. Seal the corrugated cardboard container with shipping tape or an industrial stapler.

If you are shipping the instrument to a sales representative for service or repair, attach a tag to the instrument that shows the following information:

- Owner and address
- Name of a contact person at your location
- Serial number of the instrument (located on the rear panel)
- Description of the service requested

1.7 Precautions When Using the Instrument

1.7.1 When abnormal conditions occur

If you perceive anything unusual like smoke, smell or noise, turn the power supply switch off, disconnect the power cable from the outlet, and contact an ADVANTEST representative.

ADVANTEST addresses and telephone numbers are listed at the end of this manual.

1.7.2 Warm-up

After the temperature of the instrument has become room temperature and you have warmed up the instrument for 60 minutes, turn the power supply switch on.

1.7.3 Frequency reference

The following warm-up times are necessary for the internal reference oscillator.

Table 1-4 Characteristics of the Internal Reference Crystal Oscillator

Frequency start-up characteristic	$\pm 3 \times 10^{-7}$ or less (2 minutes after the power supply is turned on at 25°C)
Aging rate	3×10^{-8}/days or less (Based on an operation of 24 hours)

1.7.4 Set conditions when the power supply is turned on

When the power supply is turned on, the conditions set the last time the instrument was turned off, are restored.

2 PANEL DESCRIPTION

This chapter describes every part of the front and rear panels.

2.1 Front Panel

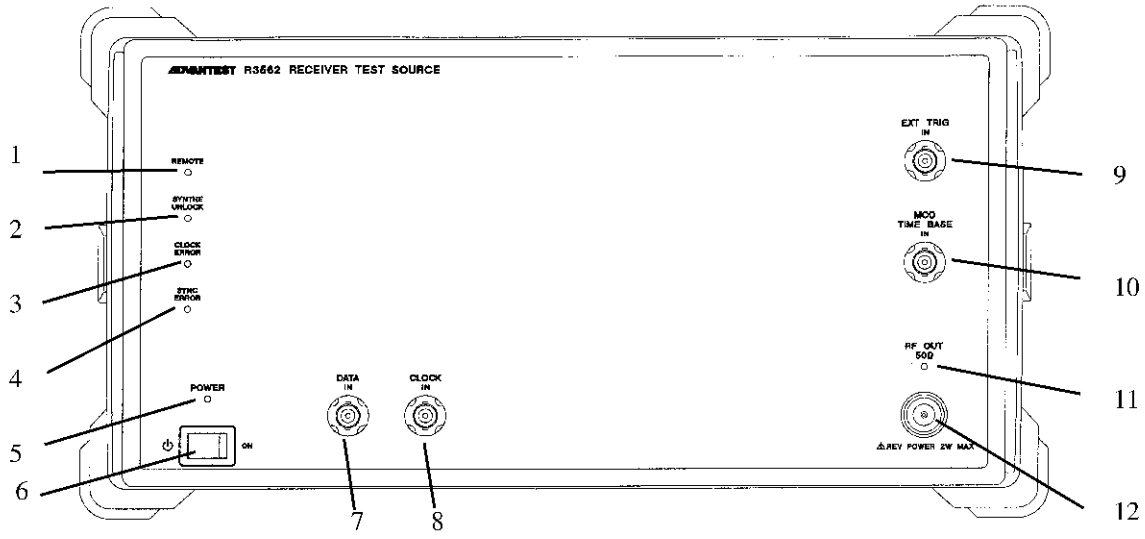


Figure 2-1 Front Panel

1. REMOTE indicator	Displays the GPIB control status. During normal operation: it is lit. If an abnormal command is detected, it goes out.
2. SYNTHE UNLOCK indicator	Lights up when the internal synthesizer goes out of sync.
3. CLOCK ERROR indicator	Lights up when the normal input CLOCK is not detected.
4. SYNC ERROR indicator	Lights up when the input DATA is abnormal (outside the measurement range and other errors) and synchronization cannot be obtained.
5. POWER indicator	Lights up after the power is turned on.
6. POWER switch	Switches the power supply between ON and STANDBY.
7. DATA IN connector	Inputs the DATA signal to the bit error rate measurement section.
8. CLOCK IN connector	Inputs the CLOCK signal to the bit error rate measurement section.
9. EXT TRIG connector	Input connector for external synchronization signals such as a the reset signal for system frame numbers

10. MODE TIME BASE IN connector	Input connector for the time base used for modulation reference synchronization
11. RF OUT indicator	Lights up when the RF signal is output.
12. RF OUT connector	Output connector for the RF signal

2.2 Rear Panel

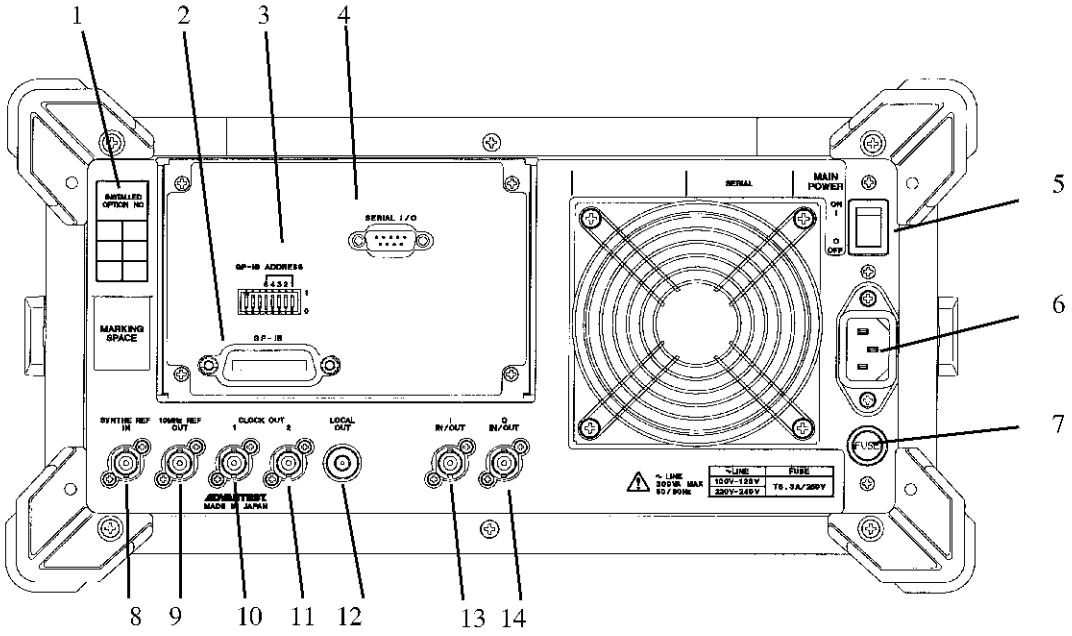


Figure 2-2 Rear Panel

1. Option label	Installed options are listed.
2. GPIB connector	Used to connect the instrument to the external controller using the GPIB cable.
3. GPIB address switches	Used to set the GPIB address. The address is set using the lowest five bits.
4. SERIAL I/O connector	Used to connect the interface cable to control the instrument from the ADVANTEST R3267 or R3273 spectrum analyzer.
5. MAIN POWER switch	Used to turn the primary power supply on or off.
6. AC power supply connector	A three-pin connector with the center pin connected to the ground connector.
7. FUSE holder	Holds the power supply fuse.

8. SYNTHE REF IN connector	Input connector for the reference signal to the RF frequency synthesizer.
9. 10 MHz REF OUT connector	Output connector for the 10 MHz signal synchronized with SYNTHE REF.
10. CLOCK OUT 1 connector	Output connector for the internal modulation clock, timing signal, etc.
11. CLOCK OUT 2 connector	Output connector for the internal modulation clock, timing signal, etc.
12. LOCAL OUT connector	Output connector for the internal local signal
13. I IN/OUT connector	Terminal for the external I signal input and the internal I signal output.
14. Q IN/OUT connector	Terminal for the external Q signal input and the internal Q signal output.

3 FUNCTIONAL DESCRIPTION

This chapter describes the functions that can be set to the instrument.

Table 3-1 shows a list of items to be set.

Table 3-1 List of items to be set

Section	Item	Related GPIB Command	Reference
System	Preset	IP	3.1
	SRQ signal control	SRQ	
	Status byte clearing	CSB	
	Status byte output	*STB	
	Status byte enabling	*SRE	
	Terminator specification	DEL	
Output Frequency	Output frequency	FR	3.2
	Output channel	CH	
	Start frequency	CSF	
	Channel spacing	CSP	
	Channel start number	CSN	
Output Level	Output ON/OFF	OUT	3.3
	Output level	AP	
	Query data unit	UNL	
	Output level upper limit	OLM	
	Output level offset ON/OFF	OOF	
	Output level offset value	OOS	
	ALC mode	ALCM	

Section		Item	Related GPIB Command	Reference
Modulation (General)		Modulation ON/OFF	MOD	3.4
		I/Q connector direction	IQDIR	3.4.1
		LINK	LINK	
(Up-Link, DPDCH)		Channel configuration	UPDPDCH:CCONF	3.4.2.1
		DPDCH data pattern setting (Physical Channel data)	UPDPDCH:DATA	
	(DTCH)	Data	UPDTCH:DATA	
		FEC ON/OFF	UPDTCH:FEC	
		CRC setting	UPDTCH:CRC	
	(DCCH)	Data	UPDCCH:DATA	
		FEC ON/OFF	UPDCCH:FEC	
		CRC setting	UPDCCH:CRC	
(Up-Link, DPCCH)		Slot formats	UPDPCCH:PFORM	3.4.2.2
		TFCI code word	UPDPCCH:TFCI	
		FBI bit pattern	UPDPCCH:FBI	
		TPC slot length in Repeat mode	UPDPCCH:TPCR	
		TPC Insert slot length in Insert mode	TPCI	
(Up-Link, Spreading)		Scrambling code	UPSCODE	3.4.2.3
(Up-Link, Gain Parameter)		DPCCH gain parameter code relative to the DPDCH	UPDPCCH:GAINC	
		DPDCH gain parameter code relative to the DPCCH	UPDPDCH:GAINC	
		DPCCH to DPDCH power ratio	UPDPCCH:GAINP	
		DPDCH to DPCCH power ratio	UPDPDCH:GAINP	
(Down-Link, DPCH)		Channel configuration	DNDPCH:CCONF	3.4.3.3

Section		Item	Related GPIB Command	Reference
(Down-Link, DPDCH)		DPDCH data pattern setting (Physical Channel data)	DNDPDCH:DATA	3.4.3.4
	(DTCH)	Data	DNDTCH:DATA	
		FEC ON/OFF	DNDTCH:FEC	
		CRC setting	DNDTCH:CRC	
	(DCCH)	Data	DNDCCH:DATA	
		FEC ON/OFF	DNDCCH:FEC	
		CRC setting	DNDCCH:CRC	
(Down-Link, DPCCH)		TFCI code word	DNDPCCH:TFCI	3.4.3.5
		TPC slot length in Repeat mode	DNDPCCH:TPCR	
		TPC Insert slot length in Insert mode	TPCI	
(Down-Link, Spreading)		DPCH Channelization code	DNDPCH:CCODE	3.4.3.6
		Scrambling code	DNSCODE	
(Down-Link, Gain Parameter)		CPICH power ratio	DNCPICH:GAINP	
		P-CCPCH (SCH) power ratio	DNPCCPCH:GAINP	
		DPCH power ratio	DNDPCH:GAINP	
IQ input/ output	(Input)	I gain adjustment	LBAI	3.5
		Q gain adjustment	LBAQ	
		IQ phase adjustment	PHA	
	(Output)	I gain adjustment	LOAI	
		Q gain adjustment	LOAQ	
BER counter		BER measurement	BER	3.6
		Measurement stop	STOP	
		Measurement data pattern	BMDAT	
		Measurement bit length	BLEN	
		Clock polarity	BCLK	
		Data polarity	BDAT	

Section	Item	Related GPIB Command	Reference
Calibration/Self-Test	Modulator calibration	CMOD	3.7
	Modulator calibration ON/OFF	CMC	
	Self-test	*TST	
Clock & Timing Signal	SYNTHE REF input	RSYN	3.8
	10 MHz reference source adjustment	SRAD	
	MOD TIME BASE input	MODTB	
	Timing synchronization command	ETRG	
	External trigger signal polarity	ETRGPOL	
	Trigger offset	ETRGOFFSET	
	CLOCK 1 output	REAROUT 1	
	CLOCK 2 output	REAROUT 2	
Saving/Recalling	Saving	SAVC	3.9
	Recalling	RECC	

3.1 System Section

This section describes how to set or select each function related to the instrument system. An explanation for each function is given below.

(1) Preset

Initializes the settings of the instrument. After initialization, each section is set as shown in Table 3-2.

NOTE: ***The preset function only initializes the sections shown in Table 3-2.***

Related GBIP command IP

Table 3-2 Set Values When Presetting

Section	Item to be set	Set Value
Output Frequency	Output frequency	2110 MHz
	Output channel	1
	Start frequency	2110 MHz
	Channel spacing	5 MHz
	Channel start number	1
Output Level	Output ON/OFF	ON
	Output level	-80 dBm
	Query data unit	dBm
	Output level upper limit	0.0 dBm
	Output level offset ON/OFF	OFF
	Output level offset value	0.0 dBm
	ALC mode	S&H (Sample and Hold)

Section		Item to be set	Set Value
Modulation (General)		Modulation ON/OFF	ON
		I/Q connector direction	OFF
		LINK	Down Link
(Up-Link, DPDCH)		Channel configuration	Information data mode Slot Format No. = 2 (see Table 3-7)
		DPDCH data pattern (Physical Channel data)	PN9
	(DTCH)	Data	PN9
		FEC ON/OFF	ON
		CRC ON/OFF	NORMAL
	(DCCH)	Data	PN9
		FEC ON/OFF	ON
		CRC setting	NORMAL
(Up-Link, DPCCH)		Slot formats	Slot Format No. = 0 (see Table 3-8)
		TFCI code word	0 [in hexadecimal]
		FBI bit pattern	0 [in hexadecimal]
		TPC slot length in Repeat mode	1
(Up-Link, Spreading)		Scrambling code	0
(Up-Link, Gain Parameter)		DPCCH gain parameter code relative to the DPDCH	15
		DPDCH gain parameter code relative to the DPCCH	15
(Up-Link, Gain Parameter)		DPCCH to DPDCH power ratio	0 dB
		DPDCH to DPCCH power ratio	0 dB
(Down-Link, DPCH)		Channel configuration	Information data mode Slot Format No. = 11 (see Table 3-13)

Section		Item to be set	Set Value
(Down-Link, DPDCH)		DPDCH data pattern (Physical Channel data)	PN9
	(DTCH)	Data	PN9
		FEC ON/OFF	ON
		CRC ON/OFF	NORMAL
	(DCCH)	Data	PN9
		FEC ON/OFF	ON
		CRC setting	NORMAL
(Down-Link, DPCCH)		TFCI code word	0 [in hexadecimal]
		TPC slot length in Repeat mode	1
(Down-Link, Spreading)		DPCH Channelization code	2
		Scrambling code	0
(Down-Link, Gain Parameter)		CPICH power ratio	0.0 dB
		P-CCPCH (SCH) power ratio	0.0 dB
		DPCH power ratio	0.0 dB
IQ input/ output	(Input)	IQ signal input gain	2000
		IQ phase adjustment	2000
	(output)	IQ signal output gain	0
BER counter		Measurement data pattern	PN9
		Measurement bit length	10000
		Clock polarity	POS
		Data polarity	POS

Section	Item to be set	Set Value
Clock & Timing Signal	SYNTHE REF input	Internal (Internal reference oscillator)
	MOD TIME BASE input	Internal (Internal reference oscillator)
	External trigger signal polarity	POS
	Trigger offset	20
	CLOCK 1 output	OFF
	CLOCK 2 output	OFF

(2) SRQ signal control

Controls the SRQ signal. For more information, refer to Chapter 5, "GPIB."

Related GPIB command SRQ

(3) Status byte clearing

Resets the status byte. For more information, refer to Chapter 5, "GPIB."

Related GPIB command CSB

(4) Status byte output

Outputs the status byte. For more information, refer to Chapter 5, "GPIB."

Related GPIB command *STB

(5) Status byte enabling

Enables any bits in the status byte. Set the bits in decimal number, so that they correspond to the value in the status byte.
For example, set 24 to enable bits 4 and 3 in the status byte. This value is initialized to 64 (only bit 6 is enabled) when the power supply is turned on.

Related GPIB command *SRE

NOTE: ***Bit 6 in the status byte is always enabled and cannot be disabled. For more information, refer to Section 5.3.2, "Status Byte."***

---

(6) Measurement status register reading

Reads the contents of the status register during bit error rate measurement.
For more information, refer to Chapter 5, "GPIB."

Related GPIB command MST

(7) Terminator specification

Selects the delimiter. The delimiter is initialized to LF+EOI when the power supply is turned on.

For more information, refer to Chapter 5, "GPIB."

Related GPIB command DEL

(8) System revision reading

Reads the serial number, system revision, and base band revision of the instrument.
For more information, refer to Chapter 5, "GPIB."

Related GPIB command IDN

3.2 Output Frequency Section

This section describes how to set or select the parameters related to the output frequency of this instrument. An explanation for each function is given below.

(1) Output frequency

Sets the output frequency.

Value after the execution of preset: 2110 MHz

Related GPIB command :FR

(2) Output channel

Specifies the output frequency using a channel number. The output frequency for a given channel number is determined by the channel start number, channel spacing, and start frequency. Use the expression shown below to calculate the output frequency.

Value after the execution of preset: 1

Related GPIB command :CH

Output frequency =
Start frequency + Channel spacing × (Channel number - Channel start number)

If a channel number (smaller than a channel start number) is entered, the setting is invalid.

(3) Start frequency

Sets the start frequency.

Value after the execution of preset: 2110 MHz

Related GPIB command :CSF

(4) Channel spacing

Sets the channel spacing.

Value after the execution of preset: 5 MHz

Related GPIB command :CSP

(5) Channel start number

Sets the channel start number. The channel start number will be a start frequency.

Value after the execution of preset: 1

Related GPIB command :CSN

3.3 RF Level Section

This section describes how to set or select each of the functions related to the RF level of the instrument. An explanation for each function is given below.

(1) Output ON/OFF

Selects whether or not to output a signal to the RF OUT connector.
When Output ON/OFF is set to OFF, the output attenuator is set to the maximum attenuation.

Related GPIB command OUT

(2) Output level

Sets the output level.

When Output level offset ON/OFF is set to OFF, the level set by the output level is output to the RF OUT connector. When this is set to ON, the sum of the set output level and the output level offset value is output to the RF OUT connector.
Value after the execution of preset: -80.0 dBm

Related GPIB command AP

NOTE: ***If the output level which is greater than the output level upper limit is specified for the RF OUT connector level, the setting is invalid.***

---

(3) Output level query data unit

Selects either dBm or dBμVemf for the unit of data when reading the output level.

Related GPIB command UNL

(4) Output level upper limit

Limits the output level of the RF OUT connector.
Value after the execution of preset: 0.0 dBm

Related GPIB command OLM

(5) Output level offset ON/OFF

When the output level offset value must be reflected upon the RF OUT connector level, select ON; otherwise, select OFF.
Value after the execution of preset: OFF

Related GPIB command OOF

(6) Output level offset value

Sets the offset level for the output level. The level actually output to the RF OUT connector is expressed by the following formula.
Level output to the RF OUT connector = Output level + Output level offset value

The output level offset value can be set within a range which meets the following condition.
-125.0 dBm≤Output level + Output level offset value≤0.0 dBm
Value after the execution of preset: 0.0 dB

Related GPIB command OOS

(7) ALC mode

Table 3-3 shows a summary of each operation mode.
The optimum operation mode is automatically selected for the currently set conditions. When the operation mode must be changed, perform it in compliance with the criteria. Table 3-4 shows the criteria used when selecting the operation mode under the currently set conditions.

Value after the execution of preset: SH (Sample&Hold)

Related GPIB command ALCM

Table 3-3 Summary of the Operation Modes

Operation Mode	Summary of Operation
AUTO	Normal ALC operation
SH (Sample&Hold)	Samples the ALC voltage used with the reference pattern signal and calibrates the ALC reference voltage during modulation.
HOLD (ALC Hold)	Holds the ALC voltage used with the reference pattern signal.

Table 3-4 Criteria for Selecting Operation Modes

Operation Mode	Selection Criteria
AUTO	• When Modulation ON/OFF is set to OFF • The External IQ terminal direction is set to INPUT or OUTPUT (refer to Section 3.4.1 (2) for the setting).
SH (Sample&Hold)	• When Modulation ON/OFF is set to ON

CAUTION:

1. ***If an optimum operation mode is not selected for the ALC operation mode, the output level at the RF OUT connector may occasionally deviate.***
2. ***When set to Sample&Hold or ALC Hold mode and the output level or frequency is changed, the output level is automatically calibrated again by generating the reference pattern.***

3.4 Modulation Section

This section describes how to set or select each of the functions related to the modulation of the instrument. An explanation for each function is presented below.

3.4.1 General settings

Items to be set for the general modulation are described as follows.

(1) Modulation ON/OFF

Selects the modulated signal or non-modulated signal (CW signal) for the output.
Value after the execution of preset: ON

Related GPIB command :MOD

(2) External IQ connector direction

Selects the direction of the external IQ connectors and the IQ signal connection paths to the internal IQ modulator (see Table 3-5). Figure 3-1 shows each IQ signal path.

Value after the execution of preset: OFF

Related GPIB command :IODIR

Table 3-5 Description of the External IQ Terminal Direction

Selection Item	Description		SW Setting	
	External IQ Terminal	IQ Modulator	SW1	SW2
OFF	-	Inputs the base band signal.	b	a
INPUT	Inputs the external IQ signal.	Inputs the external IQ signal.	b	b
OUTPUT	Outputs the base band IQ signal.	-	a	a

NOTE:When the output mode is selected, the RF OUT Signal is incorrect.

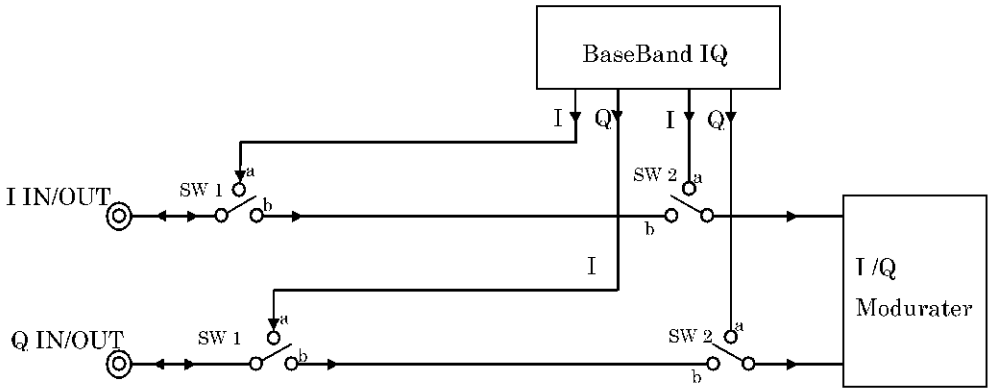


Figure 3-1 IQ Source Signal Paths

WARNING: ***If a level higher than the specified input level is input to the EXTERNAL IQ input connectors, the instrument may be damaged. Be sure to use the instrument within the specified input level.***

---

(3) LINK

Selects Link-Direction of the instrument (see Table 3-6).

Value after the execution of preset: DN

Related GPIB command LINK

Table 3-6 LINK Settings

LINK	Description
DN	Outputs the signal in the direction of BS to UE.
UP	Outputs the signal in the direction of UE to BS.

BS : Base Station
UE : User Equipment

3.4.2 UP LINK Setting

The signals used with UP LINK (UE → BS) are set.
The R3562 can output one of the DPDCH channels (Dedicated Physical Data Channels) and one of the DPCCH channels (Dedicated Physical Control Channels).

3.4.2.1 DPDCH Setting

Figure 3-2 and Table 3-7 show the DPDCH slot configurations available with the R3562.

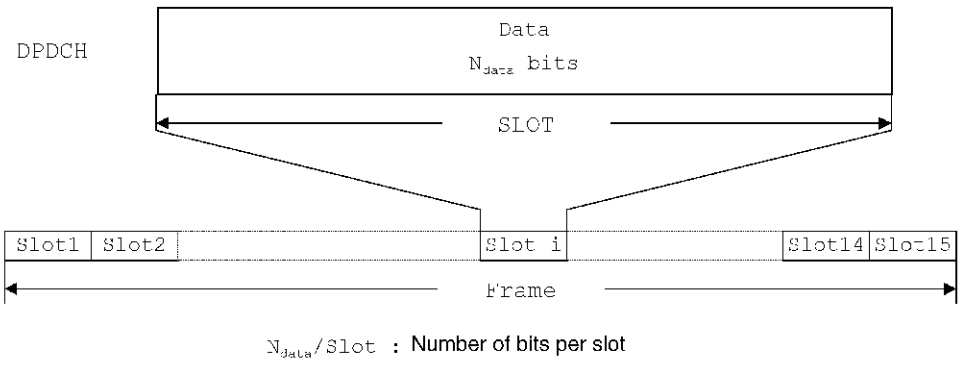


Figure 3-2 DPDCH Slot Configurations Available with the R3562

Table 3-7 DPDCH Slot Configurations Available with the R3562

Slot Format No.	Channel Bit Rate [kbps]	Channel Symbol Rate [ksps]	N_{data} /Slot	Transmitted slots /radio frame
1	30	30	20	15
2	60	60	40	15
3	120	120	80	15
4	240	240	160	15
5	480	480	320	15
6	960	960	640	15

(1) DPDCH channel configuration setting

The channel configuration for the DPDCH can be set using data modes and slot format numbers (listed in Table 3-7).

There are two data modes: Information data mode and Physical data mode.
Information data mode generates data after coding or the interleaving process has been performed on Information data from the DTCH (Dedicated Traffic Channel) or DCCH (Dedicated Control Channel) (see Figure 3-3(a)).

Physical data mode enters data directly in the DPDCH without coding or performing the interleaving process (see Figure 3-3(b)).

SP1: Sets Physical data mode to the slot format number 1 (Channel Bit Rate = 30[kbps]).

SP2: Sets Physical data mode to the slot format number 2 (Channel Bit Rate = 60[kbps]).

SP3: Sets Physical data mode to the slot format number 3 (Channel Bit Rate = 120[kbps]).

SP4: Sets Physical data mode to the slot format number 4 (Channel Bit Rate = 240[kbps]).

SP5: Sets Physical data mode to the slot format number 5 (Channel Bit Rate = 480[kbps]).

SP6: Sets Physical data mode to the slot format number 6 (Channel Bit Rate = 960[kbps]).

SI2: Sets Information data mode to the slot format number 2 (Information Bit Rate = 12.2[kbps], Channel Bit Rate = 60[kbps])

SI4: Sets Information data mode to the slot format number 4 (Information Bit Rate = 64[kbps], Channel Bit Rate = 240[kbps])

SI5: Sets Information data mode to the slot format number 5 (Information Bit Rate = 144[kbps], Channel Bit Rate = 480[kbps])

SI6: Sets Information data mode to the slot format number 6 (Information Bit Rate = 384[kbps], Channel Bit Rate = 960[kbps])

Value after the execution of preset: SI2

Related GPIB command :UPDPDCH:CCONF

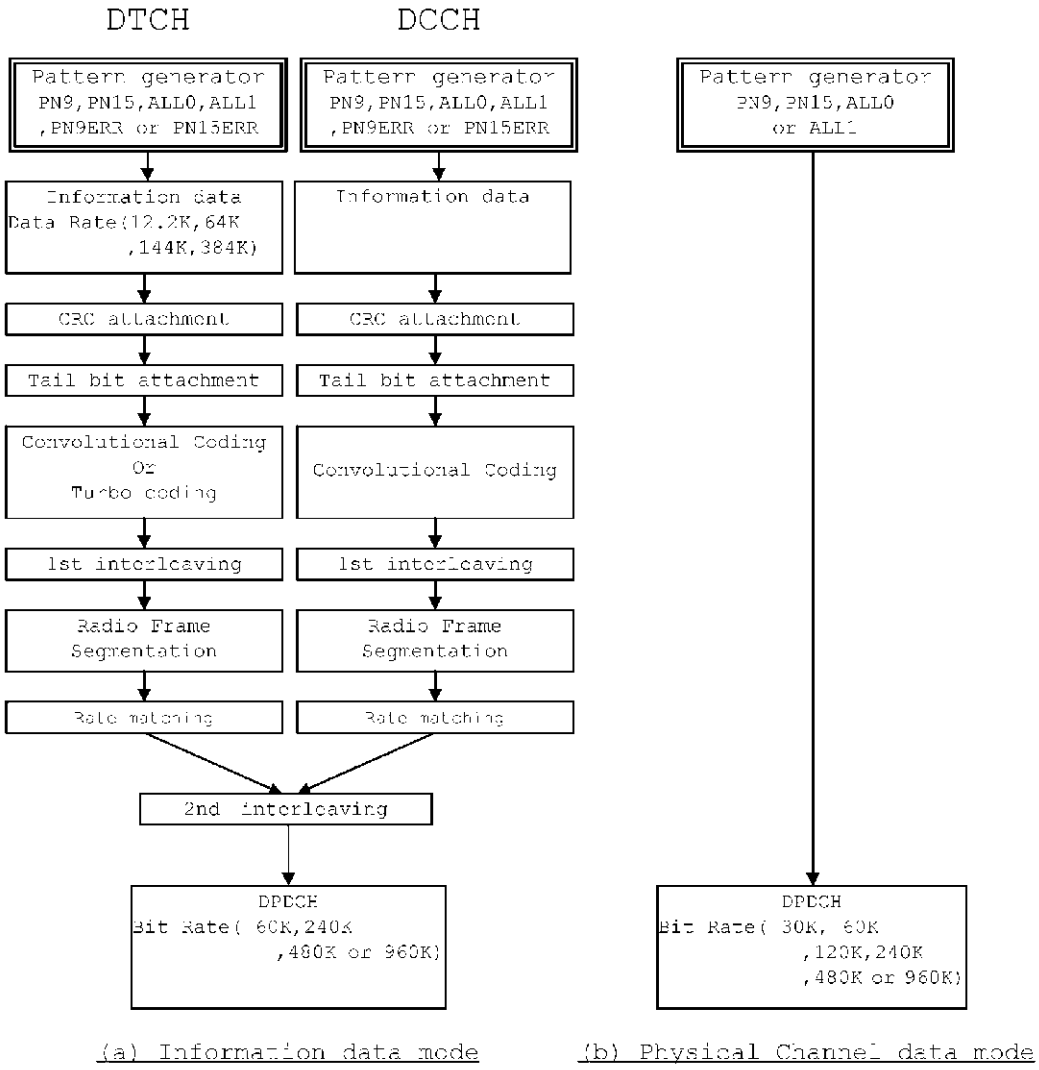


Figure 3-3 Up Link Information Data Mode and Physical Channel Data Mode

(2) DPDCH data pattern setting

Selects the DPDCH data pattern when the data mode of the channel configuration setting is set to Physical data mode. The values, which are set when Data mode is set to Physical data mode, are enabled.

PN9: Selects the sign of the PN consisting of 9 stages.

