PeakTech®

PeakTech® 1110

Operation manual

DAB - Signal Generator with RS-232 and GPIB

Spitzentechnologie, die überzeugt

READ FIRST!

In order for a long period of trouble-free service of the instrument, please pay special attention to the following precautions:

1. Protect the instrument from excessive impact during transportation and installation.

2. Be sure to verify whether the line voltage setting matches the line voltage used.
   (☞ Refer to Chapter 2, Sec. 2.3 Electrical Installation)

3. Use a fuse with correct ratings only.
   (☞ Refer to Chapter 2, Sec. 2.3 Electrical Installation)

4. Do not apply excessive AC or DC voltage to the signal output connector beyond the maximum voltage allowed.

5. Use the instrument within operating temperature range, which is from 15 deg C to 35 deg C.

6. For an accurate measurement, allow approximately 30 min. of instrument warm-up time.

7. Avoid operating the instrument under the following conditions: direct sun light, rapid temperature variation, high humidity, or strong magnetic field.

8. Do not alter or change the parts or their locations inside the instrument. please contact ***PeakTech®*** company for service and calibration.

How to use this manual

P 1110 DAB Signal Generator offers two manuals. One is SERVICE MANUAL, which contains technical information to assist product service, the other is OPERATING MANUAL, which provides information for the users of the instrument. This OPERATING MANUAL has 5 chapters as below.

Chapter 1. Specifications and general product information.

Chapter 2. Explanation for the initial instrument installation and initial verification procedure.

Chapter 3. Instructions for basic operation of the instrument.

Chapter 4. Instructions for GPIB & RS-232C users.

Chapter 5. Manual updates and technical information about the changes made after the manual is published.

*** This Information contained in this document is subject to change without Notice**

Clearing and Maintenance

1. In order for a long period of trouble-free use of the instrument, please read this manual carefully.

2. Be sure to verify whether the line voltage setting matches the line voltage used. Use a fuse with the correct rating only.

3. Use 3 pin power cable to avoid any damage caused by floating voltage.

4. Precaution

☞ Note :

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

- Avoid placing this instrument in an extremely hot or cold place.

- Do not use this instrument after bring it in from the cold.

- Do not expose the instrument to wet or dusty environment.

- Do not place liquid-filled container, such as coffee cups on top of this instrument

- Do not use this instrument where it is subject to serve vibration.

- Do not use this instrument in strong magnetic fields, such as near motors.

- Do not place heavy objects on the case or block the ventilation holes.

- Do not leave a hot soldering iron near the instrument.

- Cleaning :
To clean stained case, lightly rub the stained area with a soft cloth dipped in a neutral detergent.

Never use highly volatile material such as benzene or paint thinner.

Safety Symbols

The following symbols on instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

Warning ⚠

: A warning calls attention to a procedure, practice or the like which. correctly performed or adhered to, could result in injury or loss of life.

Caution ⚠

: A Caution calls attention to a procedure, practice or the like which. if not correctly performed or adhered to, could result in damage to or the destruction of part or all of the equipment.

 Earth Ground to chassis

 Protective Conductor Terminal

 Frame or chassis TERMINAL

 Caution, risk of danger

 Out / In position

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CHAPTER 1

GENERAL INFORMATION

1.1 INTRODUCTION

1.2 SPECIFICATIONS

Chapter 1

GENERAL INFORMATION

1.1 INTRODUCTION

P 1110 is a micro-processor controlled, DAB(Digital Audio Broadcasting system) signal generator that has a specified frequency band, Band II (87.5MHz ~ 108MHz) Band III (174MHz ~250MHz) Band L (1452MHz ~ 1492MHz). Standard features include an exclusive AutoCal self calibration function, extensive user diagnostics, an automatic power up test sequence, and non-volatile memory locations to store up to 300 different complete front panel settings. The operator may recall the next complete front panel setting above or below the current one by pressing a single key. Frequency and output level maybe increased or decreased in discrete steps, programmed by the operator. The GPIB Address for the **P 1110** and the end of string terminator maybe programmed from the front panel. Frequency and output level maybe programmed from the front panel. All operational controls are located on the front panel. Controls include keypad switches and a Rotary knob for entry of all RF output numeric parameters. The Rotary knob provides entry that has the ease, continuity and fine tuning of analog control.

1.1.1 CARRIER FREQUENCY

The operating frequency range of **P 1110** are BandII(87.5MHz ~ 108MHz), Band III (174MHz ~250MHz), Band L (1452MHz ~ 1492MHz) , resolution 1Hz with PLL accuracy. The VFD displays the frequency. The desired carrier frequency is entered directly by key pad or rotary knob. The frequency can also be stepped. Besides, the △REF is very convenient space frequency offset from a reference frequency.