PN15: Selects the sign of the PN consisting of 15 stages.

ALL0: Selects all zeros.

ALL1: Selects all ones.

PN9ERR: Selects the sign of the PN consisting of 9 stages with an error of 1%.

Value after the execution of preset: PN9

Related GPIB command :UPDPDCH:DATA

(3) DTCH (Dedicated Traffic Channel) setting

The values, which are set when the data mode for the channel configuration is set to Information data mode, are enabled.

(a) Data setting

Selects a value to be input for Information data.

PN9: Selects the sign of the PN consisting of 9 stages.

PN15: Selects the sign of the PN consisting of 15 stages.

ALL0: Selects all zeros.

ALL1: Selects all ones.

PN9ERR: Selects the sign of the PN consisting of 9 stages with an error of 1%.

Value after the execution of preset: PN9

Related GPIB command :UPDTCH:DATA

(b) FEC setting

Sets whether or not the FEC (Convolutional coding or Turbo coding) process is performed.

ON: Performs the FEC process.

OFF: Does nor perform the FEC process.

Value after the execution of preset: ON

Related GPIB command :UPDTCH:FEC

(c) CRC setting

Specifies how CRC data is generated based on the calculated CRC value.

NORMAL:The calculated CRC value is used as CRC data (correct CRC data is output).

INVERSE:The calculated CRC value is logically inverted to be used as CRC data (an incorrect CRC data is output).

ADDERR: Generates a block error of 1% using both NORMAL and INVERSE modes.

NOTE: One inverse operation takes place for every 100 CRC blocks.

Value after the execution of preset: NORMAL

Related GPIB command :UPDTCH:CRC

(4) DCCH (Dedicated Control Channel) setting

The values, which are set when the data mode for the channel configuration setting is set to Information data mode, are enabled.

(a) Data setting

Selects a value to be input for Information data.

PN9: Selects the sign of the PN consisting of 9 stages.

PN15: Selects the sign of the PN consisting of 15 stages.

ALL0: Selects all zeros.

ALL1: Selects all ones.

PN9ERR: Selects the sign of the PN consisting of 9 stages with an error of 1%.

Value after the execution of preset: PN9

Related GPIB command :UPDCCH:DATA

(b) FEC setting

Sets whether or not the FEC (Convolutional coding or Turbo coding) process is performed.

ON: Performs the FEC process.

OFF: Does nor perform the FEC process.

Value after the execution of preset: ON

Related GPIB command :UPDCCH:FEC

(c) CRC setting

Specifies how CRC data is generated based on the calculated CRC value.

NORMAL:The calculated CRC value is used as CRC data (correct CRC data is output).

INVERSE:The calculated CRC value is logically inverted to be used as CRC data (an incorrect CRC data is output).

ADDERR: Generates a block error of 1% using both NORMAL and INVERSE modes.

NOTE: One inverse operation takes place for every 100 CRC blocks.

Value after the execution of preset: NORMAL

Related GPIB command :UPDCCH:CRC

3.4.2.2 DPCCH Setting

The DPCCH setting is explained.
Figure 3-4 and Table 3-8 show the DPCCH slot formats available with the R3562.

(1) Slot formats setting

Set the DPCCH slot format to the slot format number (listed in Table 3-8). The number of bits per slot of Pilot, TFCI, FBI or TPC is determined by the slot format specified.

0: The bit configuration of the slot format number 0 is used.

1: The bit configuration of the slot format number 1 is used.

2: The bit configuration of the slot format number 2 is used.

3: The bit configuration of the slot format number 3 is used.

4: The bit configuration of the slot format number 4 is used.

5: The bit configuration of the slot format number 5 is used.

Value after the execution of preset: 0

Related GPIB command :UPDPCCH:PFORM

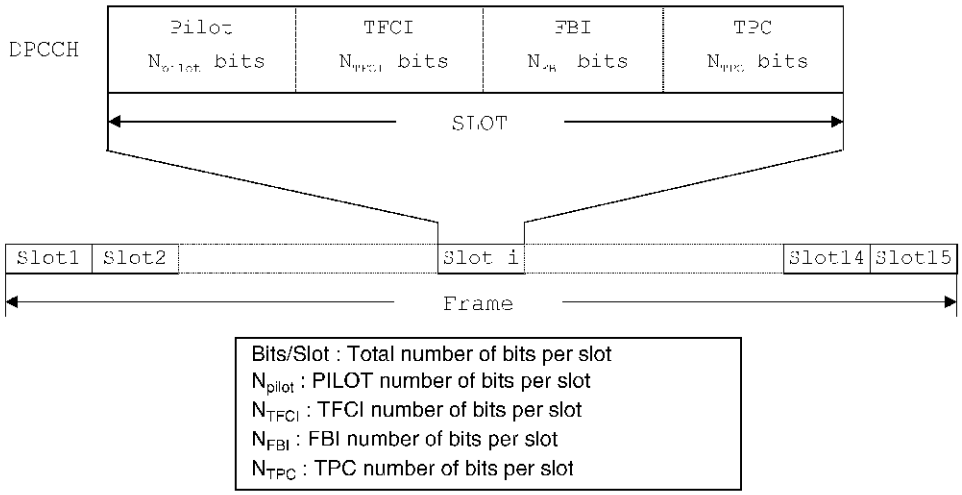


Figure 3-4 DPCCH Slot Format Available with the R3562

Table 3-8 DPCCH Slot Format Available with the R3562

Slot Format No.	Bit Rate [kbps]	Symbol Rate [ksps]	N_{pilot} /Slots	N_{TFCI} /Slots	N_{FBI} /Slots	N_{TPC} /Slots	Transmitted slots /radio frame
0	15	15	6	2	0	2	15
1			8	0	0	2	
2			5	2	1	2	
3			7	0	1	2	
4			6	0	2	2	
5			5	2	2	1	

(2) TFCI (Transport Format Combination Indicator) code word

The TFCI code word per frame is set. Ten bits of the TFCI that are input to TFCI-Coder (see (a) in Figure 3-5) are assigned for the TFCI code word.

If the number of bits of the specified TFCI is less than 10 bits, zeros are automatically inserted from the MSB (see (b) in Figure 3-5).

The value saved in the TFCI code word is valid if the number of TFCI bits per slot, which is determined by the DPCCH channel configuration setting, is not zero.

Range:0 thru 3FF [in hexadecimal]

Value after the execution of preset: 0 [in hexadecimal]

Related GPIB command :UPDPCCH:TFCI

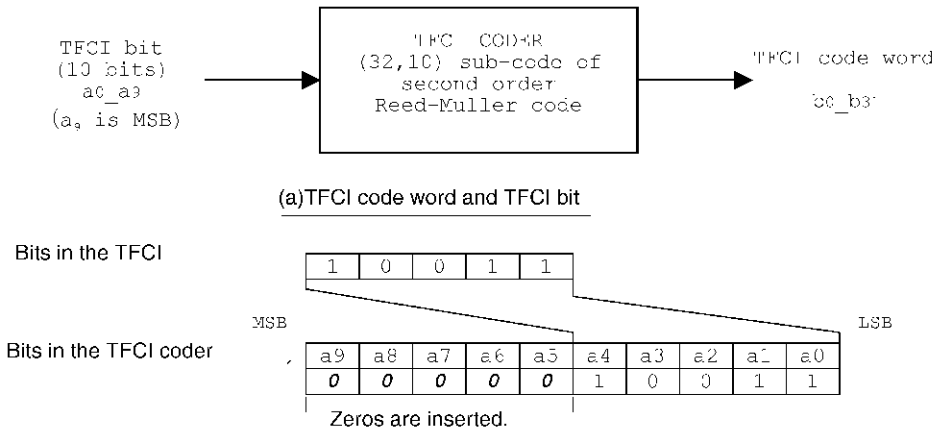


Figure 3-5 Relationship between the TFCI Bits and TFCI Code Word

(3) FBI (Feedback Information) bit pattern setting

The FBI bit pattern per frame is set. The value set with the FBI bit pattern is valid if the number of FBI bits per slot, which is determined by the DPCCH channel configuration setting, is not zero. Figure 3-6 shows how the bits in the FBI bit pattern are assigned to the FBI field.

If the number of bits of the specified FBI bit pattern is less than 30 bits (or, if the FBI bit pattern has a value which is less than 20000000 in hexadecimal), a zero is automatically added to the MSB position (see Figure 3-7).

Range:0 thru 3FFFFFFF [in hexadecimal]

Value after the execution of preset: 0 [in hexadecimal]

Related GPIB command :UPDPCCH:FBI

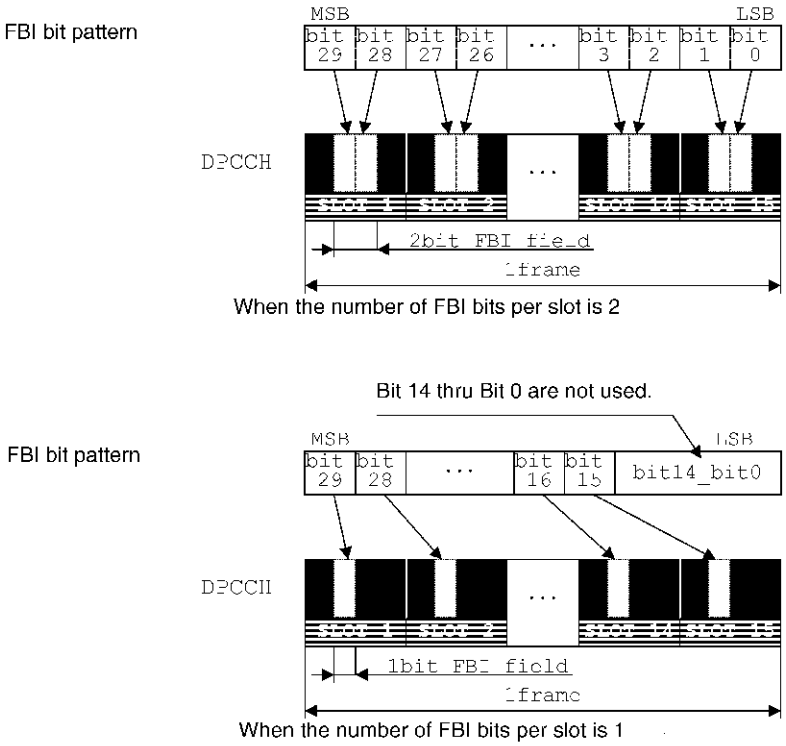
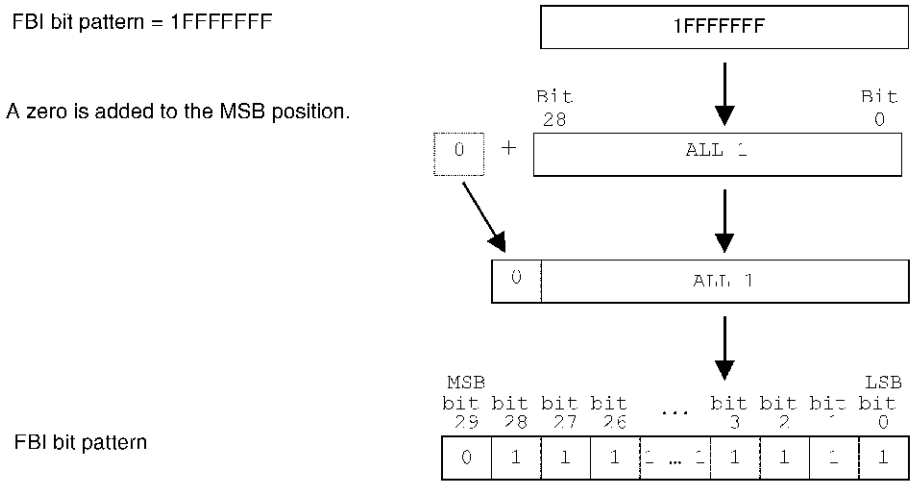


Figure 3-6 Assigning the bits of FBI Bit Pattern to the FBI Field



How the MSB is processed when the number of FBI Bit Pattern bits is 29

Figure 3-7 Inserting Zeros into the FBI Bit Pattern

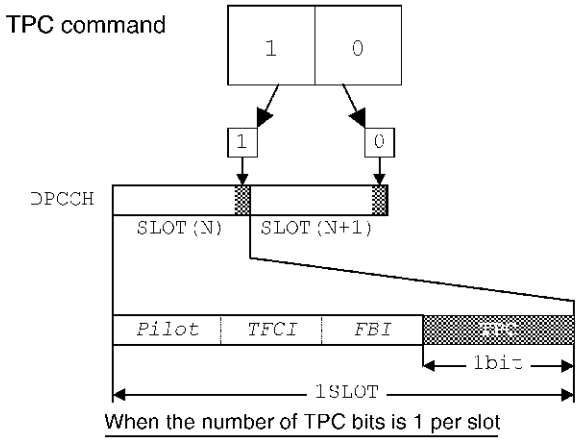
(4) TPC (Transmit Power Control) setting

Controls the TPC command. The TPC command is converted into TPC bits according to Table 3-9, and assigned to each slot (see Figure 3-8).
The number of TPC bits per slot is determined by the DPCCH channel configuration setting per slot.

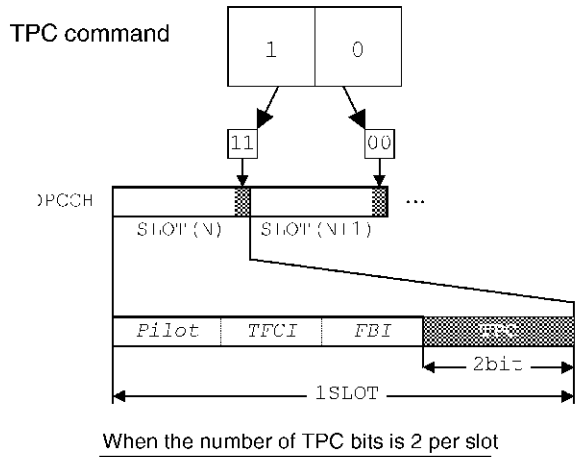
There are two TPC operating modes as shown below.

Repeat mode:The TPC command of 1 is set to the consecutive slots the specified number of times by the TPC slot length, and then the TPC command of 0 is set to the consecutive slots the specified number of times by the TPC slot length.
The above sequence takes place continuously (see Figure 3-9).

Insert mode: The TPC command is inserted during operation in Repeat mode (see Figure 3-10).



When the number of TPC bits is 1 per slot



When the number of TPC bits is 2 per slot

Figure 3-8 TPC Command and TPC Bits

Table 3-9 TPC Command and TPC Bits

TPC Command	TPC Bit Values		
	$N_{TPC} = 2$	$N_{TPC} = 4$	$N_{TPC} = 8$
1	11	1111	11111111
0	00	0000	00000000

(a) TPC slot length setting in Repeat mode (see Figure 3-9)

This setting specifies the TPC slot length in Repeat mode.

Range: 1 thru 75

Value after the execution of preset: 1

Related GPIB command UPDPCCH:TPCR

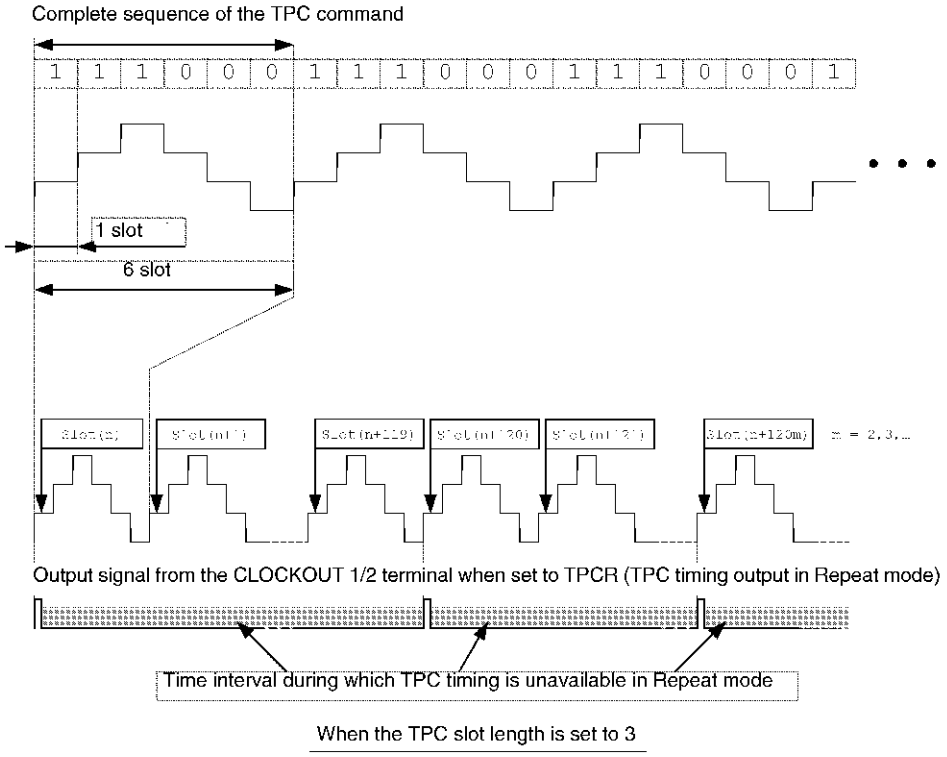


Figure 3-9 TPC Timing Output in Repeat Mode

NOTE: The first slot timing of the TPC command sequence can be output from the CLOCKOUT 1/2 terminal at TTL levels. Note that this timing is not output during 8 frames (120 slots) immediately after the aforesaid first slot timing is output (see Figure 3-9).

(b) TPC Insert slot length setting in Insert mode (TPC Insert start timing generation)

When the TPC Insert slot length setting command is detected, the TPC command of 1 or 0 is inserted into the consecutive slots the specified number of times by the TPC Insert slot length.
If the value set by the TPC Insert slot length is larger than 0, a TPC command of 1 is inserted into the consecutive slots the specified number of times by the TPC Insert slot length.
If the value set by the TPC Insert slot length is smaller than 0, a TPC command of 0 is inserted into the consecutive slots the specified number of times by the absolute value in the TPC Insert slot length (see Figure 3-10).

Range: -75 thru -1 or 1 thru 75

Related GPIB command TPCI

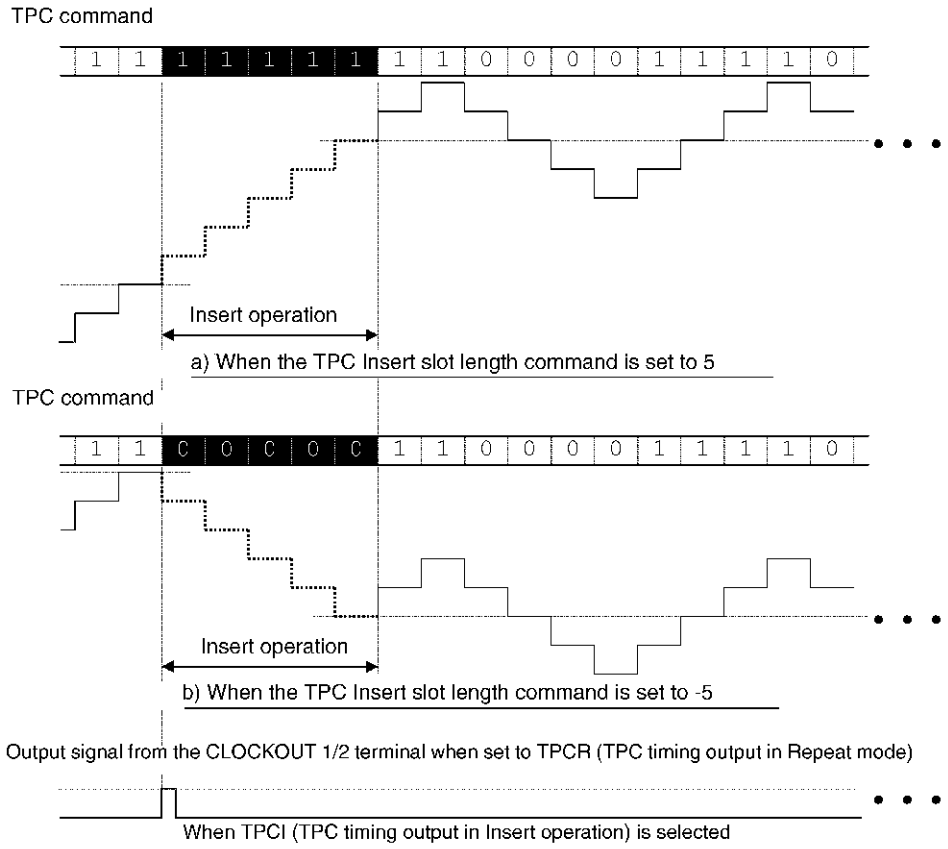


Figure 3-10 Insert Operation and TPC Timing Output (When the TPC Insert Slot Length Command Is Set to 4)

NOTE: *The timing of the TPC Insert operation can be output from the CLOCKOUT 1/2 terminal at TTL levels (see Figure 3-10).*

3.4.2.3 Spreading Setting

The setting used for spreading is explained.
For the spreading section configuration, see Figure 3-11.

(1) DPCCH channelization code number (see Figure 3-11)

DPCCH channelization code number is fixed at $C_{c,\,256,0}$ and cannot be changed.

(2) DPDCH channelization code number (see Figure 3-11)

The DPDCH channelization code number is calculated from the expression (1).

DPDCH channelization code number : n

$$n = \frac{SF}{4} \qquad (1)$$

SF: Spreading factor

The Channelization code number is automatically determined by the DPDCH channel configuration setting.
Table 3-10 shows the relationship between the DPDCH channel configuration setting and the DPDCH channelization code number.

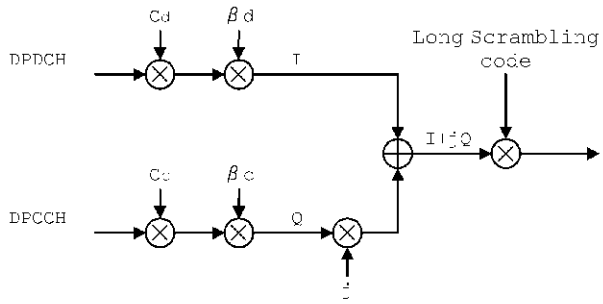
Table 3-10 DPDCH Channel Configuration Setting and DPDCH Channelization Code Number

(a) When the data mode of the DPDCH channel configuration is set to Information data mode

DPDCH Channel configuration set value (Information Bit Rate)	DPDCH Bit Rate [kbps]	SF : Spreading Factor	DPDCH Channelization code number
SI2 (12.2[kbps])	60	64	16
SI4 (64[kbps])	240	16	4
SI5 (144[kbps])	480	8	2
SI6 (384[kbps])	960	4	1

(b) When the data mode of the DPDCH channel configuration is set to Physical data mode

DPDCH Channel configuration set value	DPDCH Bit Rate [kbps]	SF : Spreading Factor	DPDCH Channelization code number
SP1	30	128	32
SP2	60	64	16
SP3	120	32	8
SP4	240	16	4
SP5	480	8	2
SP6	960	4	1



Cd :	DPDCH Channelization code
βd :	DPDCH Gain Parameter
Cc :	DPCCH Channelization code
βc :	DPCCH Gain Parameter

Figure 3-11 UP LINK Spreading Section Configuration

(3) Scrambling code setting (see Figure 3-11)

Scrambling code is set.

NOTE: ***The R3562 supports only the Long Scrambling code. Spreading using the Short Scrambling code is not supported.***

Range: 0 thru 16777215 [in decimal]

Value after the execution of preset: 0 [in decimal]

Related GPIB command UPSCODE

(4) Gain Parameter setting (see Figure 3-11)

A gain power ratio of the DPCCH to DPDCH is set. There are four ways to set the gain power ratio.

(a) DPCCH gain parameter relative to the DPDCH

The DPCCH gain ratio βc is specified using the gain parameter code (see Table 3-12), assuming that the DPDCH gain ratio βd is 1.0.

Range: 0 thru 15

Value after the execution of preset: 15

Related GPIB command UPDPCCH:GAINC

(b) DPCCH gain parameter relative to the DPDCH

The DPDCH gain ratio βd is specified using the gain parameter code (see Table 3-12), assuming that the DPCCH gain ratio βc is 1.0.

Range: 0 thru 15

Value after the execution of preset: 15

Related GPIB command UPDPDCH:GAINC

(c) Power ratio of the DPCCH to DPDCH

The DPCCH power Pc [dB] is specified while assuming that the DPDCH power Pd is 0.0 [dB].

Range: -23.5 thru 0.0 [dB] (STEP 0.1 [dB]) or thru -99.9 [dB]

NOTE: ***The DPCCH power is turned off (switched off) when -99.9 [dB] is specified.***

Value after the execution of preset: 0.0 [dB]

Related GPIB command UPDPCCH:GAINP

(d) Power ratio of the DPDCH to DPCCH

The DPDCH power Pd [dB] is specified while assuming that the DPCCH power Pc is 0.0 [dB].

Range: -23.5 thru 0.0 [dB] (STEP 0.1 [dB]) or thru -99.9 [dB]

NOTE: The DPDCH power is turned off (switched off) when -99.9 [dB] is specified.

Value after the execution of preset: 0.0 [dB]

Related GPIB command UPDPDCH:GAINP

NOTE: If a gain parameter has been changed using one of the methods mentioned above, other set values may be affected. For example, when the DPCCH gain parameter relative to the DPDCH is set to 11 and then the power ratio of the DPCCH to DPDCH is set to -8.0 [dB], the other parameters are changed as listed in the Table 3-11.

Table 3-11 Relationship between Gain Parameter Set Values

	When the DPCCH gain parameter relative to the DPDCH is set to 11	→	When the power ratio of the DPCCH to DPDCH is set to -8.0 [dB]
DPCCH gain parameter relative to the DPDCH	11		15
DPDCH gain parameter relative to the DPCCH	15		6
Power ratio of the DPCCH to DPDCH	-2.7[dB]		0.0[dB]
Power ratio of the DPDCH to DPCCH	0[dB]		-8.0[dB]

NOTE: ***When the power ratio of the DPCCH to DPDCH or the DPCDH to DPCCH is changed with no corresponding gain parameter code, choose the gain parameter code closest to this gain parameter code. Choose the one that makes the gain parameter larger, if two gain parameters are available. Append a minus (-) sign in front of the gain code parameter to indicate that this value is not exact. You can confirm the real value by reading the DPCCH gain parameter code setting relative to the DPDCH or DPDCH gain parameter code setting relative to the DPCCH.***
(Example)
When the power ratio of the DPDCH to DPCCH is set to -0.9 [dB], the DPCCH gain parameter relative to the DPDCH is 15, and the DPDCH gain parameter relative to the DPCCH is -14.

Table 3-12 Gain parameter code and Amplitude ratios

Gain parameter code setting for (a) or (b)		Power ratio setting
Gain parameter code (βc, βd)	Amplitude ratios (βc, βd)	Power ratios [dB] (Pc, Pd)
15	1.0	0.0
14	0.9333	-0.6
13	0.8667	-1.2
12	0.8000	-1.9
11	0.7333	-2.7
10	0.6667	-3.5
9	0.6000	-4.4
8	0.5333	-5.5
7	0.4667	-6.6
6	0.4000	-8.0
5	0.3333	-9.5
4	0.2667	-11.5
3	0.2000	-14.0
2	0.1333	-17.5
1	0.0667	-23.5
0	Switch off	-99.9

3.4.3 DOWN LINK Setting

DOWN LINK (BS → UE) is set.
The R3562 provides one physical channel for each of the following logical channels.

CPICH (Common Pilot Channel)

P-CCPCH (Primary Common Control Physical Channel)

SCH (Synchronization Channel)

DPCH (Dedicated Physical Channel)

3.4.3.1 CPICH

The CPICH is explained. For the CPICH configuration, see Figure 3-12.

The CPICH is fixed at a channel bit rate of 30 [kbps] (Channel symbol rate is 15 [ksps]) and the SF is fixed at 256.

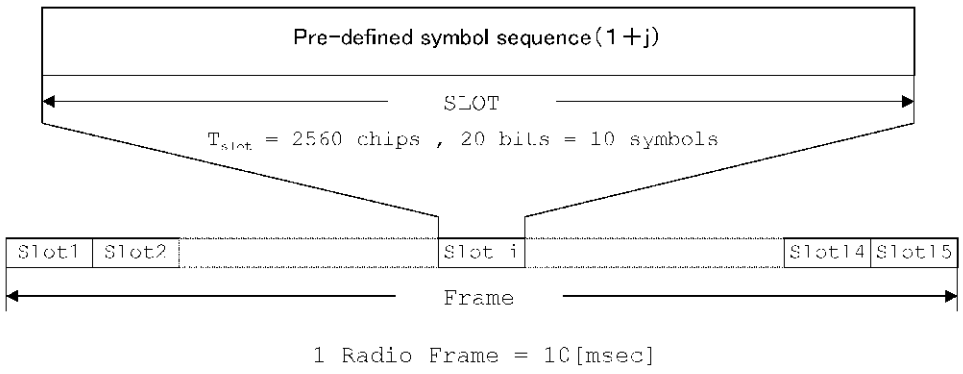


Figure 3-12 Slot and Frame Configurations of the CPICH

3.4.3.2 P-CCPCH

The P-CCPCH is explained. For the P-CCPCH configuration, see Figure 3-13.

The CPICH is fixed at a channel bit rate of 30 [kbps] (Channel symbol rate is 15 [ksps]) and the SF is fixed at 256.

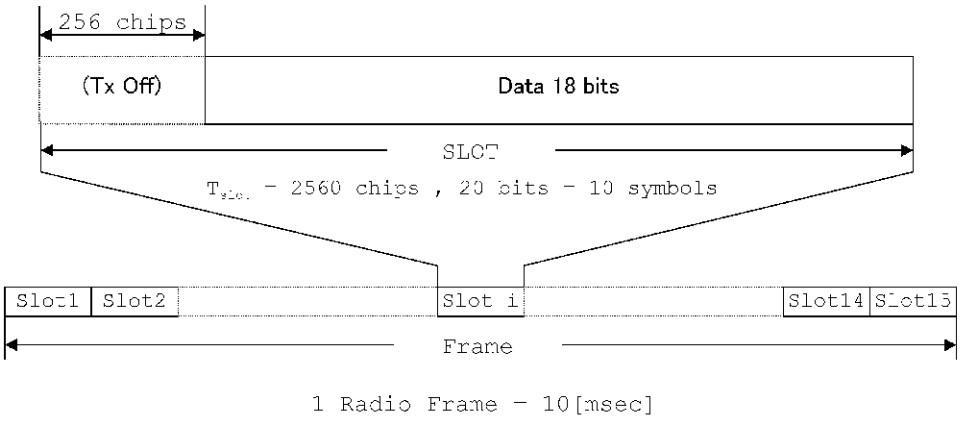


Figure 3-13 Slot and Frame Configurations of the P-CCPCH

3.4.3.3 DPCH Setting

The DPCH setting is explained.
Figure 3-14 and Table 3-13 show the slot configurations of the DPCH available with the R3562.