1.1.2 OUTPUT LEVEL

Level can vary from -120dBm to 0dBm in 10dB, 1dB and 0.1dB steps using key pad or rotary knob. Also an output level value can be entered directly from key pad or stepped in desired increment or decrement using step keys. The level resolution is 0.1dB. Output level may be read in dBm, dBuV, dBuV EMF, mV, or uV. Reverse power protection is maximum 25W.

1.1.3 MODULATION

FM can be generated either by internal 10Hz~20kHz oscillator or by external modulation signals. FM deviation is from 0Hz to 100kHz.

1.1.4 MEMORY FUNCTION (SAVe / DELete/ SEQuence / REGister)

Memory registers allow you to save instruments set-ups and recall them whenever you wish. The number of the currently selected Sequence and the last Register selected are always in the lower left corner of the display to help you keep track of where you are in your testing process.

1.1.5 GPIB

IEEE-488 bus and a computer allows programmable control of the instrument.

1.1.6 RS-232C

RS-232c and a computer allows programmable control of the instrument.

1.1.7 AUTOCAL/DIAGNOSTICS

P 1110 utilizes a unique AutoCal routine to perform a quick and easy, almost completely automatic self-calibration.

1.2 SPECIFICATIONS

1.2.1 CARRIER WAVE FREQUENCY

1.2.1.1 IF INPUT SIGNAL

Input Level	: -20±1dBm
Input Impedance	: 50Ω
Max Input Level	: +18dBm
Frequency	: 35MHz~40MHz (8kHz Step Variable)
Default IF Frequency	: 38.912MHz

1.2.1.2 I/Q INPUT SIGNAL

Input Voltage	: 1Vpp±100mV
Input Impedance	: 50Ω
Connector	: BNC-R

1.2.1.3 RF OUTPUT FREQUENCY

Frequency setting ranges

Range	Band II	: 87.5MHz ~ 108MHz
	Band III	: 174MHz ~ 250MHz
	Band L	: 1452MHz ~ 1492MHz
Frequency Resolution		: 1Hz (ALL BAND)

1.2.1.4 REFERENCE SIGNAL GENERATOR OUTPUT

Oscillation frequency	: 10MHz
Temperature stability	: 5 X $10e^{-8}$ at 5 to 35 ℃
Aging rate	: 1 X $10e^{-7}$ / year
Output level	: 8dBm

1.2.1.5 EXTERNAL REFERENCE SIGNAL OUTPUT

Frequency	: 10MHz
Output level	: 8dBm

1.2.2 RF OUTPUT

1.2.2.1 OUTPUT LEVEL

Output level	: -120dBm ~ 0dBm (with 50Ω termination)
Setting resolution	: 0.1dB
In-band frequency response	: < 1 dB (at 0dBm)

1.2.2.2 LEVEL ACCURACY

Band II , III	: ±1dB -9dBm < cw
	±1.5dB -120dBm < cw ≤ -9dBm
Band L	: ±1dB -9dBm < cw
	±1.5dB -103dBm < cw ≤ -9dBm
	±2.0dB -120dBm < cw ≤-103dBm

1.2.2.3 FLATNESS : ±1.2dB (±0.7dB, typical) at 0dBm

1.2.2.4 UNIT : dBm, dBu, EMFdBu

1.2.2.5 OUTPUT IMPEDANCE : 50Ω

1.2.2.6 VSWR

BAND II & III	: < 1.5
BANd L	: < 1.8

1.2.3 SIGNAL PURITY

1.2.3.1 HIGHER HARMONICS COMPONENTS : <-30dBc

1.2.3.2 NON-HARMONICS COMPONENTS

: <-55dBc for 100kHz or more, in +100MHz band
<-50dBc for 100kHz or more, in all bands

1.2.4 MODULATION

1.2.4.1 MODE	: FM
1.2.4.2 INTERNAL SOURCE	: 50Hz ~ 20kHz (Variable) 400Hz, 1kHz (Fixed)
1.2.4.3 EXTERNAL SOURCE	
FM mode	: 50Hz to 100kHz
Input level	: 1Vpeak (1kHz Ref.),600Ωinput Internal AF signal output function

1.2.4.4 FM CHARACTERISTICS

FM Resolution	: 100Hz
FM Deviation Range	: 0 ~ 100kHz
Modulation Accuracy, FM	: ±6% of programmed setting , at internal rates (typically±3%)
FM Distortion	: < 2% at 75kHz deviations internal rates, DEMOD. BW=50Hz to 15kHz
EXT FM Flatness	: ±1.5dB with 50Hz~100kHz. dev.75kHz

1.2.5 REVERSE POWER PROTECTION

1.2.5.1 MAX RF POWER	: 25W
1.2.5.2 MAX REVERSE DC VOLTAGE	: 25VDC

1.2.6 INTERFACE

1.2.6.1 RS232 & GPIB Standard

1.2.7 APPEARANCE

1.2.7.1 DIMENSION	: 115(H) × 430(W) × 410(D)mm
1.2.7.2 WEIGHT	: 14kg
1.2.7.3 SOURCE VOLTAGE	: 115 / 230 VAC(power input voltage fluctuation: within ±10%) 50 / 60 Hz
1.2.7.4 POWER CONSUMPTION	: Max 80VA
1.2.7.5 STANDARD ACCESSARIES	: Power Cable, Fuse, Operating Manual
1.2.7.6 Others	: Indoor use Amplitude up to 2000m Pollution degree IP20

CHAPTER 2

INSTALLATION INSTRUCTIONS

2.1 INTRODUCTION

2.2 INITIAL INSPECTION

2.3 ELECTRICAL INSTALLATION

2.4 INSTALLATION CHECK

Chapter 2

INSTALLATION INSTRUCTIONS

2.1 INTRODUCTION

This chapter provides complete installation instruction for **P 1110** . The instruction includes the initial inspection, the precautions for AC line connection, and the equipment turn-on procedures.

2.2 INITIAL INSPECTION

Open the package, inspect for any mechanical damage to the product; e.g., instrument exterior, connectors, and so on.

2.3 ELECTRICAL INSTALLATION

The equipment operates on 50/60Hz, 115/230V AC line voltages.
Check carefully Voltage selector (115V or 230 V)
1.0A fuse for 115V operation and 0.5A fuse for 230V operation are used.

Caution ⚠

Please verify the AC voltage selector and FUSE

2.4 INSTALLATION CHECK

Although every **P 1110** is checked carefully before each customer shipment, some chance still exists for equipment damage during transportation. Therefore, the operator should verify the received equipment is functioning correctly. The following installation instruction provides the verification procedure.

2.4.1 REQUIRED EQUIPMENTS

In order to test the operation of **P 1110** , one needs to verify the output frequency and power level requiring spectrum analyzer and power meter.

2.4.2 INITIAL TURN-ON

When the power switch is pushed on, the front panel display will indicate the operation of the instrument.

2.4.3 TEST PROCEDURE

The following paragraphs describe the general operational test procedures for **P 1110.** Please verify with test equipments that have proper specification.

2.4.3.1 FREQUENCY

Verify that frequency commanded with keypad or rotary knob is correct.
Set Modulation: OFF, Level: -10dBm

2.4.3.2 OUTPUT LEVEL

Set Frequency=200MHz and Level = -10dBm.
Measure the output level using a power meter. Use the spin knob to set the resolution digit at the units (ones) position and then to set the output to -15dBm. Set the output frequency to 230MHz. Measure the output level. Use spin knob to change the output -20dBm. Measure the output level.

2.4.3.3 FM

Set Level = -10dBm, Frequency = 200MHz, FM , INT 1kHz. Set FM deviation to 100kHz and verify the deviation value with modulation analyzer.

2.4.3.4 EXTERNAL FM

Using the front panel External Modulation connector, apply the external modulation source to test EXT FM. Repeat(2.4.3.3)