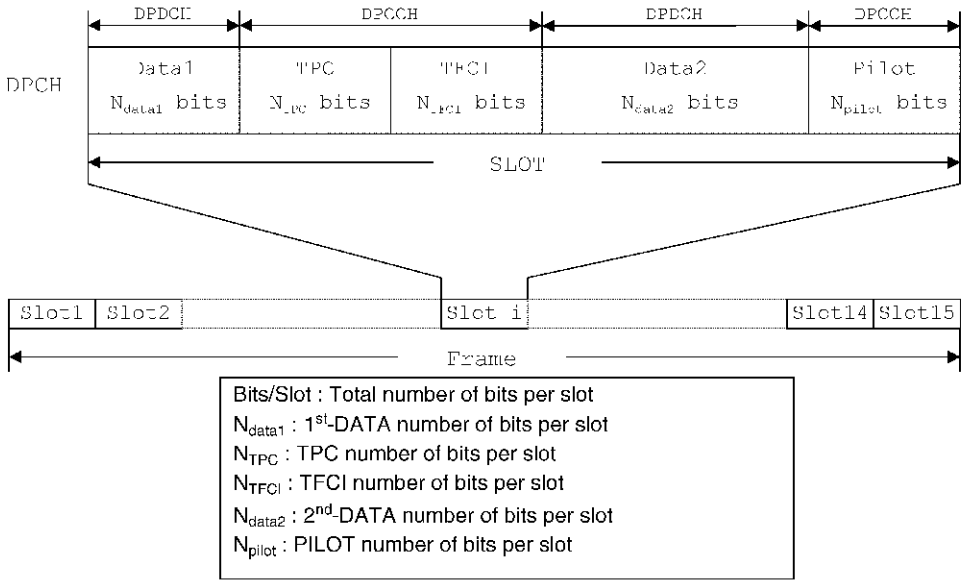


Figure 3-14 Slot Configurations of the DPCH Available with the R3562

Table 3-13 Slot Configurations of the DPCH Available with the R3562

Slot Format No.	Channel Bit Rate [kbps]	Channel Symbol Rate [ksps]	SF	Bits/ Slot	DPDCH Bits/Slot		DPCCH Bits/Slot			Transmitted slots per radio frame N_{Tr}
					N_{Data1}	N_{Data2}	N_{TPC}	N_{TFCI}	N_{Pilot}	
8	60	30	128	40	6	28	2	0	4	15
9	60	30	128	40	6	26	2	2	4	15
10	60	30	128	40	6	24	2	0	8	15
11	60	30	128	40	6	22	2	2	8	15
12	120	60	64	80	12	48	4	8*	8	15
13	240	120	32	160	28	112	4	8*	8	15
14	480	240	16	320	56	232	8	8*	16	15
15	960	480	8	640	120	488	8	8*	16	15

(1) Channel configuration setting

The DPCH channel configurations are specified using a data mode and slot format number (Slot Format No. in Table 3-13) in combination.
There are two data modes: Information data mode and Physical data mode.
Information data mode generates DPDCH data when a coding or interleaving process for DTCH (Dedicated Traffic Channel) or DCCH (Dedicated Control Channel) Information data has been completed (see (a) in Figure 3-15). Physical data mode allows you to enter data directly in the DPDCH, but no coding or interleaving process takes place (see (b) in Figure 3-15).

SP8: Sets Physical data mode to the slot format number 8 (Channel Symbol Rate = 30[ksps]).

SP9: Sets Physical data mode to the slot format number 9 (Channel Symbol Rate = 30[ksps]).

SP10: Sets Physical data mode to the slot format number 10 (Channel Symbol Rate = 30[ksps]).

SP11: Sets Physical data mode to the slot format number 11 (Channel Symbol Rate = 30[ksps]).

SP12: Sets Physical data mode to the slot format number 12 (Channel Symbol Rate = 60[ksps]).

SP13: Sets Physical data mode to the slot format number 13 (Channel Symbol Rate = 120[ksps]).

SP14: Sets Physical data mode to the slot format number 14 (Channel Symbol Rate = 240[ksps]).

SP15: Sets Physical data mode to the slot format number 15 (Channel Symbol Rate = 480[ksps]).

SI11: Sets Information data mode to the slot format number 11 (Information Bit Rate = 12.2[kbps], Channel Symbol Rate = 30[ksps]).

SI13: Sets Information data mode to the slot format number 13 (Information Bit Rate = 64[kbps], Channel Symbol Rate = 120[ksps]).

SI14: Sets Information data mode to the slot format number 14 (Information Bit Rate = 144[kbps], Channel Symbol Rate = 240[ksps]).

SI15: Sets Information data mode to the slot format number 15 (Information Bit Rate = 384[kbps], Channel Symbol Rate = 480[ksps]).

Value after the execution of preset: SI11

Related GPIB command :DNDPCH:CCONF

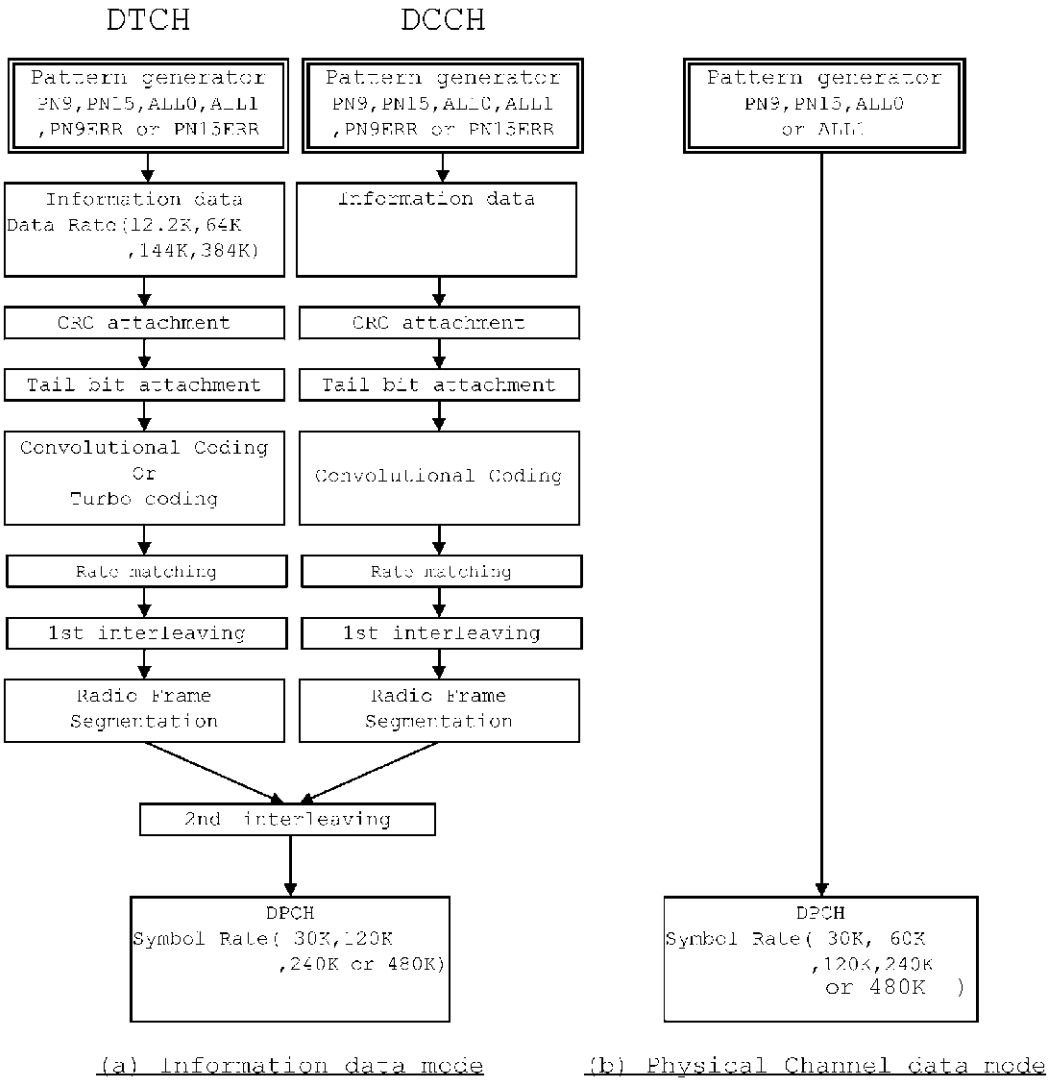


Figure 3-15 Down Link Information Data Mode and Physical Channel Data Mode

3.4.3.4 DPDCH Setting

(1) DPDCH data pattern setting

Selects the DPDCH data pattern when the data mode of the channel configuration setting is set to Physical data mode. The values, which are set when Data mode is set to Physical data mode, are enabled.

PN9: Selects the sign of the PN consisting of 9 stages.

PN15: Selects the sign of the PN consisting of 15 stages.

ALL0: Selects all zeros.

ALL1: Selects all ones.

PN9ERR: Selects the sign of the PN consisting of 9 stages with an error of 1%.

Value after the execution of preset: PN9

Related GPIB command :DNDPDCH:DATA

(2) DTCH setting

The values, which are set when the data mode for the channel configuration is set to Information data mode, are enabled.

(a) Data setting

Selects a value to be input for Information data.

PN9: Selects the sign of the PN consisting of 9 stages.

PN15: Selects the sign of the PN consisting of 15 stages.

ALL0: Selects all zeros.

ALL1: Selects all ones.

PN9ERR: Selects the sign of the PN consisting of 9 stages with an error of 1%.

Value after the execution of preset: PN9

Related GPIB command :DNDTCH:DATA

(b) FEC setting

Sets whether or not the FEC (Convolutional coding or Turbo coding) process is performed.

ON: Performs the FEC process.

OFF: Does nor perform the FEC process.

Value after the execution of preset: ON

Related GPIB command :DNDTCH:FEC

(c) CRC setting

Specifies how CRC data is generated based on the calculated CRC value.

NORMAL:The calculated CRC value is used as CRC data (correct CRC data is output).

INVERSE:The calculated CRC value is logically inverted to be used as CRC data (an incorrect CRC data is output).

ADDERR: Generates a block error of 1% using both NORMAL and INVERSE modes.

NOTE: One inverse operation takes place for every 100 CRC blocks.

Value after the execution of preset: NORMAL

Related GPIB command :DNDTCH:CRC

(3) DCCH (Dedicated Control Channel) setting

The values, which are set when the data mode for the channel configuration setting is set to Information data mode, are enabled.

(a) Data setting

Selects a value to be input for Information data.

PN9: Selects the sign of the PN consisting of 9 stages.

PN15: Selects the sign of the PN consisting of 15 stages.

ALL0: Selects all zeros.

ALL1: Selects all ones.

PN9ERR: Selects the sign of the PN consisting of 9 stages with an error of 1%.

Value after the execution of preset: PN9

Related GPIB command :DNDCCH:DATA

(b) FEC setting

Sets whether or not the FEC (Convolutional coding or Turbo coding) process is performed.

ON: Performs the FEC process.

OFF: Does nor perform the FEC process.

Value after the execution of preset: ON

Related GPIB command :DNDCCH:FEC

(c) CRC setting

Specifies how CRC data is generated based on the calculated CRC value.

NORMAL:The calculated CRC value is used as CRC data (correct CRC data is output).

INVERSE:The calculated CRC value is logically inverted to be used as CRC data (an incorrect CRC data is output).

ADDERR: Generates a block error of 1% using both NORMAL and INVERSE modes.

NOTE: One inverse operation takes place for every 100 CRC blocks.

Value after the execution of preset: NORMAL

Related GPIB command :DNDCCH:CRC

3.4.3.5 DPCCH Setting

The slot formats used with the DPCCH are determined by the setting explained in Section 3.4.3.3 "(1) Channel configuration setting".

(1) TFCI Code Word Setting

The TFCI code word setting per frame is set. The TFCI code word is specified using a TFCI consisting of 10 bits that are input to the TFCI Coder (see (a) in Figure 3-5). Zeros are automatically input from the MSB when the specified TFCI bits are less than 10 bits (see (b) in Figure 3-5).
The value saved in the TFCI code word is valid if the number of TFCI bits per slot, which is determined by the slot format setting, is not zero.

Range:0 thru 3FF [in hexadecimal]

Value after the execution of preset: 0 [in hexadecimal]

Related GPIB command :DNDPCCH:TFCI

(2) TPC (Transmit Power Control) setting

Controls the TPC command. The TPC command is converted into TPC bits according to Table 3-9, and assigned to each slot (see Figure 3-8).
The number of TPC bits per slot is determined by the slot format setting.
There are two TPC modes: Repeat and Insert modes.

Repeat mode:The TPC command of 1 is set to the consecutive slots the specified number of times by the TPC slot length, and then the TPC command of 0 is set to the consecutive slots the specified number of times by the TPC slot length.
The above sequence takes place continuously (see Figure 3-9).

Insert mode: The TPC command is inserted during operation in Repeat mode (see Figure 3-10).

(a) TPC slot length setting in Repeat mode (see Figure 3-9)

This setting specifies the TPC slot length in Repeat mode.

Range: 1 thru 75

Value after the execution of preset: 1

Related GPIB command :DNDPCCH:TPCR

NOTE: ***The first slot timing of the TPC command sequence can be output from the CLOCKOUT 1/2 terminal at TTL levels. Note that this timing is not output during 8 frames (120 slots) immediately after the aforesaid first slot timing is output (see Figure 3-9).***

(b) TPC Insert slot length setting in Insert mode (TPC Insert start timing generation)

When the TPC Insert slot length setting command is detected, the TPC command of 1 or 0 is inserted into the consecutive slots the specified number of times by the TPC Insert slot length.

If the value set by the TPC Insert slot length is larger than 0, a TPC command of 1 is inserted into the consecutive slots the specified number of times by the TPC Insert slot length.

If the value set by the TPC Insert slot length is smaller than 0, a TPC command of 0 is inserted into the consecutive slots the specified number of times by the absolute value in the TPC Insert slot length (see Figure 3-10).

Range: -75 thru -1 or 1 thru 75

Related GPIB command TPCI

NOTE: The timing of the TPC Insert operation can be output from the CLOCKOUT 1/2 terminal at TTL levels (see Figure 3-10).

3.4.3.6 Spreading Setting

The setting used for spreading is explained.
For the spreading section configuration, see Figure 3-16.

(1) Channelization code number setting

(a) CPICH Channelization code number

CPICH Channelization code number is fixed at $C_{c, 256,0}$ and cannot be changed.

(b) P-CCPCH Channelization code number

P-CCPCH Channelization code number is fixed at $C_{c, 256,0}$ and cannot be changed.

(c) DPCH channelization code number

The range for the DPCH channelization code number C_d is limited as shown below.

$2 \leq Cd \leq SF - 1$

SF : Spreading Factor

Table 3-14 shows the relationship between the DPCH channel configuration setting and the DPCH channelization code number.

When the channel configuration setting has been changed, causing the corresponding channelization code number to be out of the current range, a new upper limit of the channel configuration setting that is larger than before is automatically set. The channelization code number has a new upper limit which is increased as a result of the increase in the channel configuration setting.

Range: 2 thru 127

Value after the execution of preset: 2

Related GPIB command DNDPCH:CCODE

Table 3-14 DPCH Channel Configuration Setting and the DPCH Channelization Code Number

(a) When the data mode of the DPCH channel configuration is set to Information data mode

DPCH channel configuration set value (Information Bit Rate)	DPCH Symbol Rate [ksps]	SF : Spreading Factor	DPCH Channelization code number
SI11 (12.2[kbps])	30	128	2 ~ 127
SI13 (64[kbps])	120	32	2 ~ 31
SI14 (144[kbps])	240	16	2 ~ 15
SI15 (384[kbps])	480	8	2 ~ 7

(b) When the data mode of the DPCH channel configuration is set to Physical data mode

DPCH channel configuration set value (Information Bit Rate)	DPCH Symbol Rate [ksps]	SF : Spreading Factor	Channelization code number
SP8	30	128	2 ~ 127
SP9	30		
SP10	30		
SP11	30		
SP12	60	64	2 ~ 63
SP13	120	32	2 ~ 31
SP14	240	16	2 ~ 15
SP15	480	8	2 ~ 7

(2) Synchronisation code

The SCH synchronization code is specified using Scrambling code setting.

(3) Scrambling code setting

Scrambling code is set.

Range: 0 thru 8191 [in decimal]

Value after the execution of preset: 0 [in decimal]

Related GPIB command :DNSCODE

NOTE: ***The R3562 supports only the Primary Scrambling code.(The Secondary Scrambling code is not supported.)***

(4) Channel power ratio setting

Each physical channel power ratio is set.

The channel power for each channel is calculated and set so that a sum total of all channel powers can be maintained at a constant value by maintaining the difference in power ratio of two specific channels at a constant value.

If the CPICH power ratio set value, the P-CCPCH power ratio set value and the DPCH power ratio set value are the same, each of these channels has 1/3 of the total power of all the channels, if the total power of all the channels is 1 (the same channel power ratio is set if the power ratio set value for all the channels is 0 [dB] and the power ratio set value for all the channels is -5 [dB]).

(a) CPICH Power Ratio Setting

The CPICH channel power ratio is set.

Range: -20.0 thru 0.0 [dB] (STEP 0.1 [dB]) or -99.9 [dB]

NOTE: ***The CPICH power is turned off (switched off) when -99.9 [dB] is specified.***

Value after the execution of preset: 0.0 [dB]

Related GPIB command DNCPICH:GAINP

(b) P-CCPCH (SCH) power ratio setting

A power ratio of the P-CCPCH and the SCH in combination is specified, assuming that the combination of the P-CCPCH and SCH is equivalent to one channel.
The half of the power ratio of the P-CCPCH and the SCH in combination is specified to each of the P-SCH (Primary-SCH) and the S-SCH (Secondary-SCH).

Range: -20.0 thru 0.0 [dB] (STEP 0.1 [dB]) or -99.9 [dB]

NOTE: ***The P-CCPCH power is turned off (switched off) when -99.9 [dB] is specified.***

Value after the execution of preset: 0.0 [dB]

Related GPIB command DNPCCPCH:GAINP

(c) DPCH power ratio setting

The power ratio of the DPCH to the specified channel is set.

Range: -20.0 thru 0.0 [dB] (STEP 0.1 [dB]) or -99.9 [dB]

NOTE: ***The DPCH power is turned off (switched off) when -99.9 [dB] is specified.***

Value after the execution of preset: 0.0 [dB]

Related GPIB command DNDPCH:GAINP

NOTE: The output from all the channels cannot be shut off.

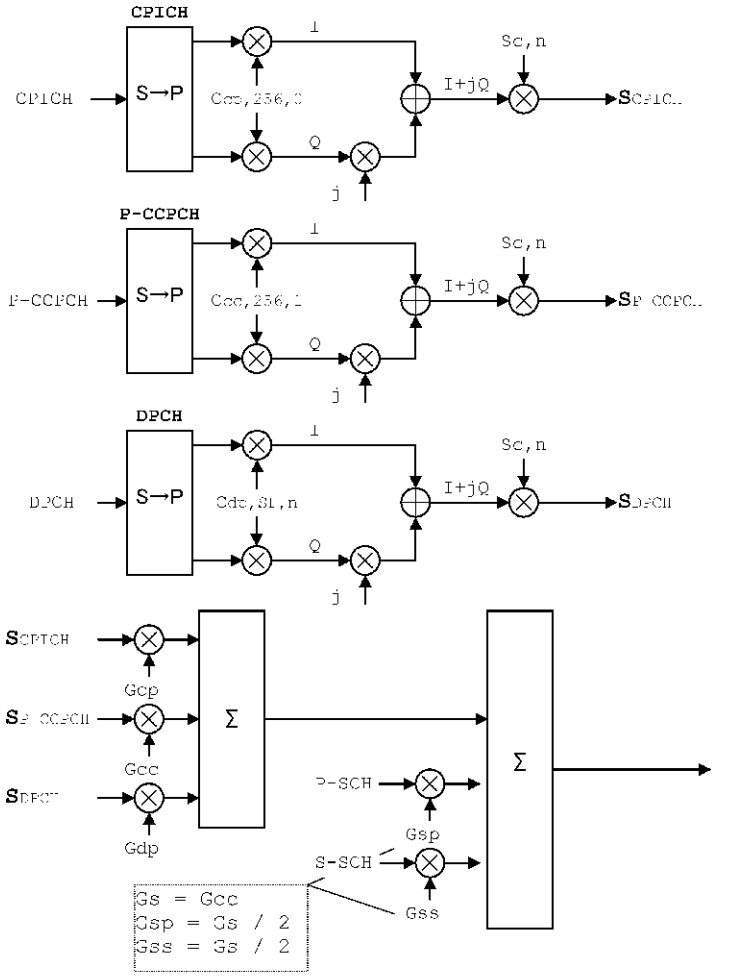


Figure 3-16 DOWN LINK Spreading Section Configuration

3.5 Section Related to the External IQ

This section describes how to set or select each of the functions related to the IQ signals of the instrument. An explanation for each function is presented below.

(1) IQ signal input gain

When External IQ connector direction is set to INPUT, the gain of the IQ signal input can be adjusted.
An adjustable range is 40 to 4000. This value indicates an adjustable range, not the gain (NOTE 1).

Value after the execution of preset: 2000

Related GPIB command LBAI, LBAO

(2) IQ signal input phase adjustment

When the direction of the external IQ connector is set to INPUT, the phases of the external IQ signals can be adjusted. This adjustment function can shift the phase of the Q signal based on the I signal.
An adjustable range is 40 to 4000. This value indicates an adjustable range, not the phase angle (NOTE 1).

Value after the execution of preset: 2000

Related GPIB command PHA

NOTE 1: For the external IQ input, the functions described in Section 3.7, "Self-Test/Calibration Section" are disabled and its accuracy is not assured. When using the external IQ input, the IQ input signals to the I/Q modulator must be adjusted to the optimum values using the above commands.

---

(3) IQ signal output gain

When External IQ connector direction is set to OUTPUT, the output gain of the IQ signal can be adjusted.
An adjustable range is -700 to +700. This value indicates a adjustable range, not the gain.

Value after the execution of preset: 0

Related GPIB command LOAI, LOAO

NOTE: For information on the direction of the external IQ connector setting, refer to Item (2) of Section 3.4.1.

3.6 BER Measurement Section

This section describes how to set or select each of the functions related to the bit error rate measurement of the instrument. An explanation for each function is presented below.

(1) Measurement start/Measurement result output

Measures the bit error rate of the TTL level signal input from the CLOCK or DATA connector on the front panel under the specified conditions. The results can be read using the query command (BER?). The return value of 9.9999E-1 indicates that the BER measurement error has occurred. The conditions under which this error occurs are as follows:

Sync error: The PN9 or PN 15 pattern cannot synchronize with the input data at the DATA connector.

Clock error: The input signal at the CLOCK connector cannot be detected.

For information about detecting the measurement status and checking the error details, refer to Section 5.3.2, "Status Byte" and Section 5.3.3, "Measurement Status Register."

Related GPIB command :BER

(2) Measurement stop

Forcibly stops the BER measurement. The measurement results become undefined.

Related GPIB command :STOP

(3) Measurement data

Specifies either PN9 or PN15 for the measurement data.
Value after the execution of preset: PN9

Related GPIB command :BMDAT

(4) Measurement bit length

Specifies the bit length of the BER measurement.
The range is 1000 to 10000000 (bits).
Value after the execution of preset: 1000

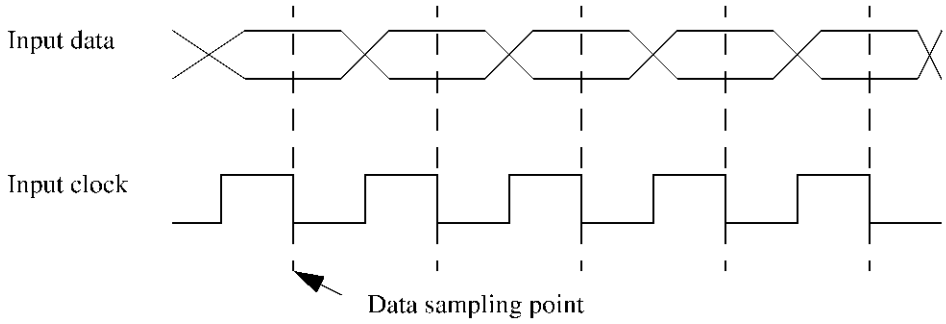
Related GPIB command :BLEN

(5) Input clock polarity

Selects whether the leading edge or the trailing edge of the CLOCK connector signal is used to sample the data.
Value after the execution of preset: POS

Related GPIB command :BCLK

• trailing edge: NEG (initial setting)



• leading edge: POS

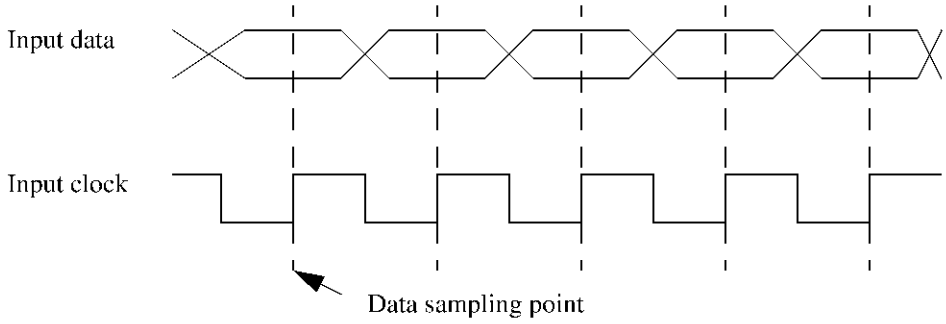


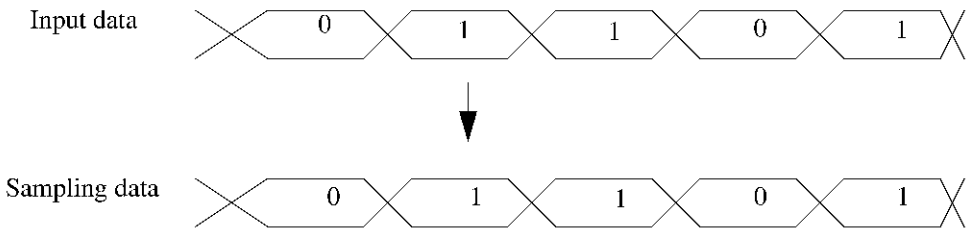
Figure 3-17 BER Clock Polarity

(6) Input data polarity

Selects whether or not to invert the data of the DATA connector signal.
Value after the execution of preset: POS

Related GPIB command :BDAT

• Non-inverse: POS (initial setting)



• Inverse: NEG

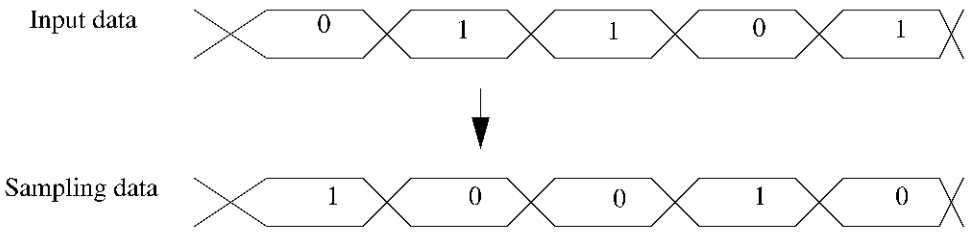


Figure 3-18 BER Data Polarity

3.7 Self-Test/Calibration Section

This section describes how to set or select each of the functions related to the Self-Test and calibration of the instrument. An explanation for each function is presented below.

(1) Modulator calibration

Calibrates the balance of the IQ modulator.

Related GPIB command CMOD

CAUTION: ***It takes approximately 10 to 30 seconds to perform the modulator calibration.***

(2) Modulator calibration correction ON/OFF

Selects whether or not to reflect the correction data obtained by the modulator calibration.

Related GPIB command CMC

Table 3-15 Modulator Calibration Correction Data ON/OFF

Selection	Description
ON	Reflects the correction data obtained by the modulator calibration.
OFF	Does not reflect the correction data obtained by the modulator calibration.

CAUTION: ***ON of the above selection is automatically set when the modulator calibration is performed.***

(3) Self-Test

Performs a Self-Test for each block of the instrument. All indicator lamps on the front panel are lit while the Self-Test is running. On completion of the Self-Test, an alarm is sounded once. If an error is detected as a result of the Self-Test, all indicator lamps remain lit. When the Self-Test has been completed normally, the status immediately before the Self-Test is restored.
The results of the Self-Test can be read through GPIB and are stored into the 16-bit register. The results of the Self-Test are notified by outputting the value contained in the register. If an error has been detected, the corresponding bit is set to "1"; otherwise, the corresponding bit is reset to "0." The highest four bits (d15 through d12) are always set to "0." See Figure 3-19.

Related GPIB command *TST

				Block Name												
				ATT	RF-AMP		MOD		SYNTHE		BASE BAND		CPU			
d15	d14	d13	d12	d11	d10	d9	d8	d7	d6	d5	d4	d3	d2	d1	d0

d15 to d12: 0
d11: Adjustment ROM
d10: ALC Circuit
d9: Adjustment ROM
d8: -
d7: Adjustment ROM
d6: -
d5: Adjustment ROM
d4: Peripheral Device
d3: Coder Block
d2: Peripheral Device
d1: Communicaton RAM
d0: Back-up RAM

Figure 3-19 Bit Assignment of the Self-Test Result Storing Register

3.8 Clock/Timing Signal Section

This section describes how to set or select each of the functions related to the clock and timing signal that are input from or output to the connectors of the instrument. An explanation for each function is presented below.

(1) SYNTHE REF IN

Selects the reference frequency that is input from the SYNTHE REF IN connector to the reference circuit for the RF synthesizer. However, the internal reference oscillator signal is input to the reference circuit for the RF synthesizer when INTERNAL is selected for the reference frequency. Table 3-16 lists selectable reference frequencies.
Value after the execution of preset: INTERNAL

Related GPIB command :RSYN

Table 3-16 Selectable Reference Frequencies

Reference Frequency
INTERNAL
1 MHz
2 MHz
5 MHz
10 MHz
15 MHz

(2) 10 MHz reference source adjustment

It is possible to set the frequency of the internal reference oscillator and correct the frequency deviation due to secular changes. The factory default is "0." An adjustable range is -2000 to +2000. This value indicates an adjustable range, not the frequency.

Related GPIB command :SRAD

(3) MOD TIME BASE IN

Selects the reference frequency that is input from the MOD TIME BASE IN connector to the reference circuit for modulation. However, the internal reference oscillator signal is input to the reference circuit for modulation when INTERNAL is selected for the reference frequency. Table 3-17 lists selectable reference frequencies.
Value after the execution of preset: INTERNAL

Related GPIB command :MODTB

Table 3-17 Selectable Reference Frequencies

Reference Frequency
INTERNAL
3.84 MHz
7.68 MHz
15.36 MHz

(4) Synchronization Using the EXT TRIG terminal

The baseband block in the instrument is synchronized to the trigger signal input to the EXT TRIG IN terminal.
This function is turned on when LINK is set to UP.