CHAPTER 3

OPERATING INSTRUCTIONS

3.1 FRONT PANEL DESCRIPTION

3.2 REAR PANEL DESCRIPTION

3.3 OPERATION EXAMPLES

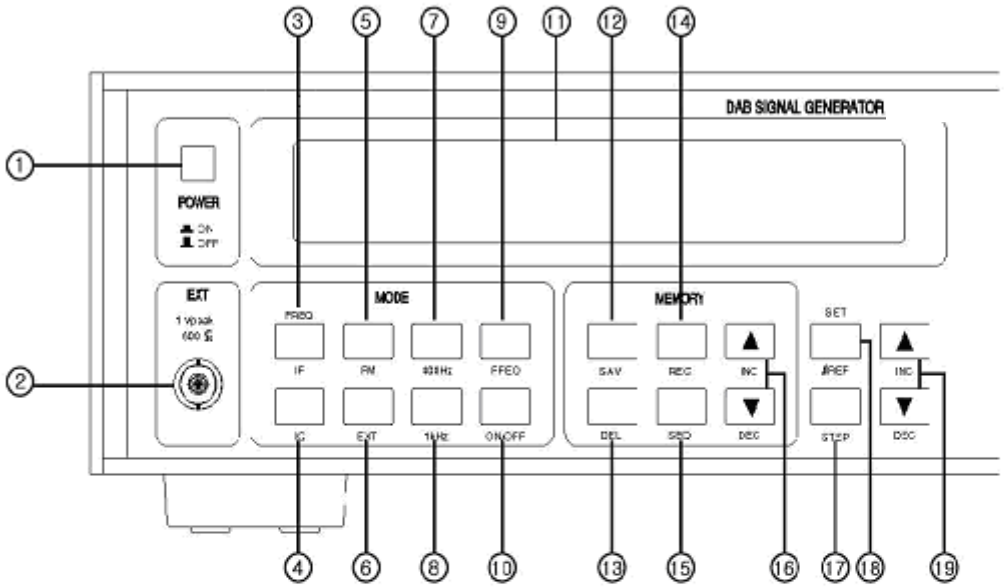
3.4 INITIALIZE

3.5 VFD BRIGHTNESS

Chapter 3

OPERATING INSTRUCTIONS

3.1 FRONT PANEL DESCRIPTION



1. POWER ON/OFF SWITCH
   Press this switch to power up the instrument.
   The instrument powers up to the same state it was in when power was turned off, except that the RF output will be turned off.

Allow a 2 seconds time interval between turning power ON and OFF. If the unit is turned ON and OFF too quickly, it is possible that damage may occur due to surge current.

2. EXTERNAL MODULATION CONNECTOR
   This female BNC connector accepts a 1Vpeak(600 Ω) signal for EXT FM.

3. IF[ ]key (Intermediate Frequency)
   Press this key to use the external IF signal.
   This key used to together with SHIFT[ ]key to set the IF frequency.
   Use numeric keys or knob to make setting the IF frequency.

   ex) IF freq : 38.196 MHz --> 36 MHz
   SHIFT[ ], IF[ ], [3], [6], [MHz dBm]

4. IQ[ ]key (In-Phase Quadrature -Phase)

Press this key to use the external I/Q signal.

5. FM[ ]key

Press this key to select the CW mode or adjust the FM deviation.

6. EXT[ ] key

Press this key for external modulation mode.

7. 400Hz[ ] key

Press this key for internal 400Hz rate.

8. 1kHz[ ] key

Press this key for internal 1kHz rate.

9. FREQ[ ] key

Press this key for internal variable modulation. (10Hz through 20kHz)

10. MOD ON/OFF[ ] key

This key toggles all modulation signals on and off. Although you can set up and enable various modulation states, the RF carrier is not modulated until MOD ON/OFF[ ] is set to ON.

An annunciator is always turned on in display to indicate whether modulation is turned on or off

11. DISPLAY

The VFD Displays provides information on the current instrument state such as modulation status, frequency and amplitude settings, status indicators, and error message.

12. SAV[ ] key

Press this key and REGister number (00 through 99) to save the current operating settings in a memory registers.

All front-panel settings except the knob digit positions and GPIB address will be saves in the register.

When you press the this key, a message is displayed to tell you the total number of registers still available.

It's available to save maximum 100 registers in one sequence. and it can be saved up to 300 registers in total sequences (1 through 9).

The number of states you can save, however, is limited by the size of whatever else is stored in the file system

13. DEL[ ] key

Press this key and a REGister number (00 through 99)to delete that register. The Specified register is deleted from the currently selected sequence only but registers in other sequences you have set up are not affected. After you have deleted a register, you will not be able to recall that register number until you have saved operating settings in it again.

14. REG[ ] key

Press this key and a register number (00 through 99) to recall the operating settings saved in that registers. The number of the last register recalled appears in the display along with the number of the selected sequence.
You can only recall registers from the currently selected sequence.
To recall a register from another sequences you must first move to the wanted band and select the sequence using SEQ[ ]key.

15. SEQ[ ] key

Sequence 1~3 are used only Band II , sequence 4~6 are used only Band III, and sequence 7~9 are used only Band L.
To select a register sequence press SEQ[ ] key and a sequence number (1 through 9). When you select a sequence, the number of the sequence appears in the display along with the first register saved in the sequence.
If no registers have been saved in the sequence, a message is displayed to lets you know

16. [▲], [▼] keys

This key recalls the memory(Register) address in selected sequence.

17. STEP[ ] key

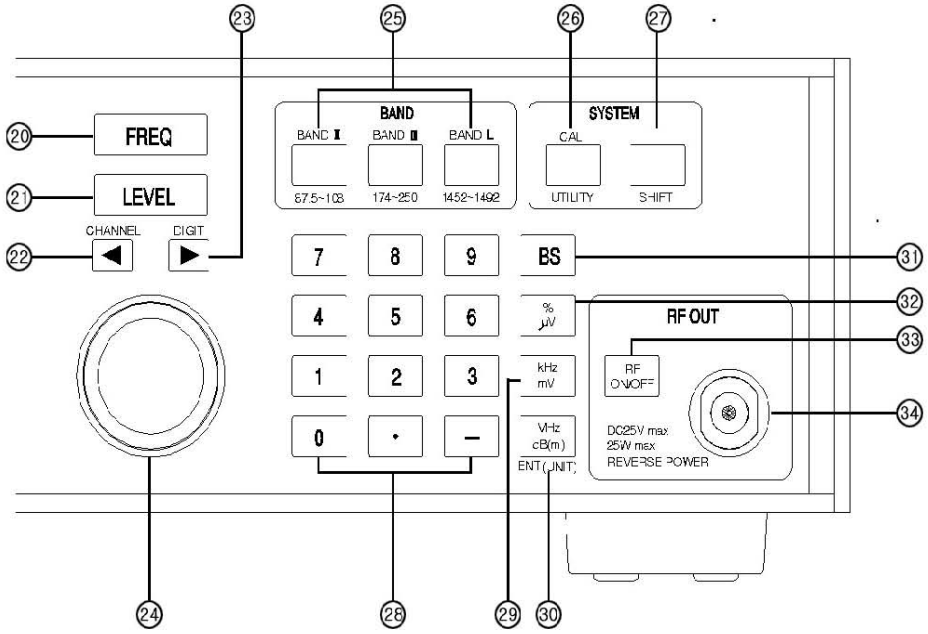
Press this key to set up the increment size for that function.
If you want to change the step value, press [FREQ]key or [LEVEL]key and then press STEP[ ]key to adjust the value.

18. △REF[ ] key

Press this key to turn on the reference mode and to set the current RF output settings as reference value. The reference value is stored in non-volatile memory until you replace it by pressing this key again when you press this key, the △symbol is displayed between the value and the units. When △ appears, the displayed value indicates the offset between the reference value and the RF output signal.

19. [▲], [▼] keys

The up and down arrow keys increase or decrease a numeric value.
That digit can be modified by the up and down arrow keys or the knob



20. [FREQ] key

Press this key to activate the frequency function so that you can change the frequency of the RF output.

21. [LEVEL] key

Press this key to activate the Level function so that you can change the amplitude of the RF output.

22, 23. [◀], [▶] key

The left and right arrow keys choose the under_cursor digit in the active function display. This key used to together with SHIFT[ ]key to select channel unit or digit unit.

ex) Frequency channel setting

SHIFT[ ], [◀], Knob : Frequency Channel setting
SHIFT[ ], [▶], Knob : Frequency Digit setting

24. KNOB

The knob increases or decreases a numeric value.

Any of the values that can be set through the numeric keypad can also be set by the knob

25. BAND

BAND II [ ]key (87.5MHz~108MHz), BAND III [ ]key (174MHz~250MHz)

BAND L [ ]key (1452MHz~1492MHz)

26. UTILITY[ ] key

Press this key to reset Memory, change level unit, change GPIB address and control VFD brightness.

This key used to together with SHIFT[ ]key to calibrate OSC, ALC and OCXO. Be careful to use this calibrate functions.

27. SHIFT[ ] key (Local[ ])

This key lets you do blue letters functions.

Press this key to return the signal generator to Local (Front panel) control from remote operation.

28. NUMERIC KEYPAD

The numeric keypad consists of the digit keys(0 through 9), a decimal point, and [−] key.

29. [KHz mU] key

This key terminates output frequency, frequency step and output level(mV) entries.

30. [MHz dBm] key

This key terminates an output frequency or frequency step (MHz) or output level(dBm) entry. This key used to together with SHIFT[ ]key to change level unit

31. BS (Back Space) key

Press this key when entering a numeric value to backspace and remove the last digit entered.

32. [uV] key

The [uV]key terminates output level (uV) entries.