(a) Timing synchronization command

This command enables only the first trigger signal that has appeared after this command has been issued to be detected. The second trigger signal onward are ignored. To re-synchronize the instrument timing with the trigger signal, issue this command again.(see Figure 3-20)

Related GPIB command ETRG

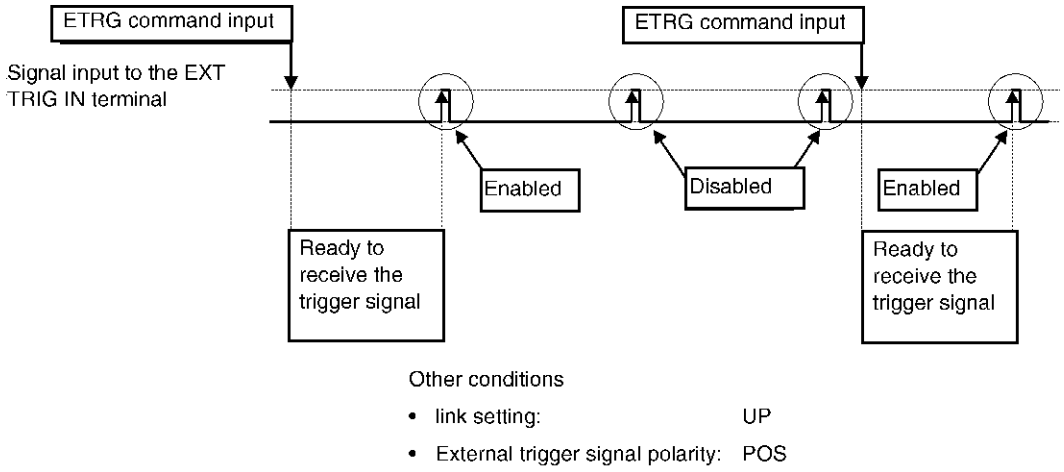


Figure 3-20 Timing Synchronization Command and the Trigger Signal

(b) Polarity of the EXT TRIG signal

Sets whether the baseband block in the instrument is synchronized to the rising or falling edge of the trigger signal.

POS: Triggered by the rising edge.

NEG: Triggered by the falling edge.

Value after the execution of preset: POS

Related GPIB command ETRGPOL

(c) EXT TRIG offset setting

The delay time between the time when the trigger signal is detected and the time when the baseband block in the instrument is synchronized to the trigger signal is set in steps of chips.

Range: 20 thru 200

Value after the execution of preset: 20

Related GPIB command ETRGOFFSET

(5) CLOCK OUT 1/2

Selects the signal that is output to the CLOCK OUT connectors 1 and 2. Table 3-18 lists selectable types of signal.

Value after the execution of preset: OFF

Related GPIB command :REAROUT1, REAROUT2

Table 3-18 Types of CLOCK OUT 1/2

Parameter	Description
OFF	Turns the output signal off.
CHIP	Outputs the chip clock.
RADIO	Outputs the timing of the radio frame.
SLOT	Outputs the timing of the slot.
TPCR	Outputs the timing of the first slot used with the TPC command sequence in Repeat mode. For more information, refer to paragraph (4) TCP Setting in Section 3.4.2.2.
TPCI	Outputs the timing of the first slot used with the inserted TPC command in Repeat mode. For more information, refer to paragraph (4) TCP Setting in Section 3.4.2.2.

3.9 Saving/Recalling Section

This section describes how to set or select each of the functions related to the saving and recalling of the instrument. An explanation for each function is presented below.

(1) Saving

Saves the current set conditions into the backup memory. Up to 3 set conditions can be stored in the backup memory.

Related GPIB command :SAVC

(2) Recalling

Recalls the set conditions stored in the backup memory and sets them again.

Related GPIB command :RECC

4 TECHNICAL REFERENCES

This chapter gives supplemental technical information for the instrument.

4.1 Principles of Operation

The instrument is designed to generate digitally modulated signals compliant with W-CDMA (FDD Chip Rate 3.84 MHz) specified by the 3GPP.

(1) Reference section

Supplies to each section of the instrument the frequency reference signal that is phase locked with the internal reference source or the signal input from the SYNTHE REF IN connector on the rear panel.

(2) Base Band section

This section consists of the following two boards.

- Symbol board

  Performs logical channel coding functions such as CRC code affixing, convolution, Turbo coding, and interleaving in real time. It consists of the base band coder to map data onto the physical channel, the BER counter to measure the error rate of the signal input from the CLOCK and DATA connectors on the front panel, and the interface with the CPU board.

- D/A board

  After diffusing each channel data input from the Symbol board using short and long codes, adds up each of the data and then limits the band using the FIR filter.
  Moreover, converts this digital signal into an analog signal to supply the IQ signals to the I/Q modulator.

In addition to the reference signal from the Reference section, the signal synchronized with the signal input from the MOD TIME BASE IN connector on the front panel can be selected as a time base for modulation.

In addition, the base band I/Q signal can be output at the timing in synchronization with the trigger signal (example: BS SFN Reset) from the front panel and this timing can be changed using the external trigger offset function.

Furthermore, modulation clocks such as a chip clock and a symbol clock, and timing signals can be selected to output to the CLOCK OUT connectors 1 and 2.

Examples of test connection in the base station and mobile station using these signals are shown below.

- Example of test connection using the R3562

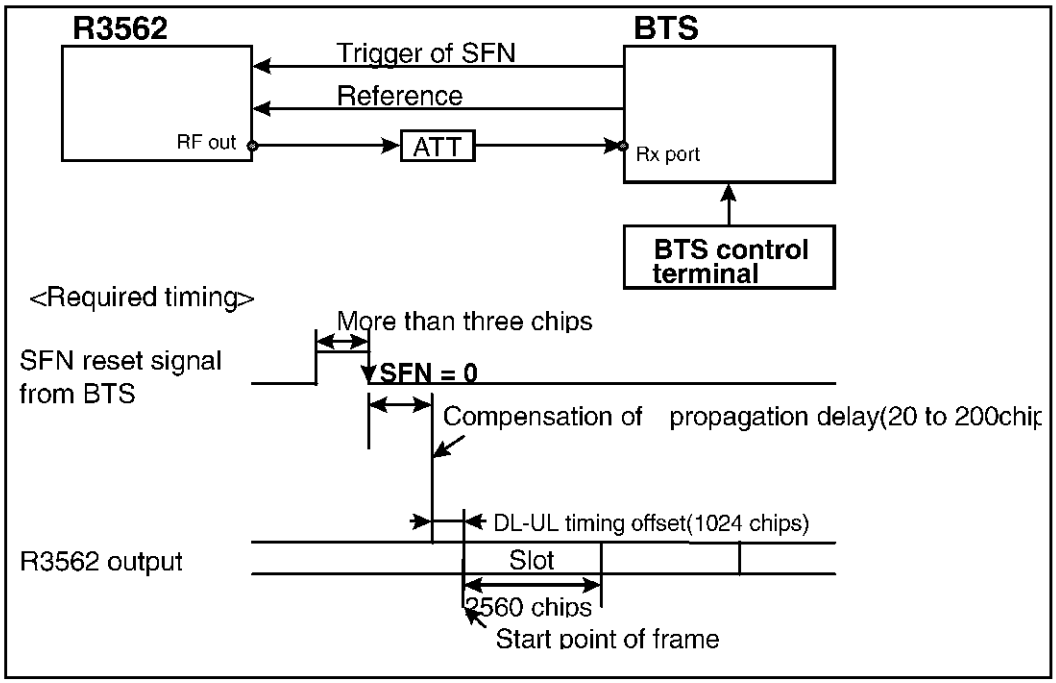


Figure 4-1 Receiver Test of BTS

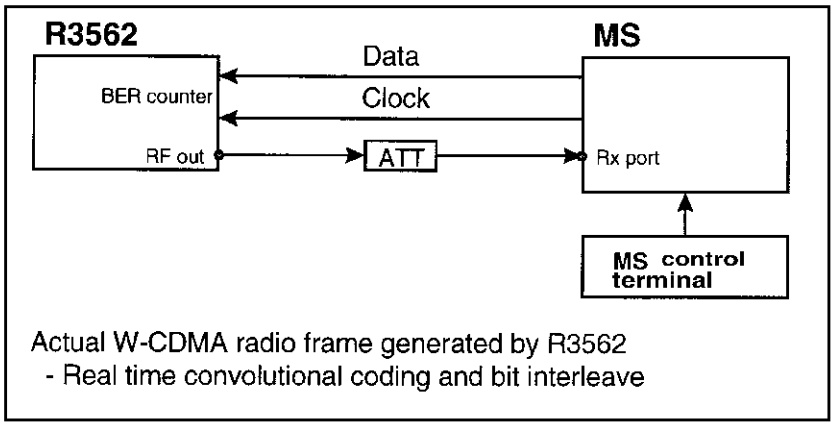


Figure 4-2 Receiver Test of MS

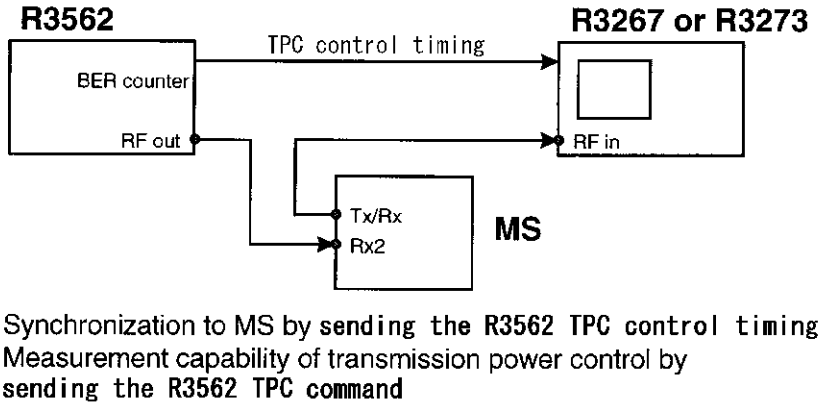


Figure 4-3 Transmitter Test of MS Using the R3562

(3) Synthesizer/YTO section

Constructing multiple PLL circuits in synchronization with the reference frequency makes it possible to implement the high purity YTO local signal of 100 MHz steps.

(4) Modulator/Up converter section

First, performs orthogonal modulation using the local signal of 421 MHz, I and Q signals. Next, generates the 4.23 GHz IF signal which is higher than the RF OUT frequency using the 3.18 GHz local signal. Finally, obtains the final RF output frequency by down-converting this IF signal using the YTO local signal and removing spurious signals using a filter.

(5) RF AMP section

This section consists of the RF signal amplifier and the high accuracy level control circuit. It realizes an output level resolution of 0.1 dB. In addition to the normal method of AUTO mode, the S/H (Sample and Hold) mode to cope with wide base band multiplexing and the Hold mode are provided as ALC mode.

(6) ATT section

Using a long life programmable attenuator, it is possible for you to install the RF OUT output range of -125 dBm to 0 dBm. The accuracy of this attenuator and the characteristics of RF AMP section are indicated on each control board so that the accurately calibrated signal can be output from the RF OUT connector on the front panel.

4.2 Signal Format

PN pattern signals coded based on the TS25.101 or TS25.104 standard and DPDCH signals directly mapped with a PN pattern are provided.
These signals comply with V3.3.0.

UL (Up Link) : TS25.104 - 12.2kbps, 64kbps, 144kbps, 384kbps

Direct Mapping - 30kbps,60kbps,120kbps,240kbps,480kbps,960kbps

DL (Down Link) : TS25.101 - 12.2kbps, 64kbps, 144kbps, 384kbps

Direct Mapping - 60kbps,120kbps,240kbps,480kbps,960kbps

The FEC (Conv or Turbo) coding is turned off while coding signals by adding dummy bits of all 0s.
The CRC can be made errors. There are two modes: one is INVERSE mode that inverts all CRCs to make them totally failed pattern, and the other is ADDERR mode that inverts part of CRCs to obtain a block error of 1%.

Link	Frame	DTCH FEC	Bit Rate (bps)	Reference
UP	TS25.104	ON	12.2 k	Figure A-1
			64 k	Figure A-2
			144 k	Figure A-3
			384 k	Figure A-4
		OFF	12.2 k	Figure A-5
			64 k	Figure A-6
			144 k	Figure A-7
			384 k	Figure A-8
	PN	-	30 k	Figure A-9
			60 k	Figure A-10
			120 k	Figure A-11
			240 k	Figure A-12
			480 k	Figure A-13
			960 k	Figure A-14
DOWN	TS25.101	ON	12.2 k	Figure A-15
			64 k	Figure A-16
			144 k	Figure A-17
			384 k	Figure A-18
		OFF	12.2 k	Figure A-19
			64 k	Figure A-20
			144 k	Figure A-21
			384 k	Figure A-22
	PN	-	60 k	Figure A-23
			120 k	Figure A-24
			240 k	Figure A-25
			480 k	Figure A-26
			960 k	Figure A-27

4.3 Block Diagram

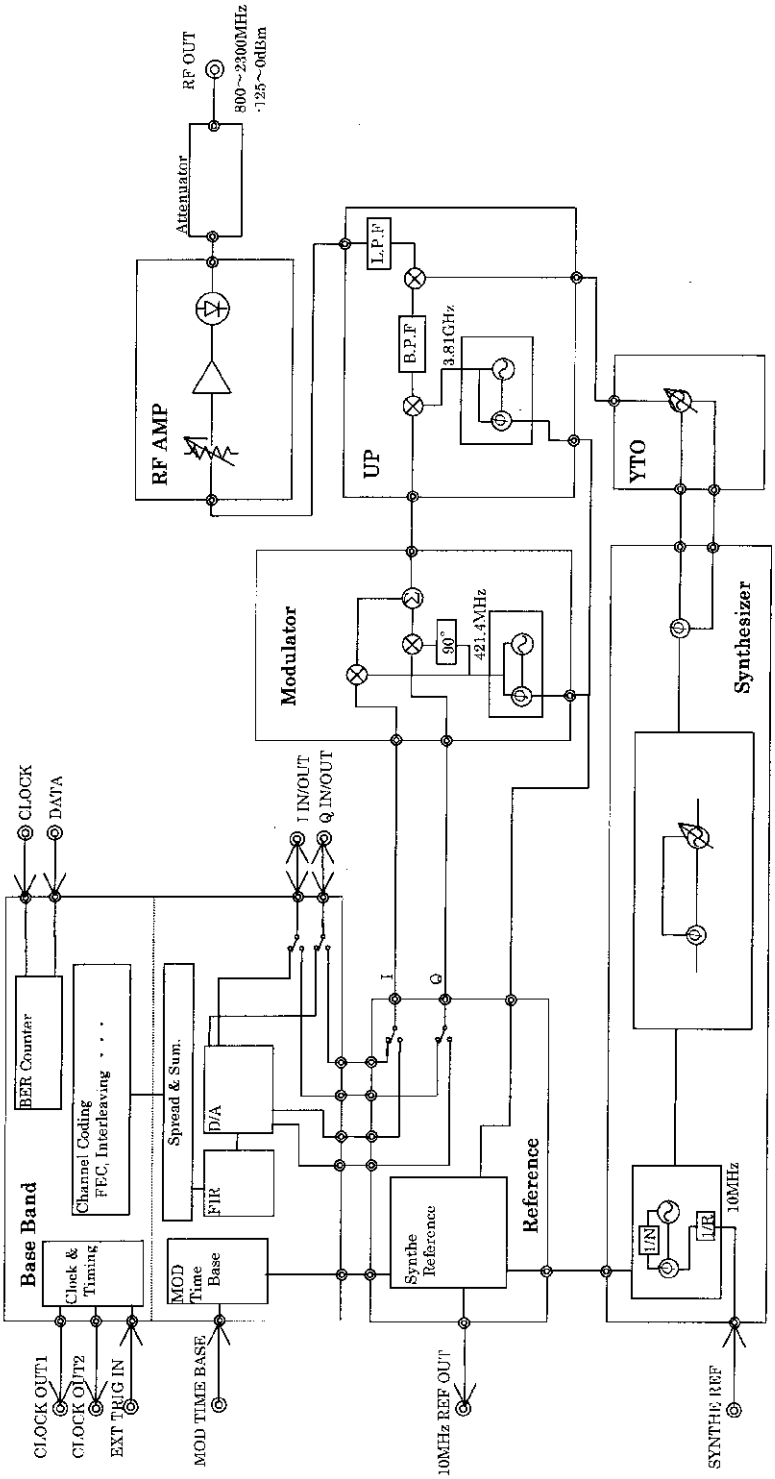


Figure 4-4 R3562 Block Diagram

5 GPIB

This chapter describes how to control the instrument using the GPIB remote control functions, and gives a list of the GPIB commands.

5.1 GPIB Remote Programming

The instrument is equipped with a GPIB (General Purpose Interface Bus) that complies with IEEE Standard 488.1-1978. This bus allows you to attach and use an external device to remotely control the instrument.

5.1.1 GPIB

The GPIB is a high-performance interface bus used to connect measuring instruments to a computer. IEEE Standard 488.1-1978 defines the operations of the GPIB. Since the GPIB has a bus-configured interface, connected devices are designated by assigning them a specific address. You can connect up to 15 devices in parallel using a single bus. GPIB devices perform one or more of the following functions:

- Talker Sends data to the bus. Only one active talker can exist on the GPIB bus.
- Listener Receives data from the bus. Multiple active listeners can exist on the GPIB bus.
- Controller Specifies which devices are designated as "talkers" or "listeners". Only one active controller can operate on the GPIB bus. Controllers used to control IFC and REN messages are referred to as system controllers.

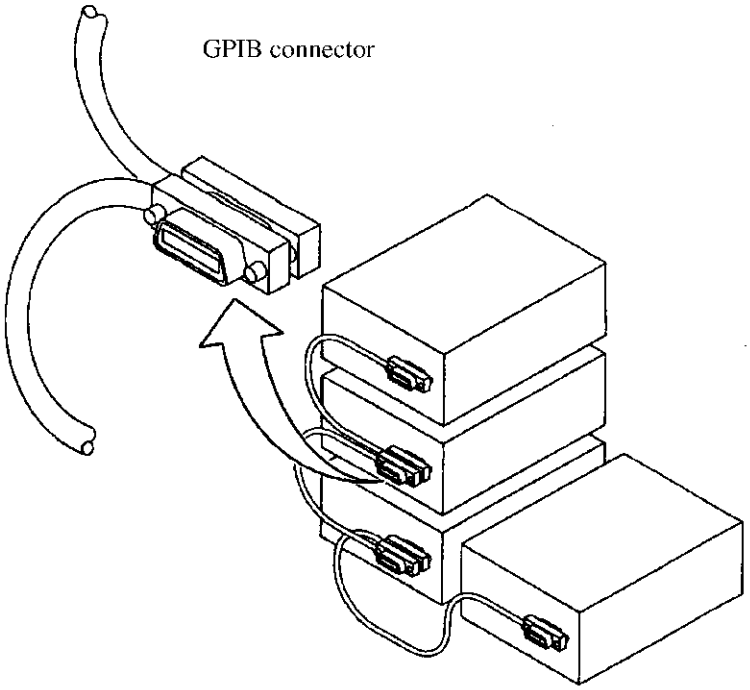
When there are multiple controllers attached to the bus, the system controller becomes the active controller by default. Other devices that can act as controllers operate as addressable devices when the system is activated.
The TCT (Take Control) interface message is used to set a controller other than the system controller as the active controller. After this setting is made, the system controller becomes inactive.
The controller controls the entire system by sending interface messages or device messages to each measuring instrument. The functions of the messages are:

- Interface message:messages used to control the GPIB bus
- Device message: messages used to control specific devices

5.1.2 GPIB Setup

(1) Connecting the GPIB

The following figure shows the standard GPIB connector and how it can be connected in parallel, or "stacked" with other connectors. Attach the GPIB connectors and secure them by tightening the screws to prevent them from coming apart during use.



The following conditions should be observed when using a GPIB interface:

- The total GPIB cable length in a single bus system must not be more than 20m (you can calculate the current cable length using the formula total length = n × 2m, where, n is the number of devices to be connected, including the GPIB controller).
- No more than 15 devices can be connected to a single bus system.
- There are no restrictions concerning the method of connection between cables. However, no more than three GPIB connectors should be connected to a single device, since more than this may damage the connector mounting due to excessive strain.

(Example) The total cable length in a system with five devices should be 10m or less (2m × 5 devices = 10m). There is no restriction on the length of the cables between the individual devices as long as the total length does not exceed 10m. However, if you connect 10 devices or more, make sure that at least some of the cables attaching the devices are less than 2m so that the total is less than 20m.

(2) Setting the GPIB address

The GPIB address of the instrument has been set to 8 as the factory default. When the GPIB address must be changed, use the GPIB address switches on the rear panel to change it.

NOTE: ***The address which is already set is enabled when the power supply is turned on.***

5.2 GPIB Bus Functions

(1) GPIB Interface Functions

Code	Description
SH1	Source handshake
AH1	Acceptor handshake
T6	Basic talker, serial polling, listener-specified listerner cancel
TE0	Extended talker (not available)
L4	Basic listener function, talker-specified listerner cancel
LE0	Extended listener (not available)
SR1	Service request function
RL1	Remote, local, local lockout
PP0	Parallel polling (not available)
DC1	Device clear
DT0	Device trigger (not available)
C1	System controller
C2	IFC transmission, Controller Charging Functions
C3	REN Transmission Function
C4	SRQ Response function
C12	Interface message Transmission Function and Control privilege Exchanging Function
E1	Using open-collector bus driver

(2) Responses to Interface Messages

The IEEE Standard 488.1-1978 defines how the instrument responds to interface messages. The responses are described in this section.

For information on how to send interface messages to the instrument, refer to the instruction manual of the controller you are using.

- Interface Clear (IFC)

  The IFC message is transmitted directly to the instrument through a signal line. The message allows the instrument to stop the operation of the GPIB bus. Although all input/output operation is stopped, the input/output buffer is not cleared. Note that the DCL is used to clear the buffer.

- Remote Enable (REN)

  The REN message is transmitted directly to the instrument through a signal line. If the instrument is specified as a listener when the message is true, the instrument is in remote mode. The instrument remains in remote mode until the GTL message is received or REN becomes false.

(3) Message Exchange Protocol

The instrument receives program messages from controllers or other devices through the GPIB bus and generates response data. Program messages include commands, queries (commands used to query response data) and data. The procedure used to exchange these commands, queries and data is explained in this section.

- GPIB buffers

  The instrument has two buffers as follows:

  - Input buffer

    This is a buffer that temporarily stores data to analyze a command.

  - Output buffer

    This is a buffer that temporarily stores data until data from the controller is stored.

- Message Exchange

  GPIB control between a controller and a device consists of two main elements: query and response data generation. These are explained below.

  - Parser

    The parser receives command messages in the order of reception from the input buffer, analyzes the syntax, and determines what the received command is.

  - Response Data Generation

    When the parser determines what the query is, the instrument generates data in the output buffer in response (that is, to output data a query must be sent immediately before the data).

5.3 How to Use GPIB

5.3.1 GPIB Command Syntax

There are two formats depending on the GPIB command type as shown below.

(1) A format consisting of a header, a parameter, and a space which is a delimiter between a header and a parameter.

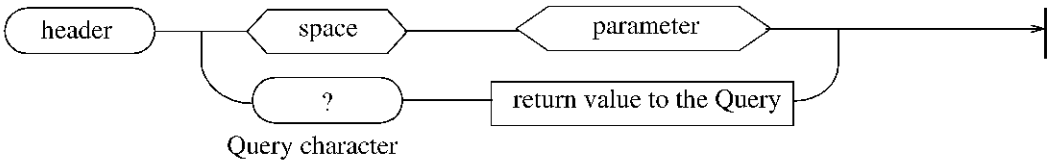


Figure 5-1 COMMAND SYNTAX - 1

Example: When setting the frequency to 1000 MHz →FR 1000MZ

(2) A format consisting of two headers delimited by a colon, a parameter, and a space which is a delimiter between the second header and the parameter.

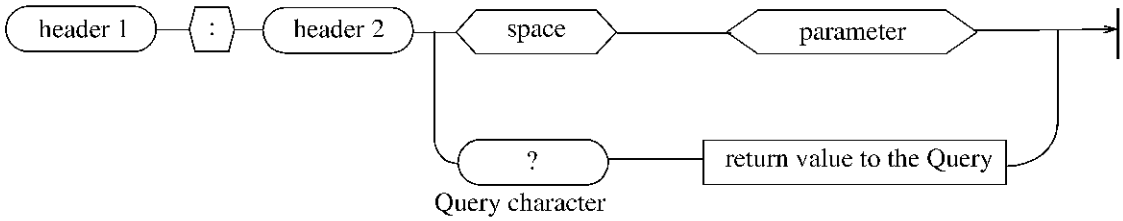


Figure 5-2 COMMAND SYNTAX - 2

Example: To make DTCH data in DOWN LINK PN9 →DTCH:DATA PN9

5.3.2 Status Byte

The meanings of each bit of the status byte and conditions for setting or resetting it are described as follows.

b7	b6	b5	b4	b3	b2	b1	b0
X	X	X	X	X	X	X	X

b0: Measurement end
"1" is set when the measurement (BER) has been completed.
"0" is set by the status byte clearing command: CSB or the status byte output command: *STB.

b1: Syntax error
"1" is set when there is a syntax error or a setting error in the program codes received.
"0" is set when the next program code is received.

b2: Measurement error
"1" is set when an error occurs during the measurement (BER)
"0" is set by the status byte clearing command: CSB or the status register output command: MST?.

b3: Indicates that the calibration has been completed.
"1" is set when the calibration has been completed.
"0" is set by the command, CSB, *STB, or CMOD.

b4: Indicates that a calibration error occurred.
"1" is set when a calibration error occurred.
"0" is set by the command, CSB, *STB or CMOD.
In addition, "0" is set when the calibration has normally been completed.

b6: Indicates that the service request is being transmitted.
"1" is set when one of bits b1, b3, and b4 is set to "1".
"0" is set when all of bits b1 and b3, and b4 are set to "0".
This bit cannot be disabled by the status byte enabling command: *SRE.
This bit is always enabled.

5.3.3 Measurement Status Register

The meaning of each bit of the measurement status register and conditions for setting or resetting it are described as follows.

b7	b6	b5	b4	b3	b2	b1	b0
X	X	X	X	X	X	X	X

b0: Sync error
"1" is set when the synchronization with the data at the BER measurement DATA connector cannot be obtained during the measurement (BER).
"0" is set by the status byte or measurement status register clearing command: CSB or the measurement status register output command: MST?.

b1: Clock error
"1" is set when the CLOCK signal is not detected at the BER measurement CLOCK connector during the measurement (BER).
"0" is set by the status byte or measurement status register clearing command: CSB or the measurement status register output command: MST?.

5.3.4 GPIB Sample Program

CAUTION ***This sample program uses Visual Basic 4.0 as programming language. The GPIB control board and control driver are National Instruments made.***

<Program example> Reads and displays the BER measurement results after making settings.

```
'*************************************************************************
' === sample program ===
' OUTPUT CONDITION >>> FREQUENCY          : 2110MHz
'                 OUTPUT LEVEL        : -80dBm
'                 LINK                : DOWNLINK
'*************************************************************************
Dim R3562 As Integer
Dim Resp As Integer

Dim BoardID As Integer
Dim read_buf As String

Call ibdev(0, 8, 0, T10s, 1, 0, R3562)          'GPIB device open
Call ibclr(R3562)                               'Device Clear
Call ibwrt(R3562, "IP")                         'Preset
Call ibwrt(R3562, "FR 2110MZ")                  'Frequency 2110MHz
Call ibwrt(R3562, "AP -80DM")                   'Output level -80dBm

Call ibwrt(R3562, "LINK DN")                    'Down link
Call ibwrt(R3562, "DNDPCH:CCONF SI11")          'DPCH ChannelConfiguration InformationData,SlotFormat No.11
Call ibwrt(R3562, "DNDTCH:DATA PN9")            'DTCH Data PN9
Call ibwrt(R3562, "DNDTCH:FEC ON")              'DTCH FEC ON
Call ibwrt(R3562, "DNDTCH:CRC NORMAL")          'DTCH CRC NORMAL
Call ibwrt(R3562, "DNDCCH:DATA PN9")            'DCCH Data PN9
Call ibwrt(R3562, "DNDCCH:FEC ON")              'DCCH FEC ON
Call ibwrt(R3562, "DNDCCH:CRC INVERSE")         'DCCH CRC INVERSE
Call ibwrt(R3562, "DNDPCCH:TFCI 0")             'TFCI Code 0
Call ibwrt(R3562, "DNDPCCH:TPCR 1")             'TPC Slot Length 1

Call ibwrt(R3562, "DNDPCH:CCODE 127")           'Channelization Code Number 127
Call ibwrt(R3562, "DNSCODE 0")                  'Scrambling Code Number 0
```

```
Call ibwrt(R3562, "DNCPICH:GAINP 0.0")          'CPICH Power Ratio   0.0dB
Call ibwrt(R3562, "DNPCCPCH:GAINP 0.0")         'P-CCPCH Power Ratio 0.0dB
Call ibwrt(R3562, "DNDPCH:GAINP 0.0")           'DPCH Power Ratio    0.0dB

Call ibwrt(R3562, "BMDAT PN9")                  'Measure Data  PN9
Call ibwrt(R3562, "BLEN 2556")                  'Bit length  2556 bits
Call ibwrt(R3562, "BCLK NEG")                   'Clock polarity negative edge
Call ibwrt(R3562, "BDAT POS")                   'Data propriety Positive

Call ibfind("GPIB0", BoardID)
Call ibwrt(R3562, "*SRE 1")                      'Measure END Status enable
Call ibwrt(R3562, "CSB")                        'Status Bite clear
Call ibwrt(R3562, "SRQ 1")                      'SRQ ON mode
Call ibgts(BoardID, 0)

Call ibwrt(R3562, "BER")                        'BER Measure start

    DoEvents
    Do
        Call WaitSRQ(BoardID, Resp)             'wait Messier end
        If Resp = 1 Then Exit Do
    Loop

Call ibwrt(R3562, "BER?")                       'Read BER value
read_buf = Space(20)
Call ibrd(R3562, read_buf)
Text1.Text = read_buf                           'Display BER value
```

5.4 List of GPIB Commands

Table 5-1 Commands Related to the System

Function	Command Header	Parameter		Query Command	Query Data
Preset (initialization)	IP	---		---	---
SRQ signal control	SRQ	0	Does not transmit SRQ.	SRQ?	0 thru 1
		1	Transmits SRQ.		
Status byte clearing	CSB	---		---	---
Status byte output	*STB	---		*STB?	0 thru 255
Status byte enabling	*SRE	0 thru 255	(1: Enable)	*SRE?	0 thru 255
Measurement status output	---	---		MST?	0 thru 255
Terminator specification	DEL	0	LF <EOI>	DEL?	0 thru 3
		1	LF		
		2	EOI		
		3	CR LF <EOI>		
System revision reading	---	---		IDN?	See to Table 5-10

Table 5-2 Commands Related to the Output Frequency

Function	Command Header	Parameter		Query Command	Query Data
<Direct Input>					
Output frequency setting	FR	Real number HZ	Hz	FR?	See Table 5-11
		KZ	kHz		
		MZ	MHz		
		GZ	GHz		
<Channel Number Input>					
Channel number setting	CH	Integer		CH?	Integer
Start frequency setting	CSF	Real number HZ	Hz	CSF?	See Table 5-11
		KZ	kHz		
		MZ	MHz		
		GZ	GHz		
Channel spacing setting	CSP	Real number HZ	Hz	CSP?	See Table 5-11
		KZ	kHz		
		MZ	MHz		
		GZ	GHz		
Channel start number setting	CSN	Integer		CSN?	Integer