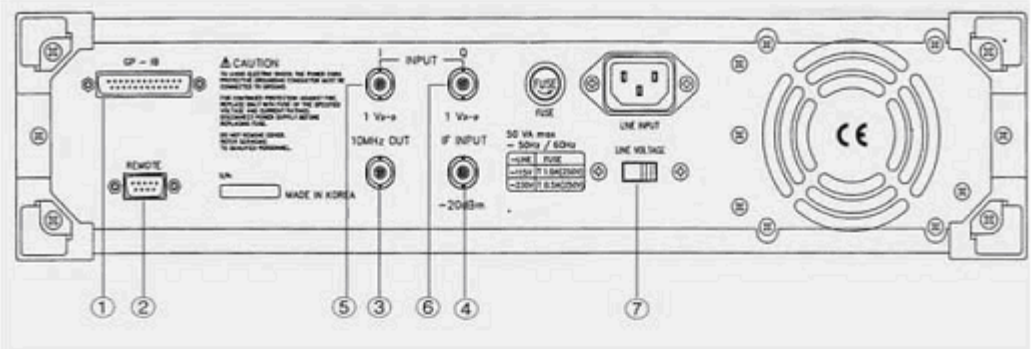
33. [RF ON/OFF] key

This key toggles the RF output signal on and off. RF OFF appears in the second line of the amplitude display when the output signal is off.

34. RF OUTPUT CONNECTOR

This female Type-N connector is output for RF signals.

3.2 REAR PANEL DESCRIPTION



1. GPIB Connector

2. RS-232c Connector

3. 10MHz OUT : output connector for the internal time base reference (10 MHz).

4. IF : input connector for the external Intermediate Frequency.

5. I : input connector for the external In-phase signal.

6. Q : input connector for the external Quadrature-phase signal.

7. Line Voltage Selector

3.3 OPERATION EXAMPLES

3.3.1 SETTING THE RF OUTPUT SIGNAL

In the following examples, you will set the frequency, level (amplitude), and modulation level of the RF output signal.

[Start display]

174.000000MHz FM 4.5kHz -107.0dBm
SEQ 4 REG -- 1KHz OFF RF OFF

3.3.1.1 Setting the Frequency (ex: 200 MHz)

Press these keys : [FREQ], [2], [0], [0], [MHz dBm]

200.000000MHz FM 4.5kHz -107.0dBm
SEQ 4 REG -- 1kHz OFF RF OFF

3.3.1.2 Setting the Level (Amplitude) (ex: -30 dBm)

Press these keys : [LEVEL], [—], [3], [0], [MHz dBm]

200.000000MHz FM 4.5kHz -30.0dBm
SEQ 4 REG -- 1kHz OFF RF OFF

3.3.1.3 Turn on the RF Output

Press the [RF ON/OFF] key to turn on the RF output.

200.000000MHz FM 4.5kHz - 30.0dBm
SEQ 4 REG -- 1kHz OFF

☞" RF OFF" is displayed below Level setting when the RF output is turned off.

3.3.1.4 Setting the modulation (ex: INT FM 3kHz, MOD rate = INT 400 Hz)

Press these keys : FM[ ], [3], [kHz mV], 400Hz[ ]

200.000000MHz FM 3.0kHz - 30.0dBm
SEQ 4 REG -- 400Hz

☞ Available modulation sources are as follows.
Internal modulation sources: INT 1kHz, INT 400Hz, INT FREQ
External modulation sources: EXT AC

3.3.2 INCREMENTING OR DECREMENTING THE RF OUTPUT SIGNAL

3.3.2.1 Preliminary steps

Set the frequency to 200MHz, and the level(Amplitude) -100dBm
The cursor position is in the level.

```
200.000000MHz  FM  3.0kHz -100.0dBm
SEQ 4 REG --    400kHz       OFF
```

3.3.2.2 Using the KNOB

Decrement the amplitude using the knob.

```
200.000000MHz  FM  3.0kHz -100.1dBm
SEQ 4 REG --    1kHz         OFF
```

Press [◄] or [►] when you wish to adjust the increment resolution

3.3.2.2 Using the STEP key

1) Enter the frequency increment of 25kHz.
(Ex: FREQ INCrement STEP= 25kHz)
Press these keys: [FREQ],STEP[ ],[2],[5],[kHz/mU]

```
25.000 ◆ kHz  FM  3.0kHz -100.1dBm
SEQ 4 REG --    400Hz       OFF
```

The symbol is displayed when you press STEP[ ] to indicate that the displayed value is the increment set value.

2) Return to main display to press frequency key
Press this key : [FREQ]

```
200.000000MHz  FM  3.0kHz -100.1dBm
SEQ 4 REG --    400Hz       OFF
```

3)Press [▲](or [▼])key

```
200.025000MHz  FM  3.0kHz -100.1dBm
SEQ 4 REG --    400Hz       OFF
```

☞This step key affects the last FUNCTION selected
(FREQUENCY, LEVEL, FM)

3.3.3 USING THE MEMORY REGISTERS

The memory register examples show you how to crate a sequence of registers, delete a register in the sequence, and insert a new register in the sequence.

Up to 9 register sequences can be defined (1 through 9). A sequence can contain up to 100 registers (00 through 99). There are a total of 300 registers available in the instrument.

The registers can be used in the sequences in any combination as long as the total does not exceed 300 registers.

It is not possible to have all 9 sequences each contain 100 registers as that would be 900 registers

3.3.3.1 Saving Instrument settings in Register Sequences

In this 10 step example, you will use the memory keys to create a sequence containing three registers. Each register will contain a different frequency setting

1) Selecting the Sequence (ex : select SEQuence 4)

Press these keys : SEQ[ ], [4]

☞ If there are registers saved in SEQquence 4, the message shown in the display below will not appear.

200.025000MHz FM 3.0kHz -100.1dBm
SEQ 4 has no registers saved in it.

☞ That steps in this example will cause the settings in registers 00,01, and 02 of SEQuence 0 to be changed

2) Saving Settings in REGisters.

Set the frequency to 210 MHz

Press these keys : [FREQ], [2], [1], [0], [MHz dBm]

210.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG-- 400Hz

3) Save the instrument settings in Register 00

Press these keys : SAV[ ], [0], [0]

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 saved

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 400Hz OFF

4) Set the frequency setting to 220 MHz

Press these keys : [FREQ], [2], [2], [0], [MHz dBm]

220.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG-- 400Hz OFF

5) Save the instrument settings in Register 01

Press these keys : SAV[ ], [0], [1]

220.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 01 saved

220.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 01 400Hz OFF

6) Set the frequency to 230 MHz.

Press these keys : [FREQ], [2], [3], [0], [MHz dBm]

230.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG01 400Hz OFF

7) Save the instrument settings in REGister 02

Press these keys : SAV[ ], [0], [2]

230.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 02 saved

230.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 02 400Hz OFF

8) Checking the Sequence

Recall the registers in SEQuence 4

Press these keys : REG[ ], [▲], [▲], [▲]

210.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 00 400Hz OFF

220.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 01 400Hz OFF

230.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 02 400Hz OFF

210.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 00 400Hz OFF

☞ The [▲], [▼] keys recall registers or sequences depending on which key was pressed last (REG[ ], SEQ[ ])

9) Checking a different Sequence

Select SEQuence 5.

Press these keys : SEQ[ ], [5]

210.000000MHz FM 3.0kHz -100.1dBm SEQ 5 has no registers saved in it.

; There are not any registers saved in SEQ 5

10) Step through the registers in Sequence 5, if there are registers saved in it Press these keys : REG[ ] , [▲]

☞ Sequence 5 does not contain the settings you saved in sequence 4.The instrument enables you to save different settings in each sequence to create up to 9 different sequences for testing.

Remember when you save or recall a register, be sure that the correct Sequence is also selected.

3.3.3.2 Deleting a Register from the Sequence

In this example, you will delete a register from the Sequence you created in the preceding example.

1) Selecting the Sequence

Select SEQ 4.

Press these keys : SEQ[ ], [4]

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 400Hz OFF

2) Deleting a Register

Delete register 01 from Sequence 4.

Press these keys : DEL[ ], [0], [1]

220.000000MHz FM 3.0kHz -100.1dBm SEQ 4 DEL-- Enter number to delete

☞ The contents of the REGister are recalled when it is deleted. This allows you to resave the contents if you need to

3) Step through the remaining registers in Sequence 4

The deleted register number has been removed from the sequence. Note that the instrument does not renumber the registers when one is deleted.

Press these keys : REG[ ], [▲], [▲], [▲]

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 400Hz OFF

230.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 02 400Hz OFF

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 400Hz OFF

3.3.3.3 Renumbering the Registers in a Sequence

In this example, you will eliminate the skip from register 00 to register 02 in sequence 4 caused when you deleted register 01 in the previous example.

1) Decreasing the Register Number

Delete Register 02

Press these keys : DEL[ ],[0],[2]

230.000000MHz FM 3.0kHz -100.1dBm SEQ 4 DEL-- Enter number to delete

2) Saving the settings from Register 02 into Register 01

Press these keys : SAV[ ],[0],[1]

230.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 01 400Hz OFF

3) Checking the Sequence

Step through the register sequence

Press these keys : REG[ ],[▲],[▲],[▲]

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 400Hz OFF

230.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 01 400Hz OFF

210.000000MHz FM 3.0kHz -100.1dBm SEQ 4 REG 00 400Hz OFF

3.3.4 OFFSETTING THE RF OUTPUT FROM A REFERENCE

In this example, you will enter an RF output frequency,

Set it as the reference value, and then offset the RF output frequency 10 MHz below the reference value

3.3.4.1 Setting the Reference value

1) Set the frequency to 210MHz .