Table 5-3 Commands Related to the Output Level

Function	Command Header	Parameter		Query Command	Query Data
Output ON/OFF setting	OUT	ON/OFF		OUT?	ON/OFF
Output level setting	AP	Real number DM	dBm	AP?	See Table 5-11
		Real number DU	dBμVemf		
Query data unit specification	UNL	0	dBm	UNL?	0 thru 1
		1	dBμVemf		
Output level upper limit setting	OLM	Real number DM	dBm	OLM?	See Table 5-11
		Real number DU	dBμVemf		
Output level offset ON/ OFF setting	OOF	ON/OFF		OOF?	ON/OFF
Output level offset value setting	OOS	Real number DB	dB	OOS?	See Table 5-11
ALC mode setting	ALCM	AUTO	Auto	ALCM?	AUTO/SH/ HOLD
		SH	Sample & Hold		
		HOLD	Hold		

Table 5-4 Commands Related to Modulation

Function	Command Header	Parameter	Query Command	Query Data
<General setting-related commands>				
Modulation ON/OFF setting	MOD	ON/OFF	MOD?	ON/OFF
I/Q connector direction specification	IQDIR	OFF/INPUT/OUTPUT	IQDIR?	OFF/INPUT/ OUTPUT
LINK setting	LINK	UP/DN	LINK?	UP/DN
<UP LINK-related commands>				
[DPDCH]				
Channel configuration	UPDPDCH:CCONF	SP1/SP2/SP3/SP4/SP5/SP6/ SI2/SI4/SI5/SI6	UPDPDCH:CCONF?	SP1/SP2/ SP3/SP4/ SP5/SP6/SI2/ SI4/SI5/SI6
DPDCH data pattern setting	UPDPDCH:DATA	PN9/PN15/ALL0/ALL1/ PN9ERR	UPDPDCH:DATA?	PN9/PN15/ ALL0/ALL1/ PN9ERR
DTCH data setting	UPDTCH:DATA	PN9/PN15/ALL0/ALL1/ PN9ERR	UPDTCH:DATA?	PN9/PN15/ ALL0/ALL1/ PN9ERR
DTCH FEC ON/OFF setting	UPDTCH:FEC	ON/OFF	UPDTCH:FEC?	ON/OFF
DTCH CRC ON/OFF setting	UPDTCH:CRC	NORMAL/INVERSE/ ADDERR	UPDTCH:CRC?	NORMAL/ INVERSE/ ADDERR
DCCH data setting	UPDCCH:DATA	PN9/PN15/ALL0/ALL1/ PN9ERR	UPDCCH:DATA?	PN9/PN15/ ALL0/ALL1/ PN9ERR
DCCH FEC ON/OFF setting	UPDCCH:FEC	ON/OFF	UPDCCH:FEC?	ON/OFF
DCCH CRC ON/OFF setting	UPDCCH:CRC	NORMAL/INVERSE/ ADDERR	UPDCCH:CRC?	NORMAL/ INVERSE/ ADDERR

Function	Command Header	Parameter	Query Command	Query Data
<UP LINK-related commands>				
[DPCCH]				
Slot format selection	UPDPCCH:PFORM	0 thru 5	UPDPCCH:PFORM?	0 thru 5
TFCI code word	UPDPCCH:TFCI	000 thru 3FF[in hexadecimal]	UPDPCCH:TFCI?	000 thru 3FF
FBI bit pattern	UPDPCCH:FBI	0 thru 3FFFFFFF [in hexadecimal]	UPDPCCH:FBI?	0 thru 3FFFFFFF [in hexadecimal]
TPC slot length in Repeat mode	UPDPCCH:TPCR	1 thru 75	UPDPCCH:TPCR?	1 thru 75
TPC Insert slot length setting in Insert mode (TPC Insert start timing generation)	TPCI	-75 thru -1 or 1 thru 75	---	---
[Spreading setting]				
Scrambling code setting	UPSCODE	0 thru 16777215 [in decimal]	UPSCODE?	0 thru 16777215 [in decimal]
[Gain Parameter setting]				
DPCCH gain parameter code relative to the DPDCH	UPDPCCH:GAINC	0 thru 15	UPDPCCH:GAINC?	0 thru 15
DPDCH gain parameter code relative to the DPCCH	UPDPDCH:GAINC	0 thru 15	UPDPDCH:GAINC?	0 thru 15
DPCCH to DPDCH power ratio	UPDPCCH:GAINP	Real number DB	UPDPCCH:GAINP?	See Table 5-11
DPDCH to DPCCH power ratio	UPDPDCH:GAINP	Real number DB	UPDPDCH:GAINP?	See Table 5-11

Function	Command Header	Parameter	Query Command	Query Data
<DOWN LINK-related commands>				
[DPCH]				
Channel configuration setting	DNDPCH:CCONF	SP8/SP9/SP10/SP11/SP12/ SP13/SP14/SP15/ SI11/SI13/SI14/SI15	DNDPCH:CCONF?	SP8/SP9/ SP10/SP11/ SP12/SP13/ SP14/SP15/ SI11/SI13/ SI14/SI15
[DPDCH]				
DPDCH data pattern setting	DNDPDCH:DATA	PN9/PN15/ALL0/ALL1/ PN9ERR	DNDPDCH:DATA?	PN9/PN15/ ALL0/ALL1/ PN9ERR
DTCH data setting	DNDTCH:DATA	PN9/PN15/ALL0/ALL1/ PN9ERR	DNDTCH:DATA?	PN9/PN15/ ALL0/ALL1/ PN9ERR
DTCH FEC ON/OFF setting	DNDTCH:FEC	ON/OFF	DNDTCH:FEC?	ON/OFF
DTCH CRC ON/OFF setting	DNDTCH:CRC	NORMAL/INVERSE/ADDERR	DNDTCH:CRC?	NORMAL/ INVERSE/ ADDERR
DCCH data setting	DNDCCH:DATA	PN9/PN15/ALL0/ALL1/ PN9ERR	DNDCCH:DATA?	PN9/PN15/ ALL0/ALL1/ PN9ERR
DCCH FEC ON/OFF setting	DNDCCH:FEC	ON/OFF	DNDCCH:FEC?	ON/OFF
DCCH CRC ON/OFF setting	DNDCCH:CRC	NORMAL/INVERSE/ADDERR	DNDCCH:CRC?	NORMAL/ INVERSE/ ADDERR
[DPCCH]				
TFCI code word	DNDPCCH:TFCI	000 thru 3FF[in hexadecimal])	DNDPCCH:TFCI?	000 thru 3FF[in hexa-decimal]
TPC slot length in Repeat mode	DNDPCCH:TPCR	1 thru 75	DNDPCCH:TPCR?	1 thru 75

Function	Command Header	Parameter	Query Command	Query Data
TPC Insert slot length setting in Insert mode (TPC Insert start timing generation)	TPCI	-75 thru -1 or 1 thru 75	---	---
[Spreading setting]				
DPCH Channelization code setting	DNDPCH:CCODE	2 thru 127 [in decimal]	DNDPCH:CCODE?	2 thru 127 [in decimal]
Scrambling code setting	DNSCODE	0 thru 8191 [in decimal]	DNSCODE?	0 thru 8191 [in decimal]
[Channel power ratio setting]				
CPICH power setting	DNCPICH:GAINP	Real number DB	DNCPICH:GAINP?	See Table 5-11
P-CCPCH power setting	DNPCCPCH:GAINP	Real number DB	DNPCCPCH:GAINP?	See Table 5-11
DPCH power setting	DNDPCH:GAINP	Real number DB	DNDPCH:GAINP?	See Table 5-11

Table 5-5 Commands Related to the External I/Q

Function	Command Header	Parameter	Query Command	Query Data
I signal input gain adjustment	LBAI	Integer	LBAI?	Integer
Q signal input gain adjustment	LBAQ	Integer	LBAQ?	Integer
I/Q signal input phase adjustment	PHA	Integer	PHA?	Integer
I signal output gain adjustment	LOAI	Integer	LOAI?	Integer
Q signal output gain adjustment	LOAQ	Integer	LOAQ?	Integer

Table 5-6 Commands Related to the BER Counter

Function	Command Header	Parameter	Query Command	Query Data
Measurement start/Measurement result output	BER	---	BER?	See Table 5-11
Measurement stop	STOP	---	---	---
Measurement data specification	BMDAT	PN9/PN15	BMDAT?	PN9/PN15
Measurement bit length specification	BLEN	Integer	BLEN?	Integer
Input clock polarity	BCLK	POS/NEG	BCLK?	POS/NEG
Input data polarity	BDAT	POS/NEG	BDAT?	POS/NEG

Table 5-7 Commands Related to the Self-Test/Calibration

Function	Command Header	Parameter	Query Command	Query Data
Modulator calibration execution	CMOD	---	---	---
Modulator calibration correction ON/OFF	CMC	ON/OFF	CMC?	ON/OFF
Self-Test execution/Result output	---	---	*TST?	Integer

Table 5-8 Commands Related to the Clock/Timing Signal

Function	Command Header	Parameter		Query Command	Query Data
SYNTHE REF IN setting	RSYN	C0	1MHz External	RSYN?	C0/C1/C2/C3/ INTERNAL
		C1	2MHz External		
		C2	5MHz External		
		C3	10MHz External		
		C4	15MHz External		
		INTERNAL	Internal reference source		
10 MHz reference source adjustment	SRAD	Integer		SRAD?	Integer
MOD TIME BASE IN setting	MODTB	M0	3.84MHz External	MODTB?	M0/M1/M2/ INTERNAL
		M1	7.68MHz External		
		M2	15.36MHz External		
		INTERNAL	Internal reference source		
Timing synchronization command	ETRG	---		---	---
Polarity of EXT TRIG signal	ETRGPOL	POS/NEG		ETRGPOL?	POS/NEG
EXT TRIG offset setting	ETRGOFFSET	Integer		ETRGOFFSET	Integer

Function	Command Header	Parameter		Query Command	Query Data
CLOCK OUT 1 connector specification	REAROUT1	OFF		REAROUT1?	OFF/CHIP/ RADIO/ SLOT/TPCR /TPCI
		CHIP	Chip Clock		
		RADIO	Radio Frame		
		SLOT	Slot Tiimming		
		TPCR	TPC Sequence Timming		
		TPCI	TPC Insert Timming		
CLOCK OUT 2 connector specification	REAROUT2	OFF		REAROUT2?	OFF/CHIP/ RADIO/ SLOT/TPCR /TPCI
		CHIP	Chip Clock		
		RADIO	Radio Frame		
		SLOT	Slot Tiimming		
		TPCR	TPC Sequence Timming		
		TPCI	TPC Insert Timming		

Table 5-9 Commands related to saving/recalling set conditions

Function	Command Header	Parameter	Query Command	Query Data
Set condition saving	SAVC	Integer		
Set condition recalling	RECC	Integer		

Table 5-10 System Revision Format

Product Name	MS	Product Serial Number	MS	System Code	MS	System Revision1	MS	System Revision2
R3562	,	9-digit integer	,	3GPP3.3.0	,	A00	/	A00

(NOTE) MS:Message Separator

Table 5-11 Output Format for Numerical Data

Item			Output Format	Unit
Output frequency-related data	Direct input		D.DDDDDDDDDeD	Hz
	Channel number input	Channel spacing setting		
		Start frequency		
Output level-related data	Output level setting		D.DDDeD D.DDDe-D -D.DDDeD -D.DDDe-D	(NOTE)
	Output level upper limit setting			
	Output level offset value setting			dB
Modulation-related data	UP LINK	Power ratio of the DPCCH to DPDCH		
		Power ratio of the DPDCH to DPCCH		
	DOWN LINK	CPICH power setting		
		P-CCPCH power setting		
		DPCH power setting		
BER counter-specific data	Measurement result		D.DDDDDDDe-D	-

(NOTE) The unit can be specified using "Query data unit specification" command.

6 PERFORMANCE VERIFICATION

This chapter describes instruments and procedures used to verify that the R3562 performance complies with the specifications.

NOTE: ***Before executing performance verification, carry out the warm-ups and calibrations for the R3562 and other instruments used for measurement.***

6.1 Instruments Used and Specifications

A list of instruments used is shown below.

NOTE: ***Use instruments that conform to the specified standards.***

Table 6-1 List of Instruments Used

No.	Instrument Name	Required Specification	Recommended Instrument
1	Frequency Reference Source	Frequency: 10 MHz Stability: 5×10^{-10}/day Output level: 0.5 Vrms at 50 Ω	R3031 ADVANTEST
2	Spectrum Analyzer	Frequency range: 100 Hz to 8 GHz Noise side band: -110 dBc/Hz (offset: 10 kHz) Mean noise level: -125 dBm/Hz W-CDMA modulation analysis function	R3267 + 01 + 62 ADVANTEST
3	Power Meter	Frequency range: 800 MHz to 6600 MHz Level range: -20 dBm to +10 dBm	NRVS + NRV-Z51 Rode&Schwarz
4	Attenuator	Attenuation: 0 to 125 dB Resolution: 1 dB	RSG Rode&Schwarz
5	Preamplifier	Frequency band: 800 MHz to 2300 MHz Gain: > 15 dB Noise figure: >5 dB	
6	Arbitrary Wave Generator	Clock frequency: 250 MHz Output voltage: 50 mV to 5 Vp-p	AWG2021 Tektronix
7	PN Signal Generator	Data pattern: PN9/PN15 Data rate: 5 Mbps Level: TTL	
8	Function Generator	Frequency range: 100 kHz to 20 MHz Level: TTL	HP3325B Hewlett Packard

No.	Instrument Name	Required Specification	Recommended Instrument
9	Oscilloscope	Frequency band: 500 MHz Sampling rate: 2 GHz	TDS-754C Tektronix

6.2 Performance Verification

6.2.1 Output Frequency

Verify the range and resolution of the output frequency in sync with the internal reference source.

(1) Specifications

Range: 800 MHz to 2300 MHz

Resolution: 100 Hz

Accuracy: Depends on the accuracy of the reference source.

(2) Setup

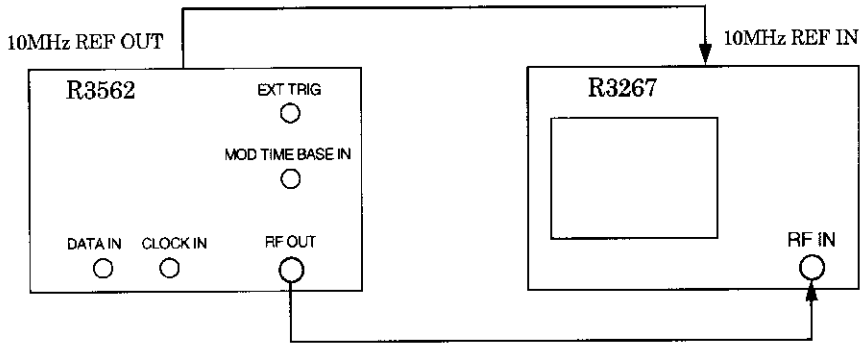


Figure 6-1 Setup (Output Frequency)

(3) Procedure

1. Set the R3562 as follows.

   Frequency: 800 MHz
   Output level: 0 dBm
   Modulation: OFF

2. Match the center frequency of the R3267 with the frequency of the R3562, then verify that the frequency is within ±1 count using the frequency counter function.

3. Repeat the above measurement by changing the R3562 frequency up to 2300 MHz as shown in the performance check sheet.

6.2.2 Output Level

Verify the output level-frequency characteristics at the RF OUT connector and the levels in each modulation mode with the power meter. Verify levels that are outside of the power meter measurement range using the reference attenuator and spectrum analyzer.

(1) Specifications

Range: -125 dBm to 0 dBm
Accuracy: At 25 °C ± 10°C
[Frequency ≤1000 MHz]
< ± 1.5 dB (-120 dBm to 0 dBm)
< ± 2.5 dB (-125 dBm to -120.1 dBm)
[Frequency > 1000 MHz]
< ± 1.5 dB (-110 dBm to 0 dBm)
< ± 2.5 dB (-125 dBm to -110.1 dBm)

(2) Measurement within the power meter range

(a) Setup

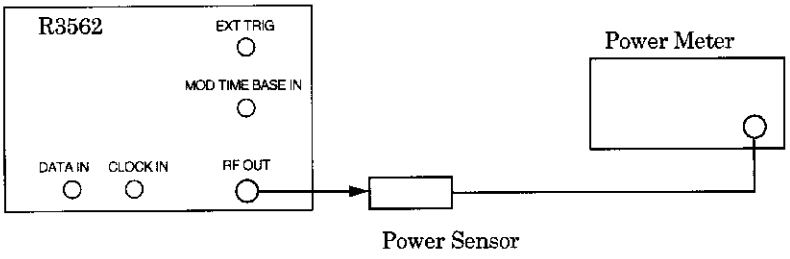


Figure 6-2 Setup (Measurement within the power meter range)

(b) Procedure

1. Set the R3562 as follows.

   Frequency: 800 MHz
   Output level: 0 dBm
   Modulation: OFF

2. Verify the output levels using the power meter by changing the frequency from 800 MHz to 2300 MHz.

3. Repeat the same measurement after the modulation has been turned on.

(3) Measurement outside of the power meter range

(a) Setup

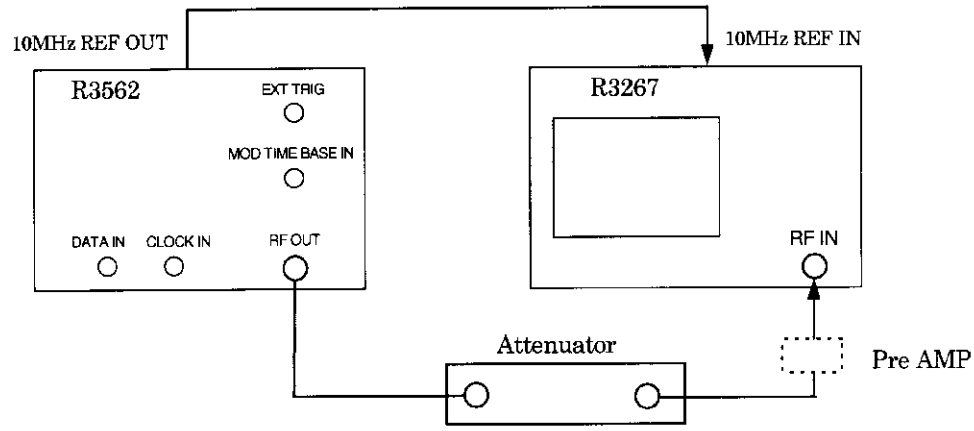


Figure 6-3 Setup (Measurement outside of the power meter range)

(b) Procedure

1. Set the R3562 modulation to OFF.

2. Set the R3562 output level to the reference level within the power meter range (for example -10 dBm) and connect an external attenuator that is set to 16 dB, then measure the output waveform level using the R3267.

3. Set the external attenuator to 0 dB and decrease the R3562 output level by the amount of this attenuation, then measure the output waveform level at the R3267.

4. Calculate the R3562 output level accuracy using the difference of levels measured in Steps 2 and 3, and the reference level measured by the power meter.

5. Verify the R3562 output levels using the procedure outlined in Steps 2 to 4 by changing the output level from the set level to the level 125 dBm down from the set level, according to the performance check sheet.

---

*NOTE: **Add the preamplifier to the input connector of the R3267 when measuring low levels. In addition, stabilize the measured values using the averaging function.***

6.2.3 Signal Purity

Measure harmonic waves, non-harmonic waves, SSB phase noises, and ACP (adjacent channel leakage power) of the output signal at the RF OUT connector using the spectrum analyzer.

(1) Specifications

Harmonic wave:	<-30 dBc
Non-harmonic wave:	<-60 dBc (offset > 10 kHz)
SSB phase noise:	<-107 dBc/Hz (offset: 50 kHz at 1000 MHz)
ACP:	<-45 dBc (offset: 5 MHz)
	<-55 dBc (offset: 10 MHz)

(2) Setup

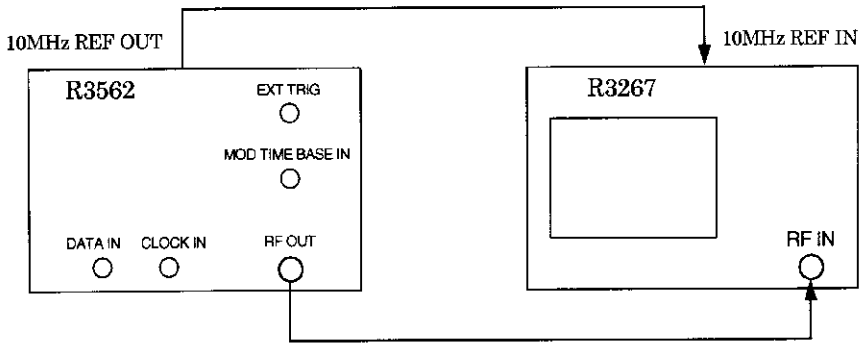


Figure 6-4 Setup (Single Purity)

(3) Procedure

Measurement of harmonic waves

1. Set the R3562 as follows.

   Frequency: 800 MHz
   Output level: 0 dBm
   Modulation: OFF

2. Match the center frequency of the R3267 spectrum analyzer with the output frequency of the R3562, then measure the level of the fundamental wave.

   Frequency span (for example: 500 kHz)

3. Set the center frequency of the R3562 to a value two times the R3267 output frequency, then measure the level of the secondary harmonic wave. Verify that the difference between the secondary harmonic wave level and the fundamental wave level is within the specified value.

4. Repeat the measurements using the same procedure outlined in Steps 2 and 3 by changing the R3562 output frequency to up to 2300 MHz according to the performance check sheet.

Measurement of non-harmonic waves

1. Set the R3562 as follows.

   Frequency: 800 MHz
   Output level: 0 dBm
   Modulation: OFF

2. Match the center frequency of the R3267 spectrum analyzer with the output frequency of the R3562, then verify the difference between the fundamental wave levels and non-harmonic wave levels by switching the frequency span (for example from50 kHz to 500 kHz, and then to 50 MHz).

3. Repeat the measurement in the same way, by changing the R3562 output frequency to up to 2300 MHz according to the performance check sheet.

Measuring the SSB phase noise

1. Set up the R3562 as follows.

   Frequency: 1000 MHz
   Output level: 0 dBm
   Modulation: OFF

2. Adjust the center frequency of the R3267 to the output frequency of the R3562, and measure the single side band noise at 50 kHz offset in dBc/Hz mode (on the R3267).

   Frequency span (Example: 200 kHz)

Measuring the adjacent channel leakage power

1. Set up the R3562 as follows.

   Frequency: 800 MHz
   Output level: 0 dBm
   Modulation: ON

2. Adjust the center frequency of the R3267 to the output frequency of the R3562, and measure the adjacent channel leakage power in ACP mode on the R3267.

   Frequency span: 25 MHz
   RBW: 30 kHz
   VBW: 30 kHz

   -CS/BS Setup
   Channel Space: 5 MHz and 10 MHz
   Band Width: 3.84 MHz

3. Repeat Steps 1 to 2 according to the performance check sheet until the frequency on the R3267 reaches 2300 MHz.

6.2.4 Modulation

Verify the modulation accuracy and channel multiplexing function of the output signal at the RF OUT connector using the 3GPP measurement option of the R3267 spectrum analyzer.

(1) Specification

Modulation accuracy: Vector error < 6% rms

(2) Setup

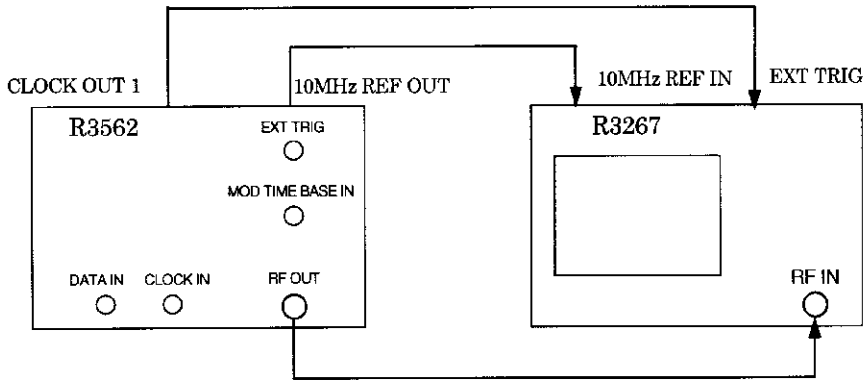


Figure 6-5 Setup (Modulation)

(3) Procedure

Measurement of modulation accuracy

1. Set the R3562 as follows.

Frequency:	800 MHz
Output level:	0 dBm
Modulation:	ON
Link:	Down Link
Channel configuration:	Information Bit Rate=12.2 kbps
Scrambling Code:	0
CLOCK OUT 1:	Radio Frame

2. Perform a modulator calibration for the R3267.

3. Verify the modulation accuracy with the R3267 set to TRANSIENT mode.

   • STD Setup

type:	3GPP
Meas Mode:	SLOT
Link :	DOWN LINK
Offset Level :	0.0 dB
Input :	RF

- Parameter Setup

  Scrambling code Define:Define
  Scrambling Code No : 0
  Trigger Mode : EXT
  EXT Trigger Slope : +
  EXT Trigger Delay : 0.000 chip
  Search Mode : SCH
  Primary CPICH SF : 256
  Primary CPICH No. : 0
  Active CH. Detection : AUTO
  Analysis Rate: ACTIVE
  Meas Unit : 640 (2560 chip)
  Meas Start Position : 0(0 chip)
  Threshold : -5 dB
  Phase Inverse : Normal
  Frequency Error : Normal
  Transmit Timing : OFF

4. Repeat the measurement in the same way by changing the R3562 output frequency up to 2300 MHz according to the performance check sheet.

6.2.5 I/Q Input and Output

Set the direction of the R3562 I/Q to the INPUT mode, then verify the frequency characteristics when I/Q signals within the specified range are input from the external source.
In addition, verify the I/Q signal output levels when the I/Q direction is set to OUTPUT mode.

(1) Specifications

Input frequency: 1 kHz to 2.5 MHz, Frequency characteristic < 2 dBp-p
Input level: $\sqrt{(1^2 + Q^2)} = 0.5$ Vrms at 50 Ω, Maximum input: 3 Vp-p
Internal IQ output level: 1 Vp-p at 50 Ω

(2) Checking the I/Q input

(a) Setup

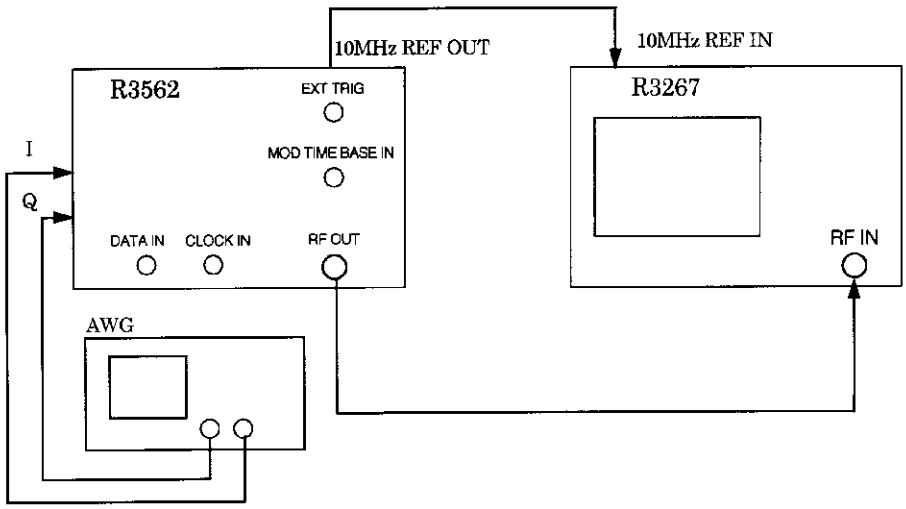


Figure 6-6 Setup (IQ Input)

(b) Procedure

1. Set the R3562 as follows.

   Frequency: 1000 MHz
   Output level: 0 dBm
   Modulation: ON
   I/Q direction: INPUT

2. Input the I/Q signals within the specified range to the R3562 using the arbitrary wave generator.

3. Verify the frequency characteristics in the modulation band by monitoring the output signal at the RF OUT connector on the R3562 using the R3267.

(3) Checking the I/Q output

(a) Setup

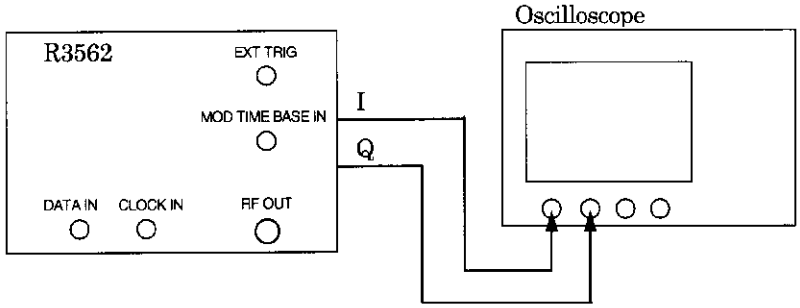


Figure 6-7 Setup (IQ Output)

(b) Procedure

1. Set the R3562 as follows.

   Frequency: 1000 MHz
   Output level: 0 dBm
   Modulation: ON
   I/Q direction: OUTPUT

2. Verify the I/Q output waveform by monitoring the output signal using the oscilloscope.

3. Verify that the level of the output waveform is more than 1 Vp-p (50 Ω) by changing the I/Q output gain.

6.2.6 BER Counter

Verify the measurement function of the bit error rate by inputting the PN9 or PN15 pattern signal with a TTL level to the CLOCK or DATA connector on the front panel.

(1) Specifications

Measurement rate:	1 kbps to 5 Mbps
Measurement pattern:	PN9, PN15
Measurement bit length:	1000 to 10000000
CLOCK/DATA polarity:	Polarity can be switched between POS and NEG
Input signal:	CLOCK, DATA (TTL level)

(2) Setup

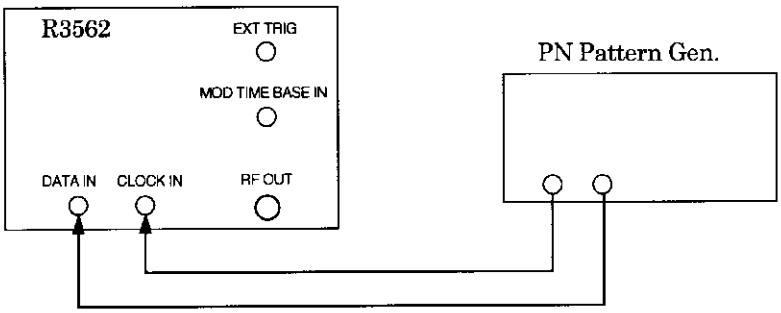


Figure 6-8 Setup (BER Counter)

(3) Procedure

1. Set the R3562 as follows.

Measurement pattern:	PN9
Measurement bit length:	10000
CLOCK polarity:	NEG
DATA polarity:	POS

2. Verify the error-free (0%) result by measuring the bit error rate using a bit error rate measurement command.

3. Verify the bit error rate in the same way by switching the measurement pattern, measurement bit length, and CLOCK/DATA polarity of R3562 according to the performance check sheet.

6.2.7 Clock/Timing Signal

Verify the following:

- Synchronization of a modulation signal with the input signal at the EXT TRIG or MOD TIME BASE connector on the front panel.
- Output of clocks and timing signals used for modulation at CLOCK OUT 1 and 2 connectors on the rear panel
- Output level of the 10 MHz reference source
- Frequency synchronization with the external reference source.

(1) Checking the synchronization with the external trigger

(a) Specifications

External trigger
Offset adjustable width: 20 to 200 chips
Input level: TTL
Modulation time base
Input frequency: 3.84 MHz × n (n = 1, 2, or 4)
Input level: TTL

(b) Setup

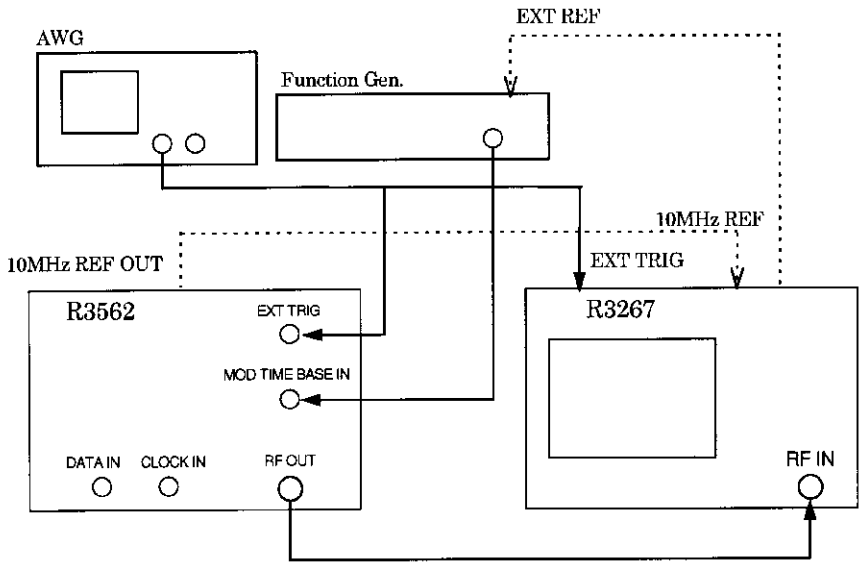


Figure 6-9 Setup (Synchronization with the Exteral Trigger)

(c) Procedure

1. Set the R3562 as follows.

Frequency: 800 MHz
Output level: 0 dBm
Modulation: ON
Link setting: Up Link
Channel configuration: Information Bit Rate=12.2 kbps

Scrambling Code :	00001 [HEX]
ETRIG:	20
MODTB:	3.84 MHz

2. Input a TTL level signal of 3.84 MHz from the function generator to the R3562 MOD TIME BASE IN connector.

3. Measure the modulation accuracy with the R3267 set to TRANSIENT mode to verify that MOD TIME BASE is correctly synchronized with the external signal. When the modulation accuracy is within the specified value, MOD TIME BASE is correctly synchronized with the external signal.

   • STD Setup

type :	3GPP
Meas Mode :	SLOT
Link :	UP LINK
Offset Level :	0.0 dB
Input :	RF

   • Parameter Setup

Scrambling Code No :	0
Trigger Mode :	EXT
EXT Trigger Slope :	+
EXT Trigger Delay :	1045 chip
DPCCH SF :	256
DPCCH No. :	0
Analysis Rate :	60 ksps
Meas Unit :	40 (2560 chip)
Meas Start Position :	0 (0 chip)
Threshold :	-5 dB
Phase Inverse :	Normal
Frequency Error:	Normal

4. Verify the modulation accuracy in the same way by switching the R3562 MODTB selection and the function generator frequency from 3.84 MHz to 7.68 MHz and then to 15.36 MHz.

5. Change ETRIG OFFSET within a range of 20 to 200, then verify the changes in τ (Time Alignment Error) on the same R3267 measurement screen as is used in Step 4.

NOTE: When setting ETRIG OFFSET on the R3562 to 100 chips or greater, make a measurement with EXT Trigger Delay set to (1025+n) chips, and add n chips to the displayed value to obtain a measurement value.
n: R3562 ETRIG OFFSET Value

---

(2) Checking the CLOCK OUT signals 1 and 2

(a) Specifications

Output signals: Chip clock, Symbol clock, Frame timing, Slot timing, TPC repeated timing, TPC inserted timing

Output level: TTL

(b) Setup

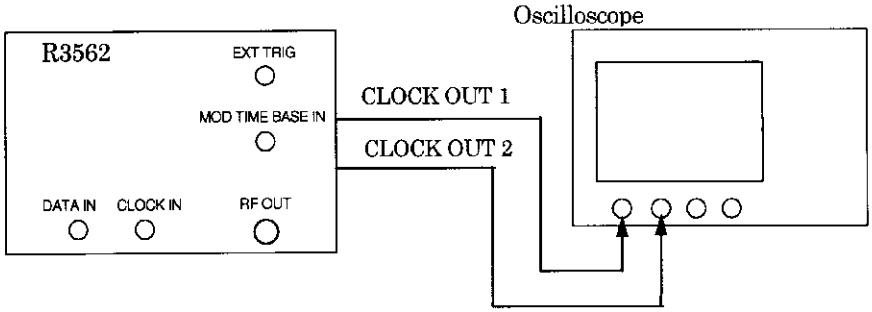


Figure 6-10 Setup (CLOCK OUT 1,2)

(c) Procedure

1. Monitor the output signals from the CLOCK OUT 1 connector on the rear panel with the oscilloscope to verify that the output signals are at TTL levels.

2. Verify the output signals from the CLOCK OUT 2 terminal using the same procedure as outlined in Step 1.

(3) Checking the internal reference source output

(a) Specifications

Frequency: 10 MHz
Output level: >0 dBm at 50 Ω
Warm-up: 2 minutes, 3×10^{-7} (25°C)
Stability: 3×10^{-8}/day, 5×10^{-7}/year (based on 24-hour operation)

(b) Setup

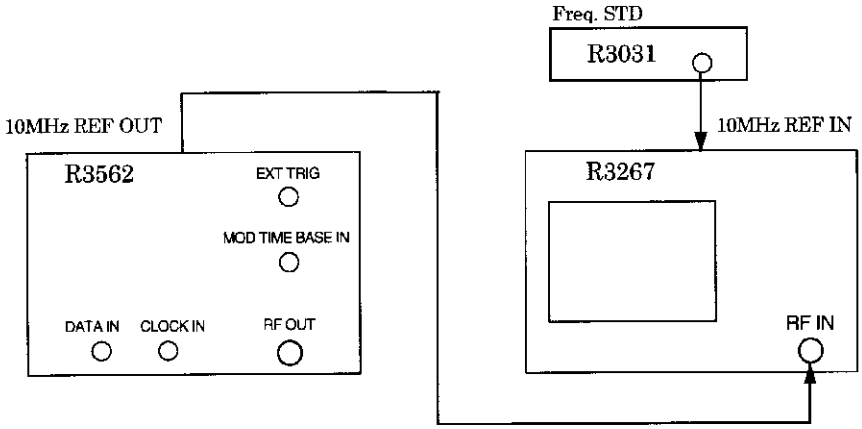


Figure 6-11 Setup (Internal Reference Source Output)

(c) Procedure

1. After turning the R3562 power supply on, preset the R3562 once and then allow it to warm up by waiting the specified period of time.

2. Verify the frequency and level of the signal at the 10 MHz OUT connector on the rear panel using the R3267 frequency counter and marker functions.

(4) Checking the synchronization with the external reference source

(a) Specifications

Input frequency: 1 MHz, 2 MHz, 5 MHz, 10 MHz or 15 MHz
Input level: > 0 dBm at 50 Ω

(b) Setup

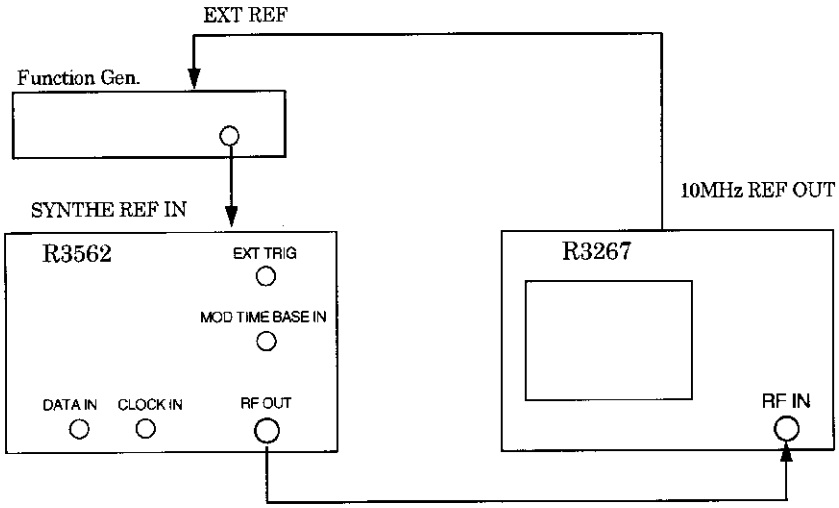


Figure 6-12 Setup (Synchohization with the External Reference Source)

(c) Procedure

1. Set the R3562 as follows.

   Frequency: 1000 MHz
   Output level: 0 dBm
   Modulation: OFF
   SYNTHE REF IN setting: 1 MHz

2. Input a signal of 1 MHz and 0 dBm from an external source to the SYNTHE REF IN connector on the R3562 rear panel.

3. Verify that the RF OUT frequency of the R3562 is synchronized with the external reference source using the R3267 frequency counter function.

4. Verify the RF OUT frequency synchronization in the same way by changing the setting of the R3562 SYNTHE REF IN and the external reference frequency from 1 MHz to 2 MHz, 5 MHz, 10 MHz, and 15 MHz.

6.2.8 Local Output

Verify the level of the R3562 local output signal with the power meter.
(the frequency does not need to be checked, because it has already been verified by the procedure outlined in Section 6.2.1, "Output Frequency.")

(1) Specifications

Frequency: 5.0314 GHz to 6.5314 GHz
Level: > 0 dBm

(2) Setup

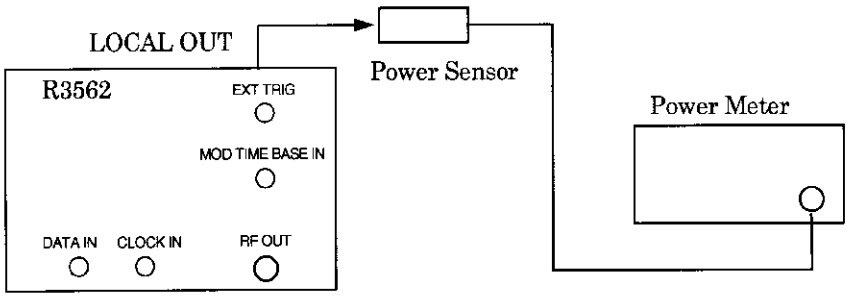


Figure 6-13 Set up (Local Output)

(3) Procedure

1. Set the R3562 as follows. Connect the power meter to the LOCAL OUT connector on the rear panel to verify the output level.

   Frequency: 800 MHz
   Output level: 0 dBm

2. Verify the output level in the same way by changing the R3562 frequency according to the performance check sheet.

3. Check the output level as in Step 2 changing the frequency according to the performance check sheet.

6.3 Performance Check Sheet

Item	Setting		Spec (Min.)	Measured Value	Spec (Max.)	Unit	Decision
6.2.1 Output Frequency	800 MHz to 2300 MHz (in 10 MHz steps) 811.1111MHz , 899.9999MHz		checked				
6.2.2 Output Level	Modulation OFF 0 dBm 800 MHz to 2300 MHz (in 50 MHz steps)		-1.5		+1.5	dBm	
	Modulation ON 0 dBm 800 MHz to 2300 MHz (in 50 MHz steps)		-1.5		+1.5	dBm	
	Modulation OFF	-16dBm	-17.5		-14.5	dBm	
		-32dBm	-33.5		-30.5	dBm	
		-64dBm	-65.5		-62.5	dBm	
		-70dBm	-71.5		-68.5	dBm	
		-80dBm	-81.5		-78.5	dBm	
		-90dBm	-91.5		-88.5	dBm	
		-100dBm	-101.5		-98.5	dBm	
		-110dBm	-111.5		-108.5	dBm	
		-125dBm	-127.5		-122.5	dBm	
6.2.3 Signal Purity	Harmonic waves 800 MHz to 2300 MHz (in 50 MHz steps)				-30	dBc	
	Non-harmonic waves	800MHz			-30	dBc	
		1500MHz			-30	dBc	
		2300MHz			-30	dBc	
		811.1111MHz			-30	dBc	
		899.9999MHz			-30	dBc	
	SSB phase noise	1000MHz			-107	dBc/Hz	
	ACP	800MHz			-30	dBc	
		1500MHz			-30	dBc	
		2300MHz			-30	dBc	

Item	Setting		Spec (Min.)	Measured Value	Spec (Max.)	Unit	Decision
6.2.4 Modulation	Modulation accuracy	800MHz			6	%rms	
		1500MHz			6	%rms	
		2300MHz			6	%rms	
6.2.5 I/Q Input and Output	I/Q direction	INPUT			2	dBp-p	
		OUTPUT	checked				
6.2.6 BER Counter	Pattern	PN9			0	%	
		PN15			0	%	
	Bit length	1000			0	%	
		10000000			0	%	
	Clock	POSI			0	%	
		NEGA			0	%	
	Data	POSI			0	%	
		NEGA			0	%	
6.2.7 Output Frequency	MOD TIME BASE	3.84MHz	checked				
		7.68MHz	checked				
		15.36MHz	checked				
	Trigger offset	20 to 200 chip	checked				
	CLOCK 1 and 2 signals switching (TTL output)		checked				
	10 MHz output	SYNTHE REF INTERNAL	0			dBm	
	SYNTHE REF	1MHz	checked				
		2MHz	checked				
		5MHz	checked				
		10MHz	checked				
		15MHz	checked				

Item	Setting		Spec (Min.)	Measured Value	Spec (Max.)	Unit	Decision
6.2.8 Local Output	RF OUT (LOCAL)	800(5031.4) MHz	0			dBm	
		1500(5731.4) MHz	0			dBm	
		2300(6531.4) MHz	0			dBm	

7 R3562 SPECIFICATIONS

Characteristics		Specification
Output Frequency	Range	800 MHz to 2300 MHz
	Resolution	100 Hz
	Accuracy	Depends on the reference source accuracy
Output Level	Range	-125 dBm to +0 dBm
	Resolution	0.1dB
	Accuracy (25 ± 10°C)	Frequency:≤ 1000 MHz <±1.5 dB(-120.0 dBm to 0 dBm) <±2.5 dB(-125.0 dBm to -120.1 dBm)
		Frequency: >1000 MHz <±1.5 dB(-110.0 dBm to 0 dBm) <±2.5 dB(-125.0 dBm to -110.1 dBm)
	Output impedance	50 Ω
	Maximum reverse input	2 W
Signal Purity	Harmonic waves	< -30 dBc
	Non-harmonic waves	< -60 dBc (offset > 10 kHz)
	ACP	< -45 dBc (offset: 5 MHz) < -55 dBc (offset: 10 MHz)
	SSB phase noise	< -107 dBc/Hz (offset: 50 kHz, @1000 MHz)
Modulation (Modulation basis)	Modulation mode	QPSK (DL)/HPSK (UL)
	Applicable system	3GPP (FDD)
	Chip rate	3.84 Mcps
	Base band filter	Root Nyquist (α=0.22)
	Data source	PN9, PN15, ALL0, ALL1
	Modulation accuracy	Vector error < 6 %rms

Characteristics		Specification
(Up Link)	Output channel	DPCCH DPDCH × 1channel
	Channel bit rate	30/60/120/240/480/960 kbps (DPDCH)
	Information bit rate	12.2/64/144/384 kbps (DTCH)
	Long scrambling code	0 to 16777215
	Channelization code	SF/4 (DPDCH)
	Channel power ratio	Gain factor βc, βd = 0 to 15
	TFCI bit	0 to 3FF [Hexadecimal number]
	FBI bit	0 to 3FFFFFFF [Hexadecimal number]
	TPC information	Maximum slot length:75, Up/Down or Repeat
(Down Link)	Output channel	Primary CPICH Primary SCH, Secondary SCH P_CCPCH DPCH × 1channel
	Channel bit rate	60/120/240/480/960 kbps (DPCH)
	Information bit rate	Information bit rate12.2/64/144/384 kbps (DTCH)
	Primary scrambling code	0 to 8191
	Channelization code	2 to 127 (DPCH)
	Channel power ratio	-20 to 0 dB/0.1 dB step
	TFCI bit	0 to 3FF [Hexadecimal number]
	TPC information	Maximum slot length: 75 , Up/Down or Repeat
	Channel timing	τ_{DPCH}= 0 chip
I/Q Input and Output	Input frequency	1 kHz to 2.5 MHz, Frequency characteristic< 2 dBp-p
	Input level	√I2 + Q2 = 0.5 Vrms at 50 Ω, Maximum input 3 Vp-p
	Internal IQ output level	1 Vp-p at 50 Ω
BER Counter	Measurement rate	1 kbps to 5 Mbps
	Measurement pattern	PN9, PN15
	Measurement bit length	1000 to 10000000
	Clock/Data polarity	POSI/NEGA
	Input signal	CLOCK, DATA (TTL level)

Characteristics		Specification
Clock/Timing Signal	Internal frequency reference	Stability: 3×10^{-8}/day, 5×10^{-7}/year (based on 24-hour operation) Frequency : 10 MHz Output level: > 0 dBm, 50 Ω Warm-up 2 minutes 3×10^{-7}(25°C)
	External frequency reference (SYNTHE REF IN)	Input frequency: 1 MHz/2 MHz/5 MHz/10 MHz/15 MHz Input level: > 0 dBm, 50 Ω
	Modulation time base (MOD TIME BASE IN)	Input frequency: 3.84 MHz × n (n = 1,2,4) Input level: TTL
	External trigger (EXT TRIG IN)	Input level: TTL Offset adjustable width: 20 to 200 chips
	Clock/Timing output (CLOCK OUT 1) (CLOCK OUT 2)	Chip clock/radio frame timing/slot timing/TPC repeat timing/TPC insert timing (TTL level)
Local Output	Frequency	5.0314 GHz to 6.5314 GHz
	Level	> 0dBm
External Interface	GPIB	IEEE-488
	Serial I/O	R3267/73 special interface
General Specifications	Temperature	Operating temperature: 0 °C to +50 °C
		Storage temperature: -20 °C to +60 °C
		Humidity: Relative humidity of 85% or lower (without condensation)
	AC power supply input	100 VAC system/ 200 VAC system (automatic switching)
		When operating100 VAC system: 100 V to 120 V, 50 Hz/ 60 Hz
		When operating 200 VAC system: 220 V to 240 V, 50 Hz/ 60 Hz
	Power consumption	300 VA or less
	Frequency	50 Hz / 60 Hz
	Mass	16 kg or less
	External dimensions	Approximately 178 (H) × 355 (W) × 420 (D) mm (Excluding protruding portions such as rear feet or connectors)

APPENDIX

A.1 Specifications for the R3562 Channel Coding

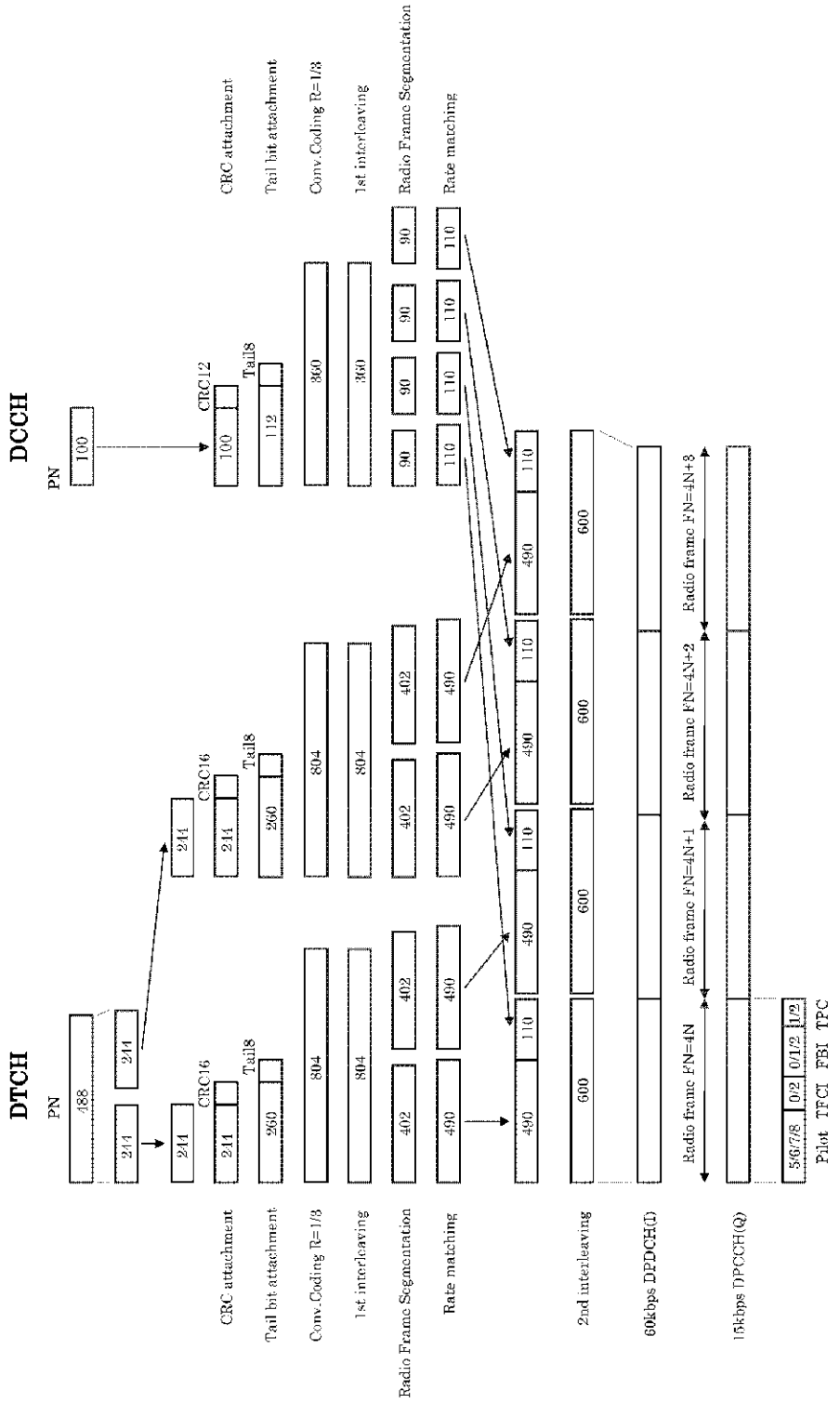


Figure A-1 UL Information bit rate = 12.2 kbps Coding

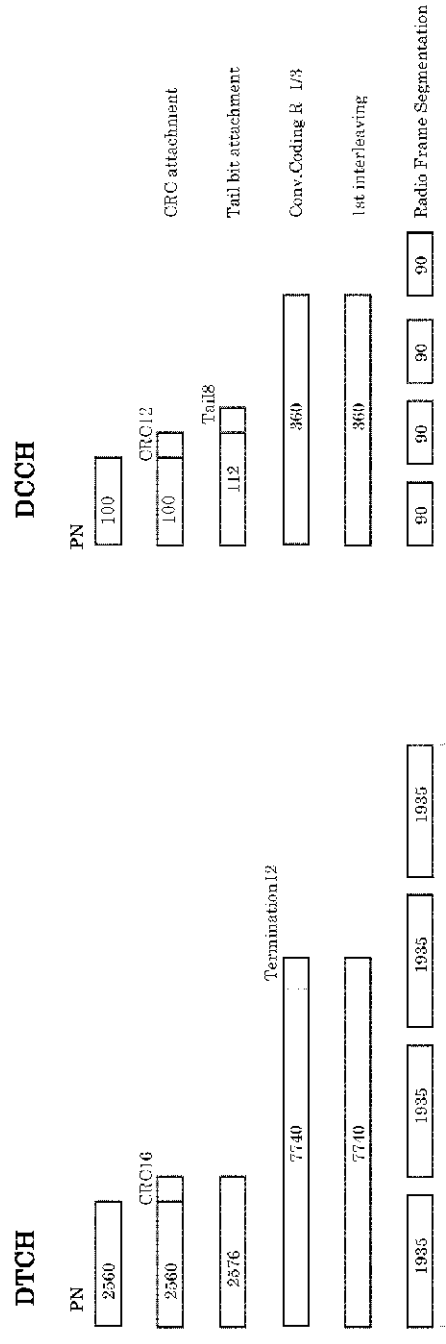


Figure A-2 UL Information bit rate = 64kbps Coding

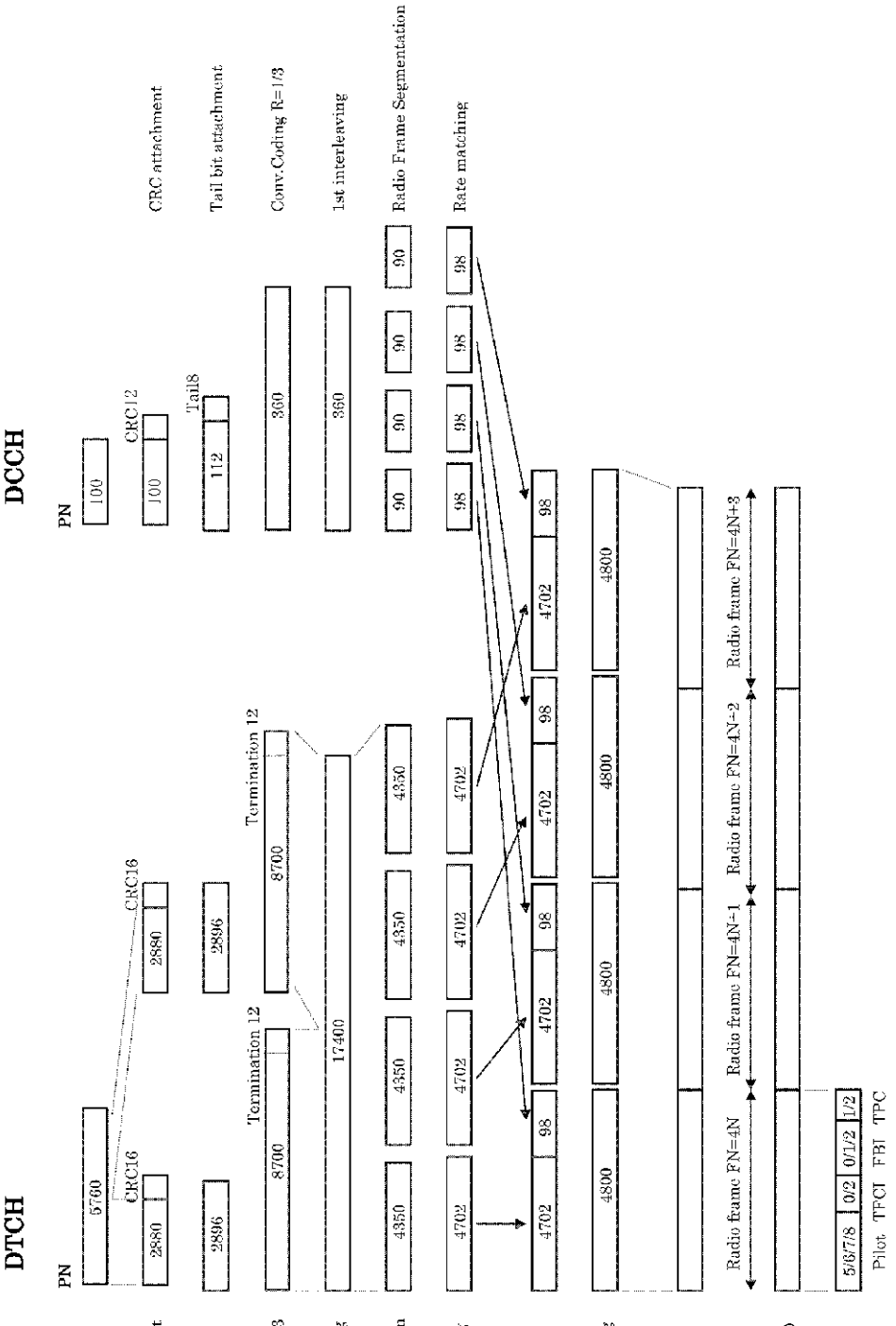


Figure A-3 UL Information bit rate = 144kbps Coding

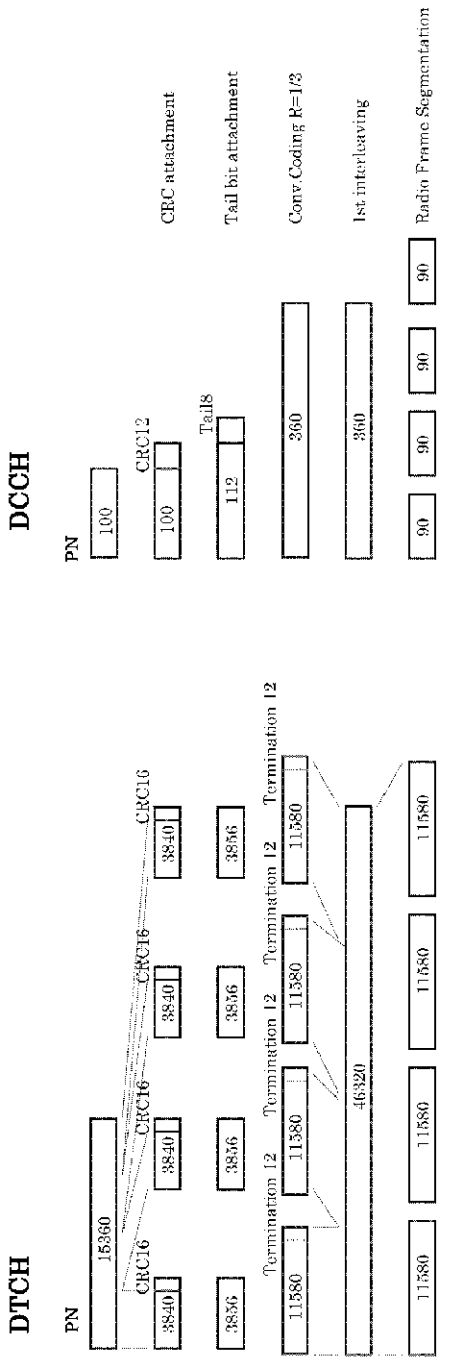


Figure A-4 UL Infomation bit rate = 384kbps Coding

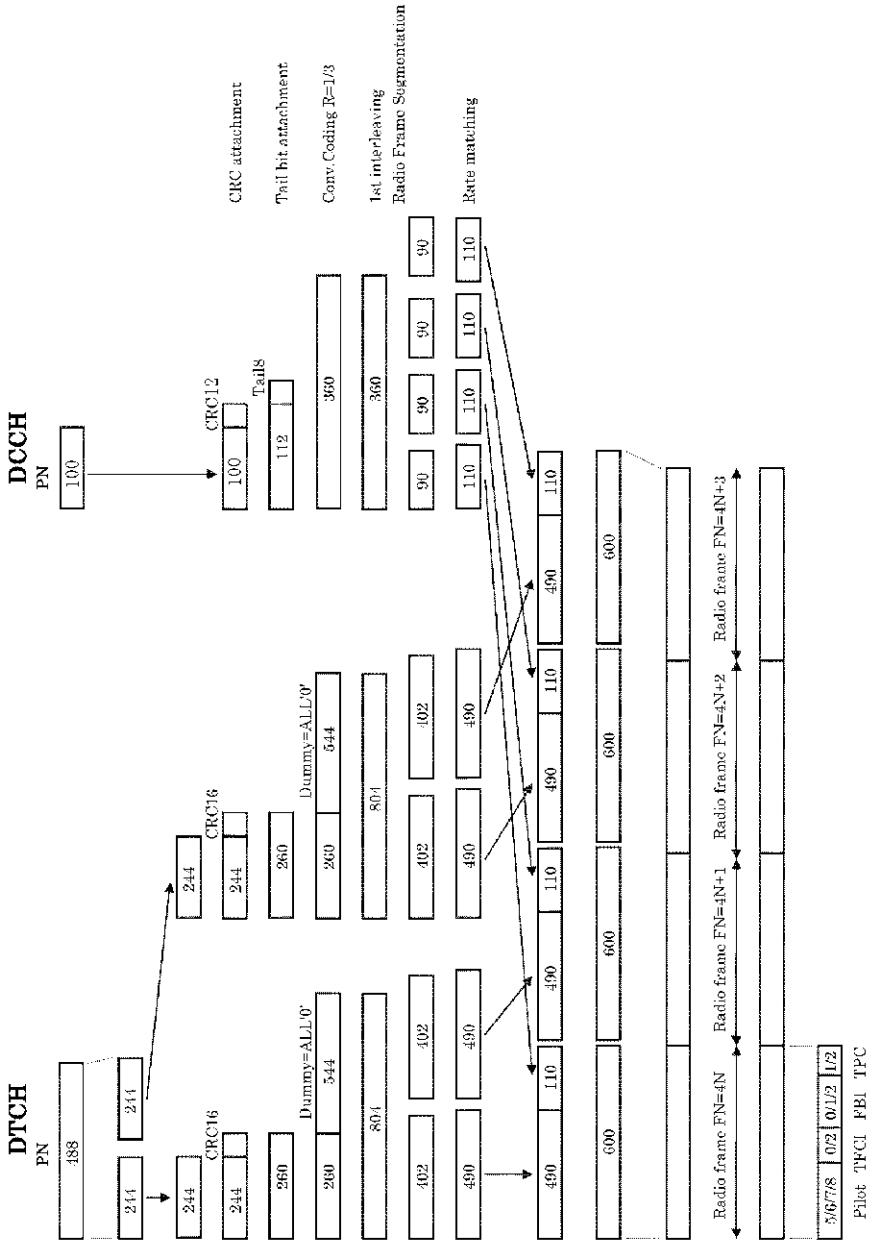


Figure A-5 UL Information bit rate = 12.2kbps (DTCH FEC=OFF) Coding

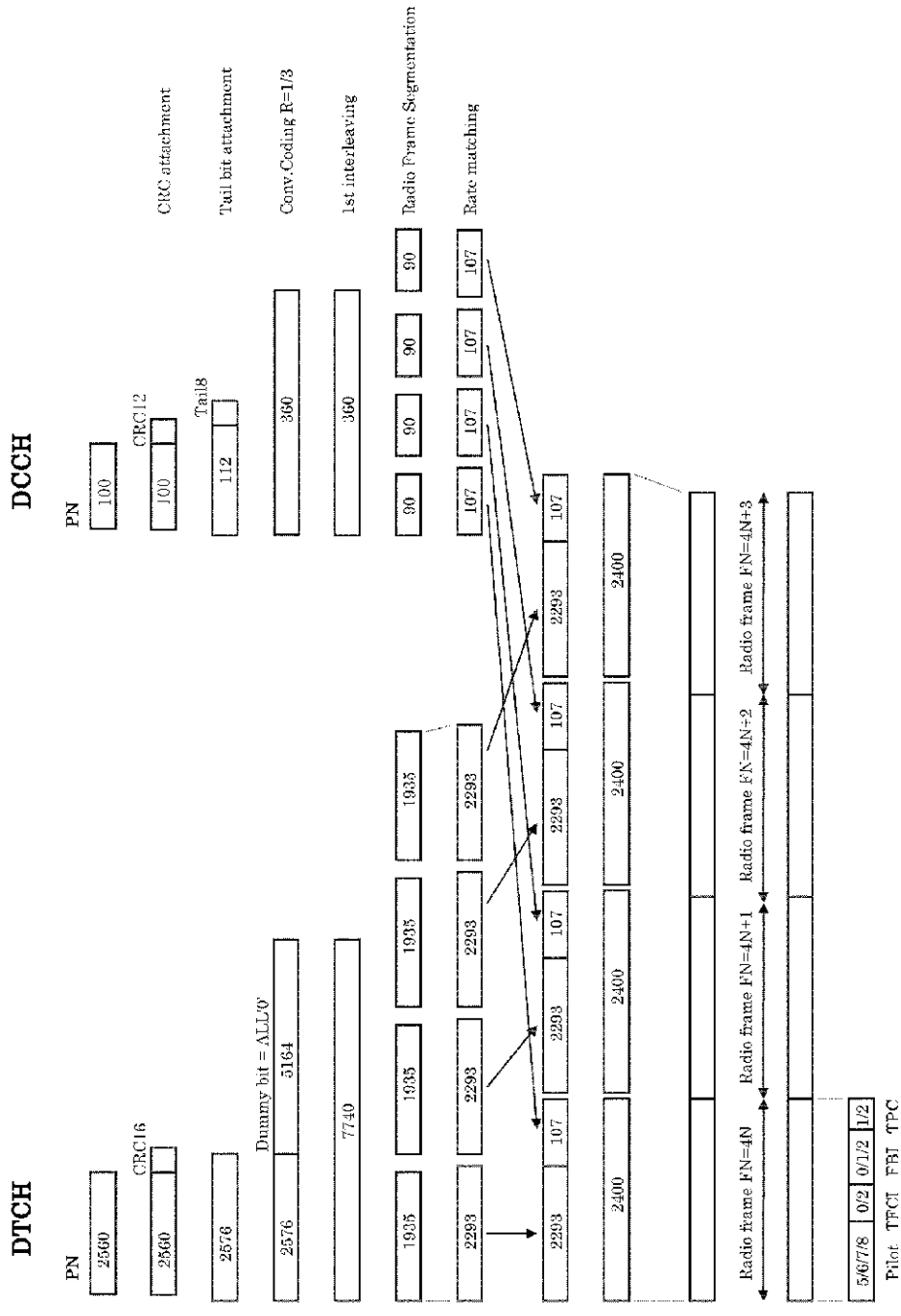


Figure A-6 UL Information bit rate = 64kbps (DTCH FEC=OFF) Coding

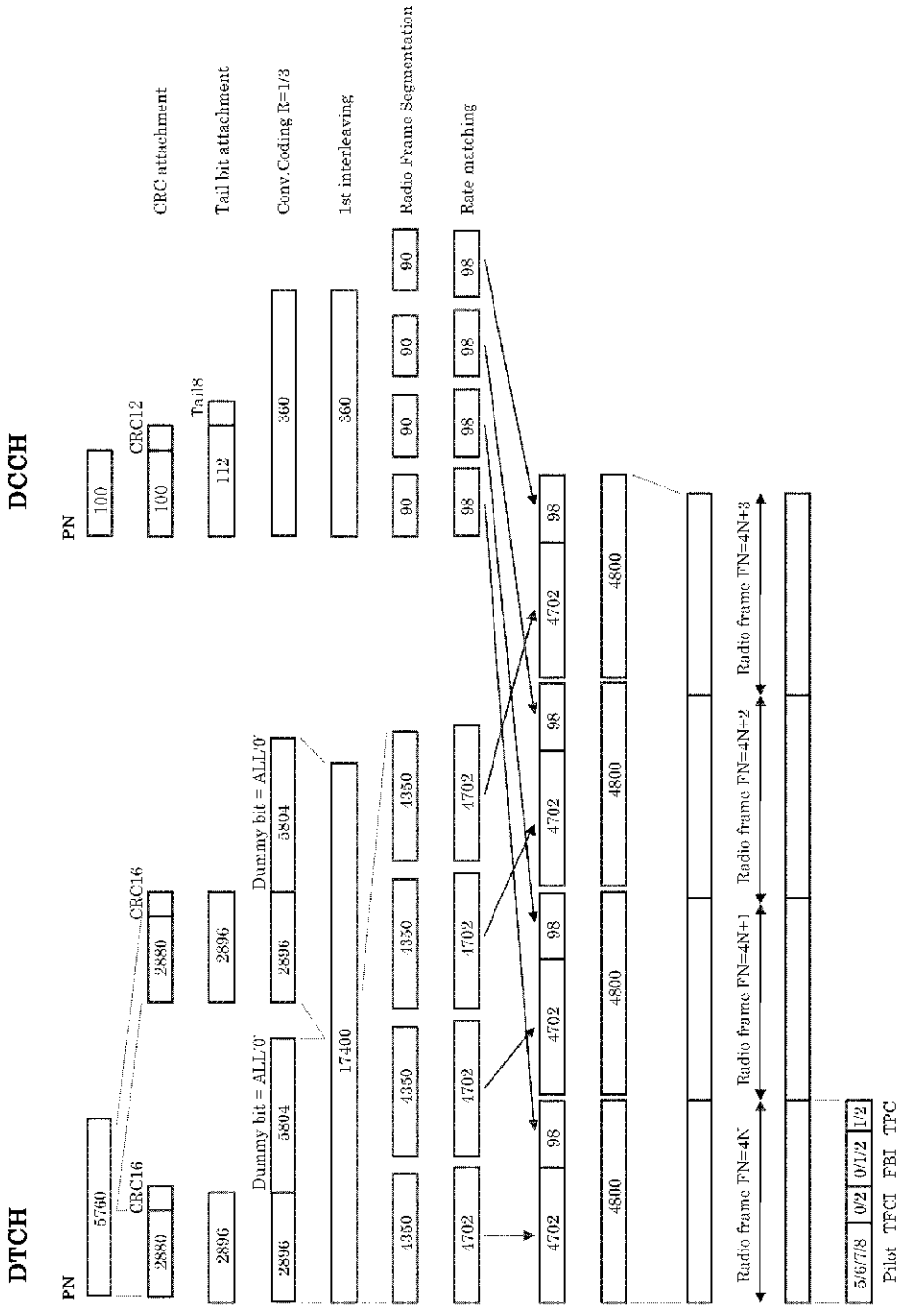


Figure A-7 UL Information bit rate = 144kbps (DTCH FEC=OFF)Coding

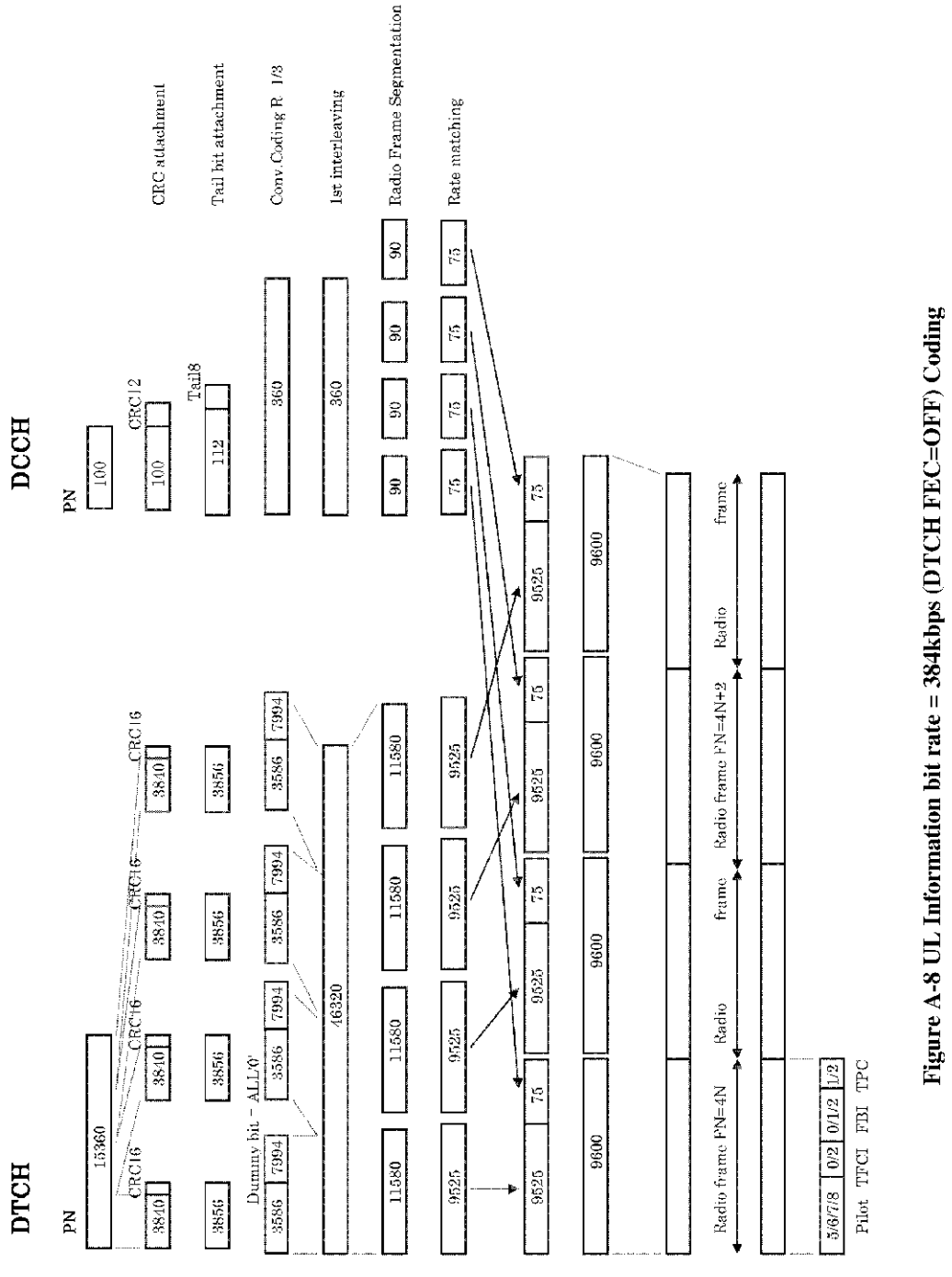


Figure A-8 UL Information bit rate = 384kbps (DTCH FEC=OFF) Coding

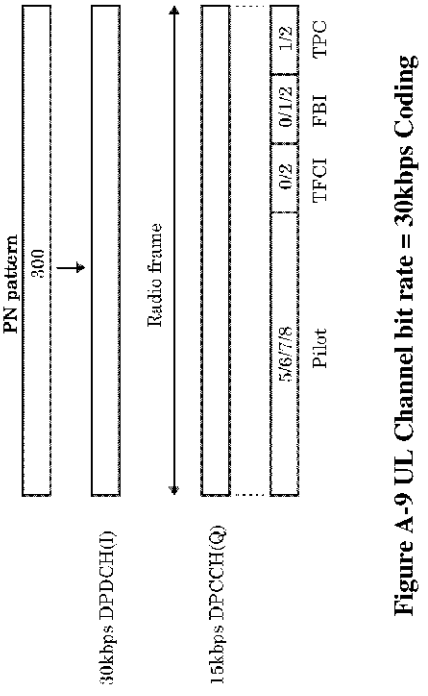


Figure A-9 UL Channel bit rate = 30kbps Coding

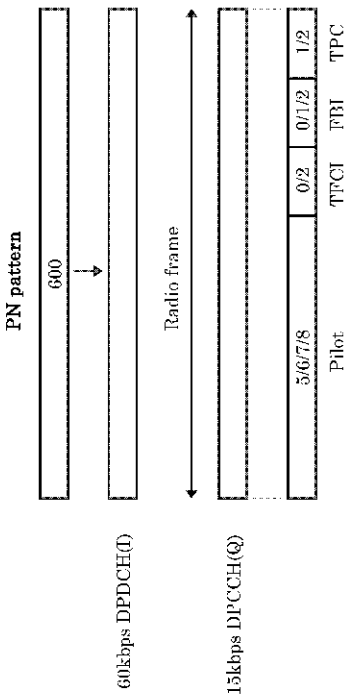


Figure A-10 UL Channel bit rate = 60kbps Coding

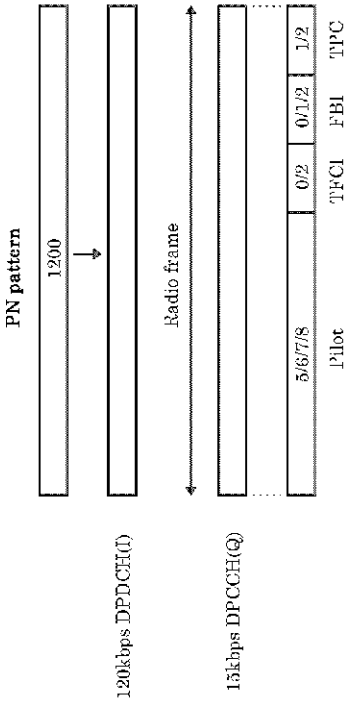


Figure A-11 UL Channel bit rate = 120kbps Coding

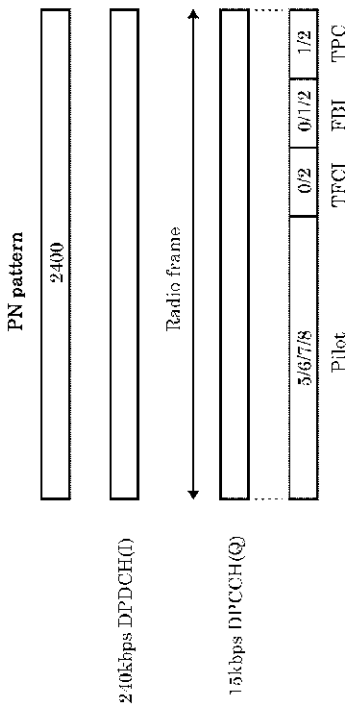


Figure A-12 UL Channel bit rate = 240kbps Coding

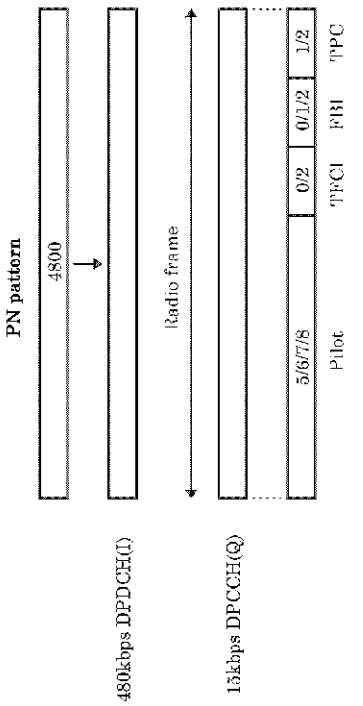


Figure A-13 UL Channel bit rate = 480kbps Coding

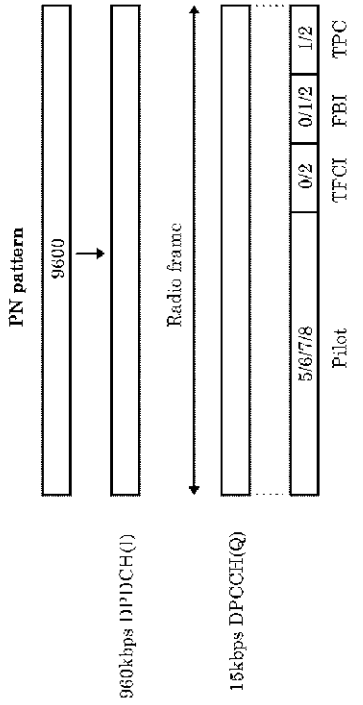


Figure A-14 UL Channel bit rate = 960kbps Coding

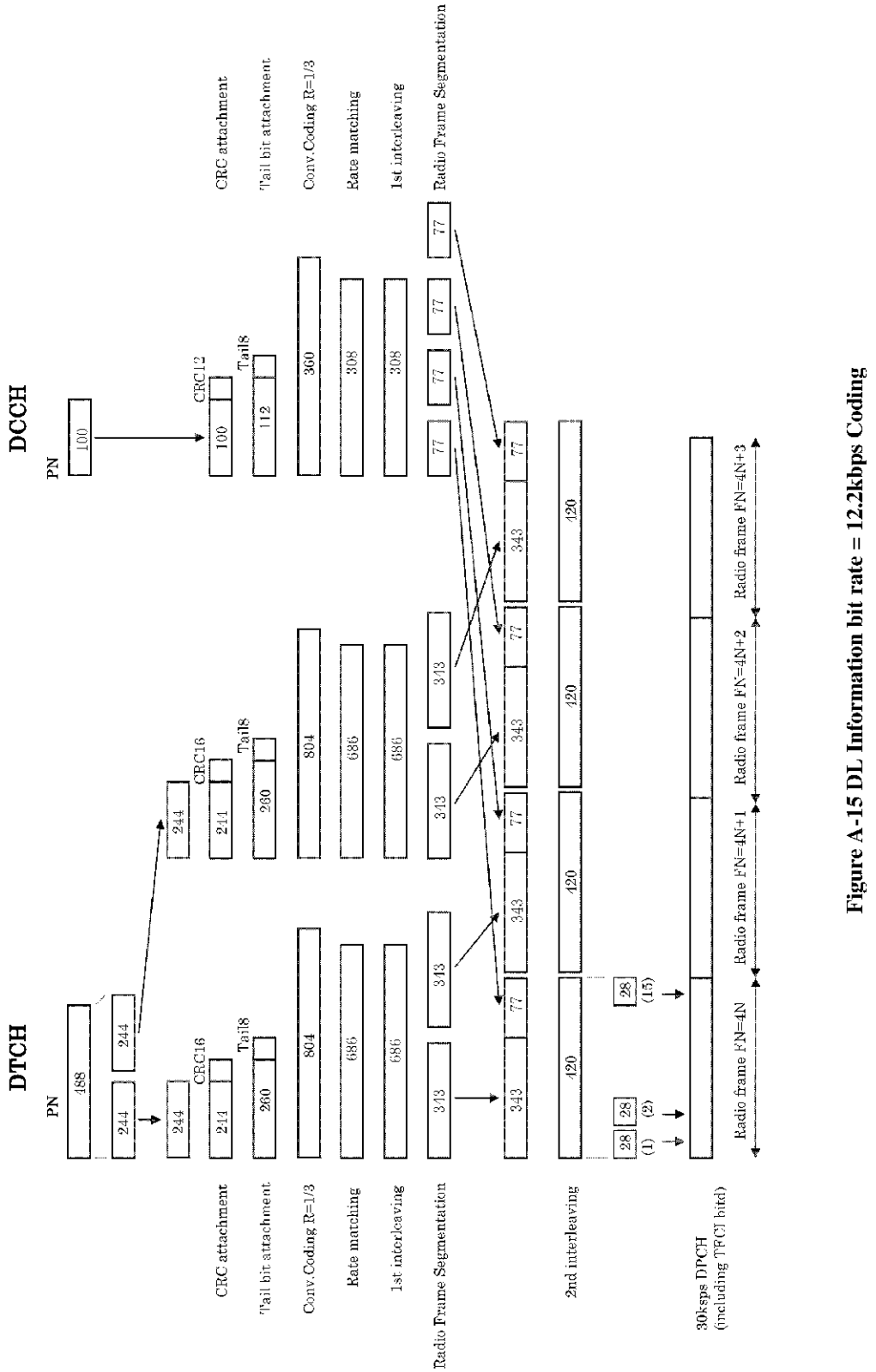


Figure A-15 DL Information bit rate = 12.2kbps Coding

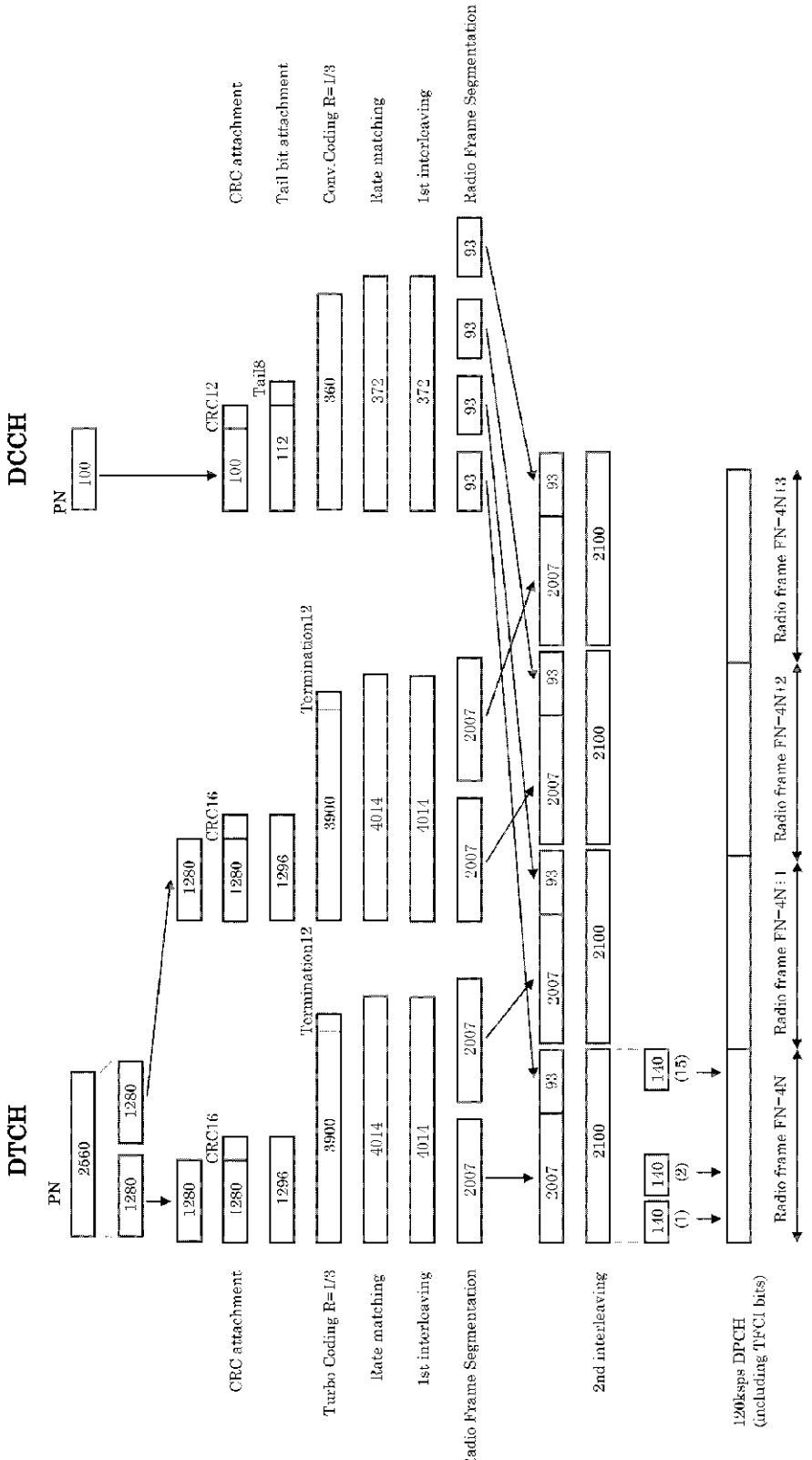


Figure A-16 DL Information bit rate = 64kbps Coding

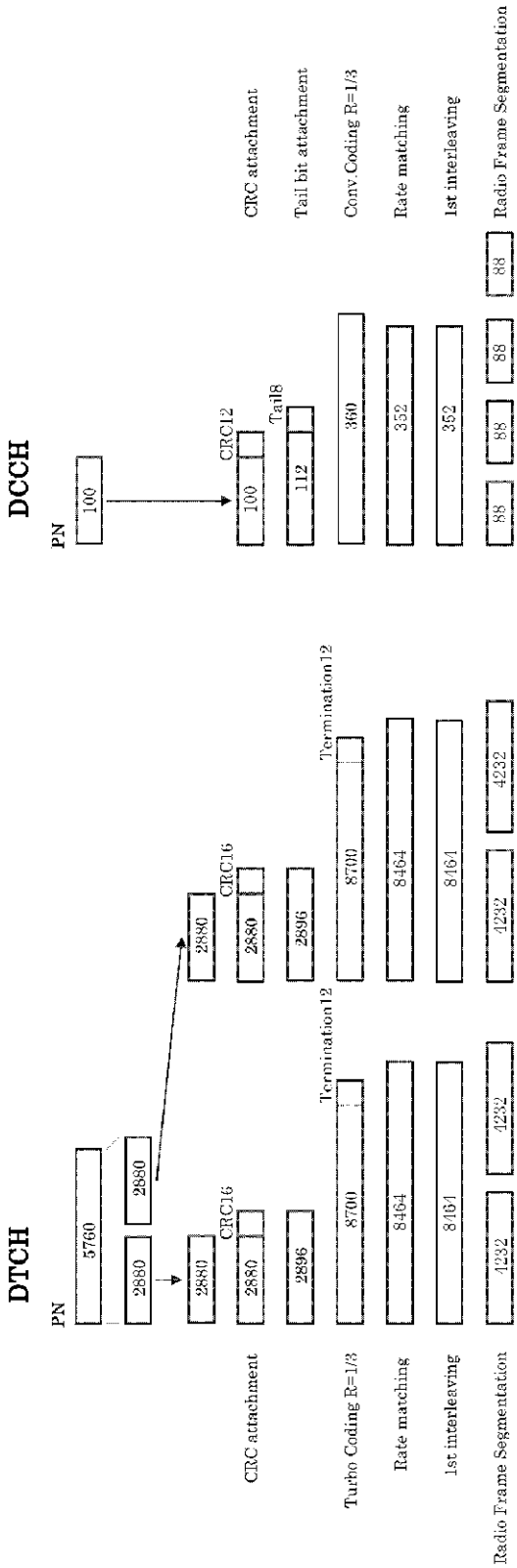


Figure A-17 DL Information bit rate = 144kbps Coding

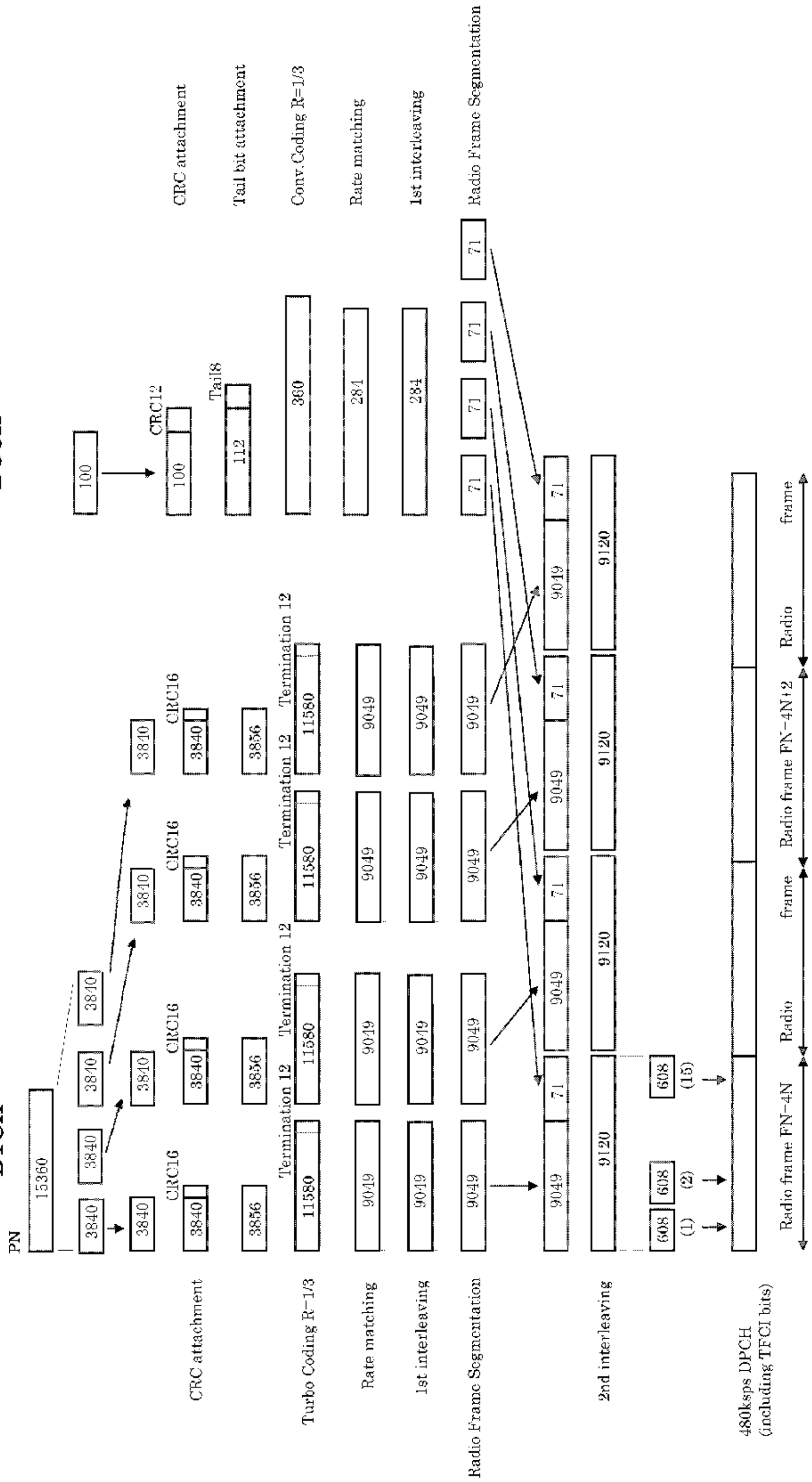


Figure A-18 DL Information bit rate = 384kbps Coding

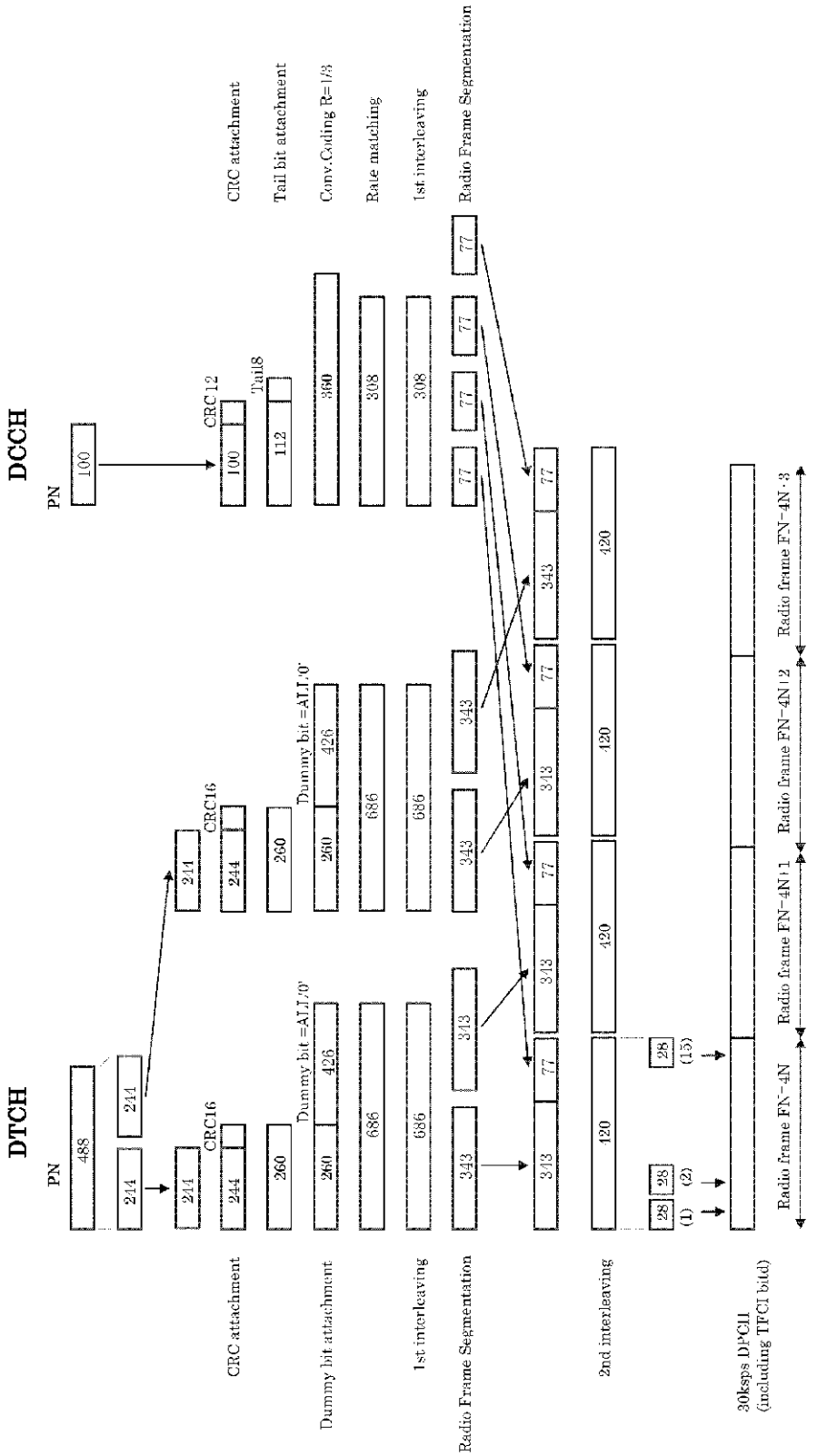


Figure A-19 DL Information bit rate = 12.2kbps (DTCH FEC=OFF) Coding

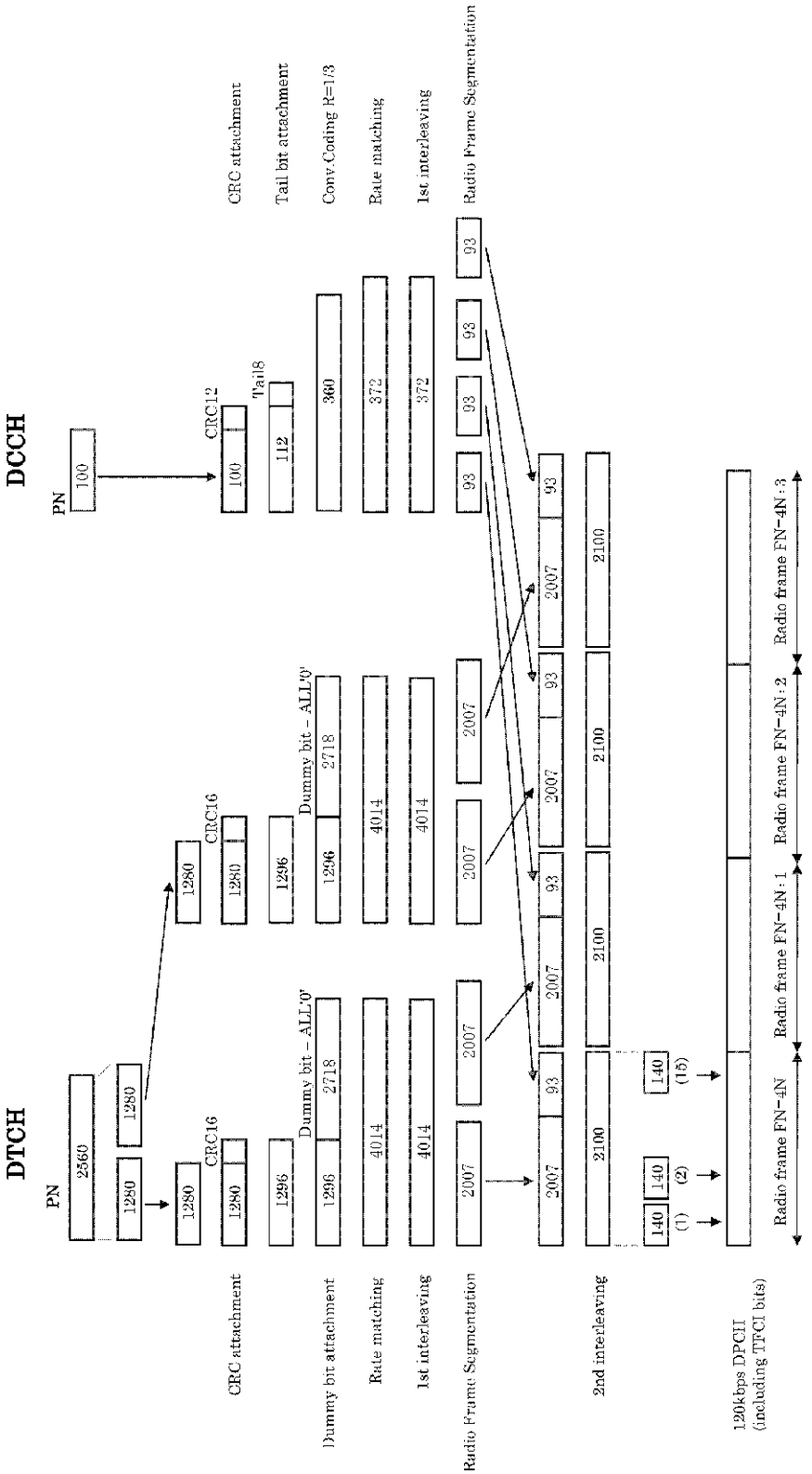


Figure A-20 DL Information bit rate = 64kbps (DTCH FEC=OFF) Coding

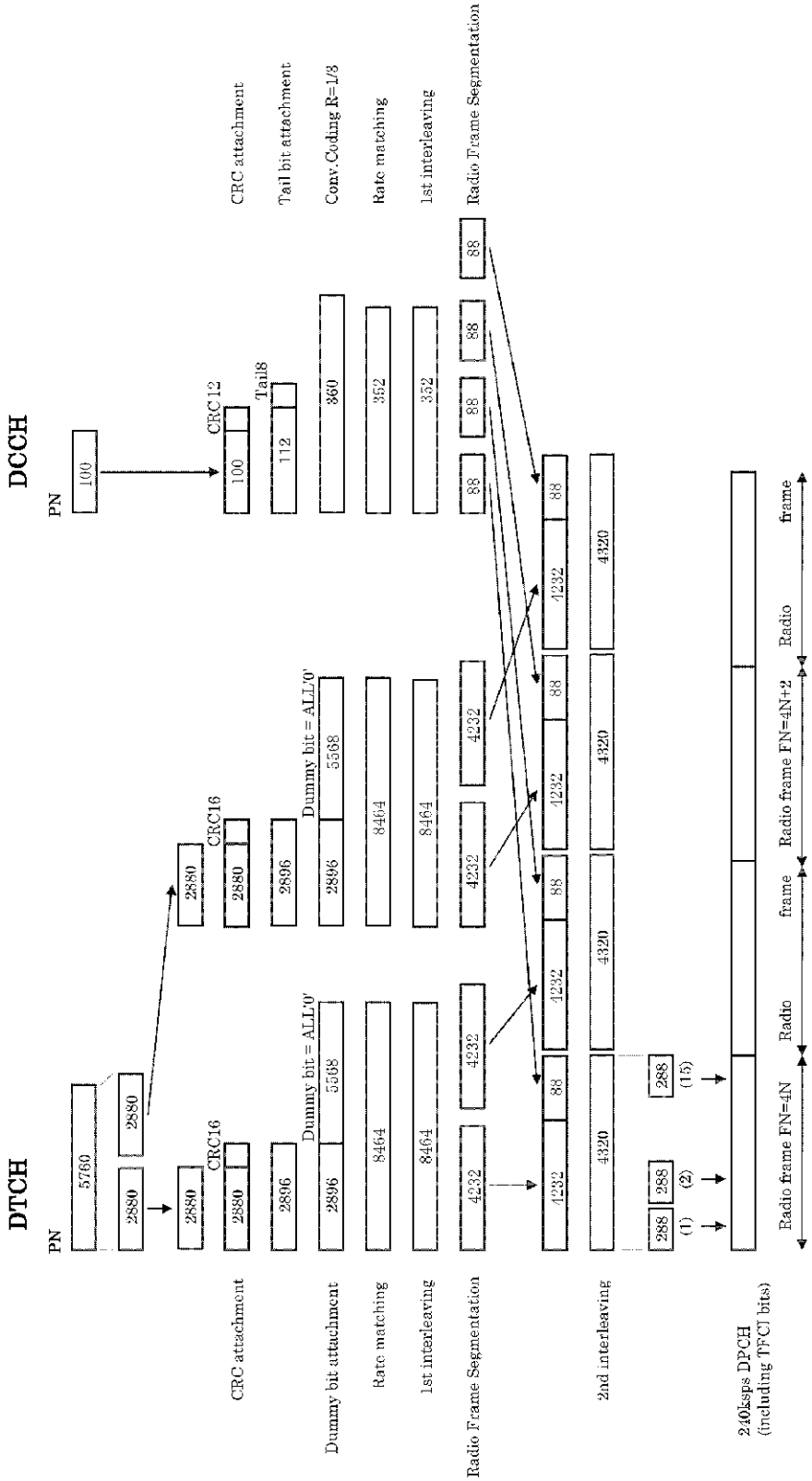


Figure A-21 DL Information bit rate = 144kbps (DTCH FEC=OFF) Coding

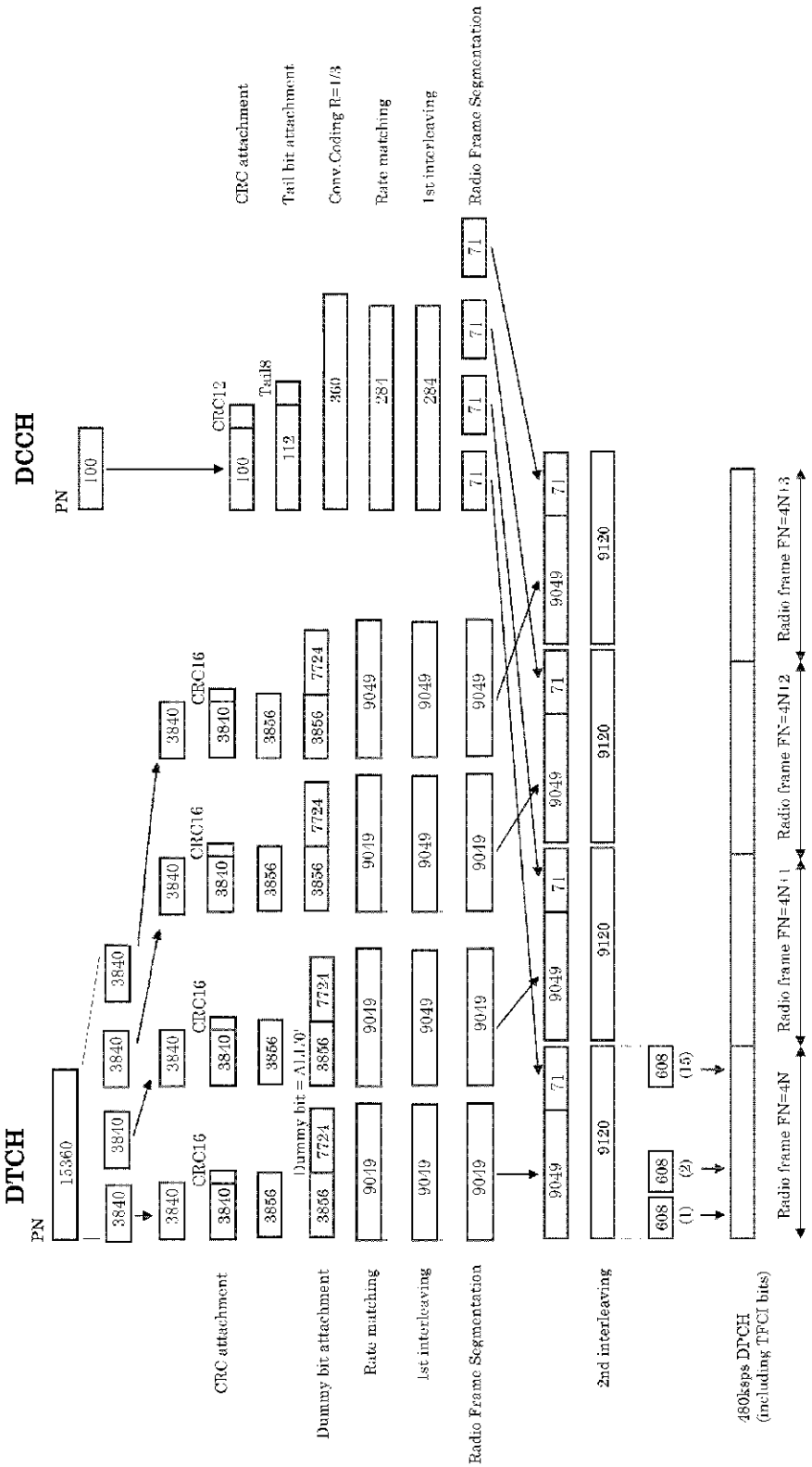


Figure A-22 DL Information bit rate = 384kbps (DTCH FEC=OFF) Coding

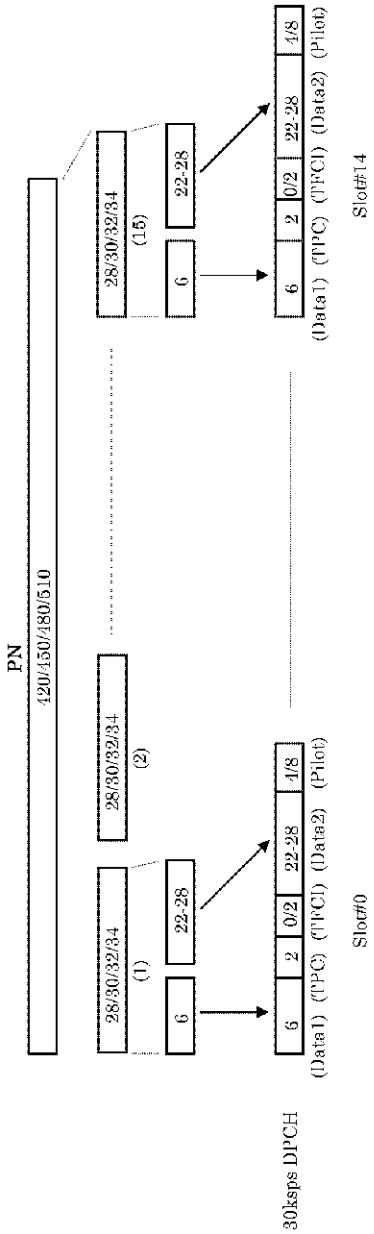


Figure A-23 DL Channel bit rate = 60kbps Coding

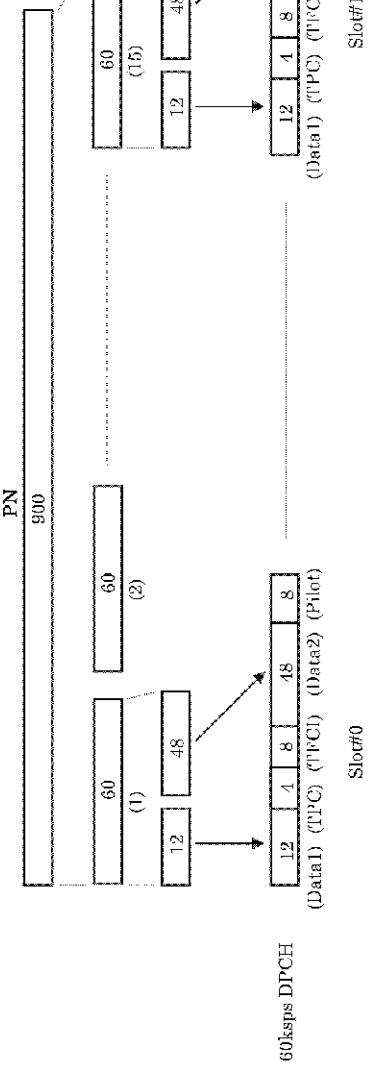


Figure A-24 DL Channel bit rate = 120kbps Coding

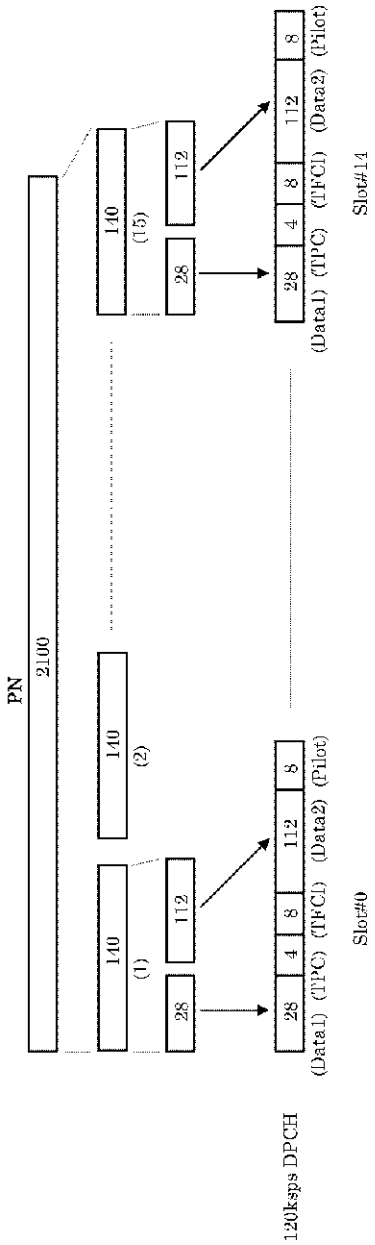


Figure A-25 DL Channel bit rate = 240kbps Coding

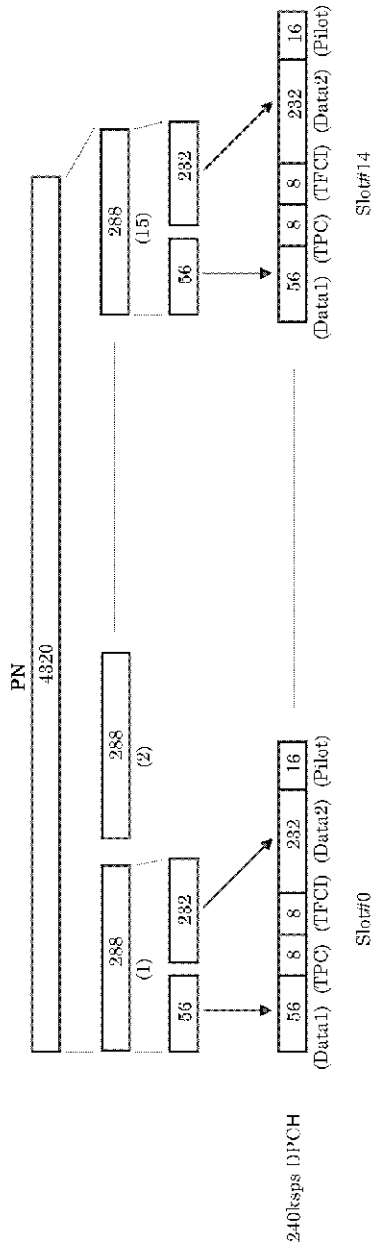


Figure A-26 DL Channel bit rate = 480kbps Coding

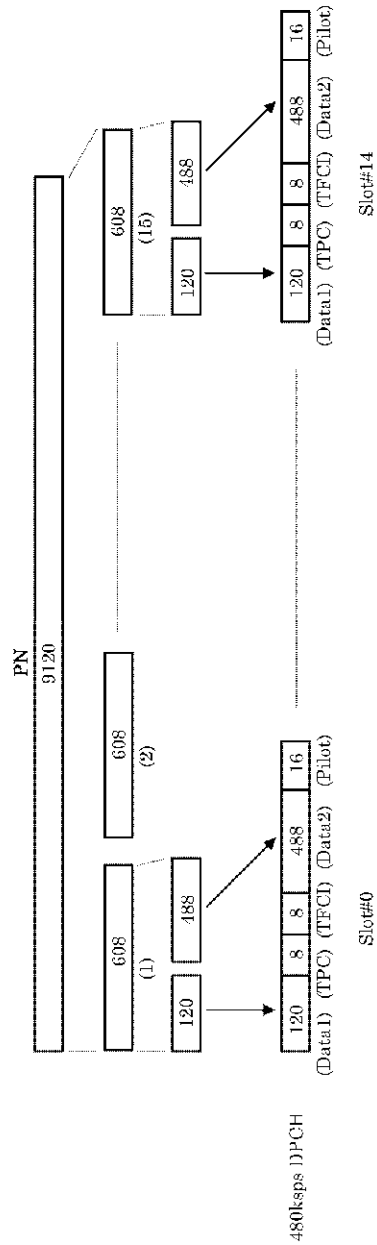
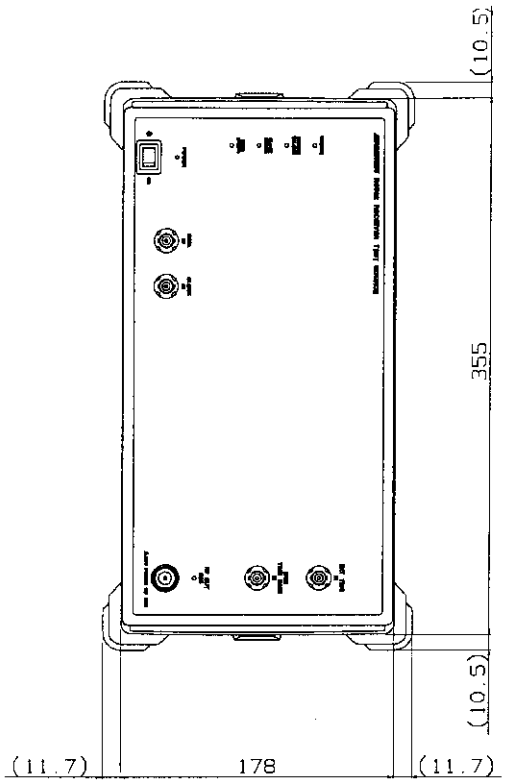
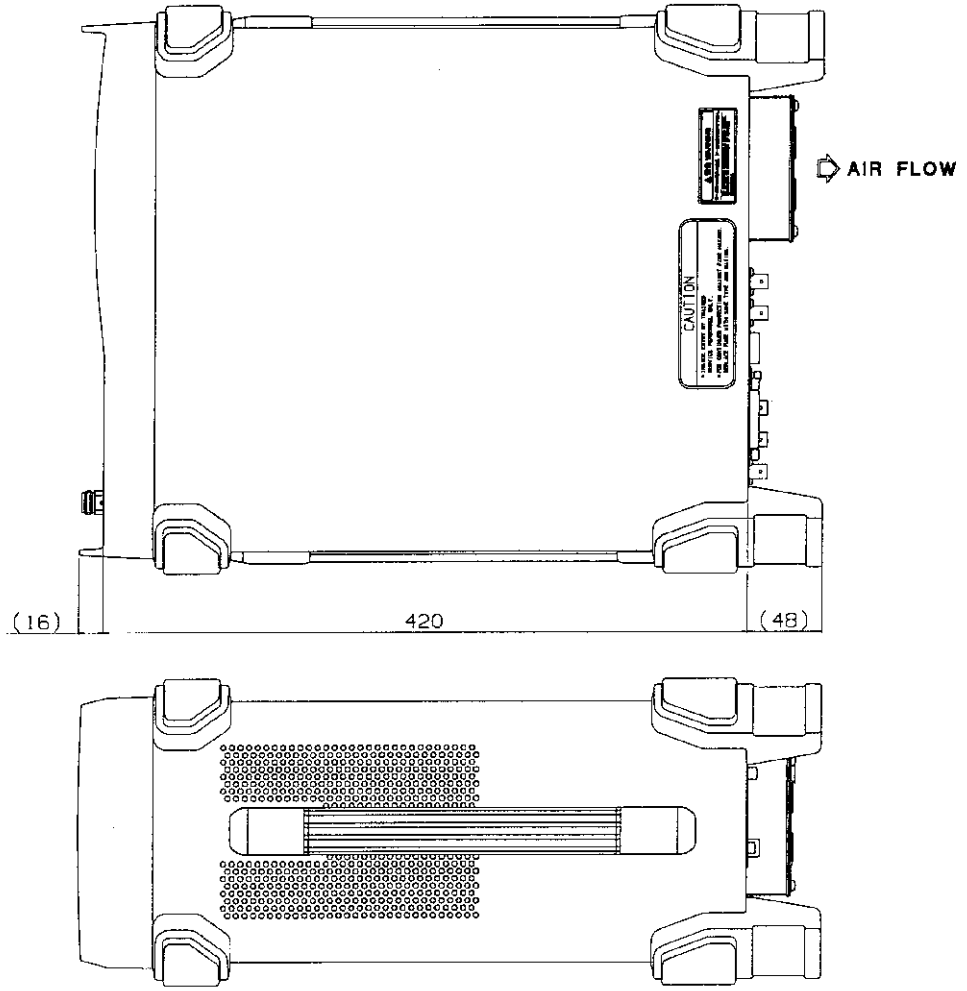


Figure A-27 DL Channel bit rate = 960kbps Coding





Unit : mm

CAUTION

This drawing shows external dimensions of this instrument.

The difference in products and options used can cause a change in the appearance of the instrument.

DIMENSIONAL OUTLINE DRAWING

ALPHABETICAL INDEX

[Numerics]

[A]

[B]

[C]

[D]

[E]

[F]

[G]

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[U]

[W]

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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;

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   (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.

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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

ADVANTEST®

http://www.advantest.co.jp

ADVANTEST CORPORATION
Shin-Marunouchi Center Building, 1-6-2 Marunouchi, Chiyoda-ku, Tokyo 100-0005, Japan
Phone: +81-3-3214-7500