Press these keys : [FREQ], [2], [1], [0], [MHz dBm]

210.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 00 400Hz OFF

2) Set 210 MHz as the reference frequency

Press this key : △REF[ ], SHIFT[ ]+△REF[ ] (set function)

0.000000△MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 00 400Hz OFF

☞ The output frequency is still 210MHz.

3) Offsetting the RF output.

Offset the output frequency 10 MHz below the reference frequency.

You can enter in the offset value directly, or use the knob or [▲]or[▼]

Press these keys : [FREQ], [—], [1], [0], [MHz dBm]

-10.000000△MHz FM 3.0kHz -100.1dBm
SEQ 4 REG 00 400Hz OFF

☞ The output frequency is 200MHz.
In the reference mode, the output frequency equals the reference frequency ± the displayed offset frequency.

4) Turning the reference Mode Off or On

Turn-off the reference mode to display the actual output frequency.

Press this key : △REF[ ]

200.000000MHz FM 3.0kHz -100.1dBm
SEQ 4 REG -- 400Hz OFF

5) Turn-on the reference mode without changing the reference frequency.

Press this key : △REF[ ]

-10.000000△MHz FM 3.0kHz -100.1dBm
SEQ 4 REG -- 400Hz OFF

6) Change the displayed units to kHz

Press this key : [kHz mV]

-10000.000△kHz FM 3.0kHz -100.1dBm
SEQ 4 REG -- 400Hz OFF

☞ For Level (amplitude),reference settings are displayed in dB units only.

7) Setting a New Reference Value

Press this key : △REF[ ]

200000.000kHz FM 3.0kHz -100.1dBm
SEQ 4 REG -- 400Hz OFF

Set the current output frequency as the new reference frequency at any time.

3.4 INITIALIZE

To initialize, Press these keys sequentially (UTILITY[ ],[▲](or[▼]),[MHz dBm])

MEMORY RESET
PRESS "ENT" KEY TO RESET MEMORY

then 300 memories are created and the instrument return to default setting

☞ Be careful since all the memory contents will be lost

TABLE 3-2 Default setting.

(The case of BandII and FM mode is selected last state)

FREQ	: 174 MHz
FM	: 4.5 kHz
LEVEL	: -107.0dBm
SEQ	: 4
REG	: --
MOD Freq	: 1kHz
MOD On/Off	: Off
FREQ STEP	: 125 kHz
LEVEL STEP	: 1.0dB
FM STEP	: 0.1 kHz
CURSOR POSITION	: FREQ 1kHz
GPIB ADDRESS	: 02
RF ON/OFF	: OFF

3.5 VFD BRIGHTNESS

To control the VFD brightness , press these keys sequentially

(UTILITY[ ],[▲](or[▼]),[MHz dBm])

BRIGHTNESS (50%)
PRESS "0~3" KEY TO RESET BRIGHTNESS

0 : 100 % 1 : 75 %

2 : 50 % (Factory Setting) 3 : 25 %

CHAPTER 4

GPIB & RS-232C

4.1 INTRODUCTION

4.2 INSTALLATION INSTRUCTION

4.3 OPERATING INSTRUCTION

Chapter 4

GPIB & RS-232C

4.1 INTRODUCTION

4.1.1 GPIB

General Purpose Interface Bus (GPIB) is another important option in **P 1110** for test automation.

P 1110 GPIB is fully compatible with IEEE 488-1978 standard and the following set of commands are available.

-. SH1	Source handshake
-. AH1	Complete acceptor handshake capability
-. T6	Talker
-. TE0	Extended talker mode disabled
-. L4	Basic listener
-. LE0	Extended listener mode disabled
-. RL1	Complete Remote/Local capability
-. PP0	Parallel poll capability disabled
-. DC1	Deice clear capability
-. DT0	Device trigger disabled
-. C0	Controller capability disabled
-. SR0	Service request disabled

All of the instrument functions except Power ON/OFF can be accessed through GPIB.

The GPIB Command format in **P 1110** uses small set of unique commands which are flexible for general purpose programming from GPIB controller (Computer).

4.1.2 RS-232C

Communication Protocol.

-. BAUD RATE	:	9600 bps
-. PARITY	:	None/8 bits, 1 stop bit
-. cable	:	DTE-DTE interface cable (cross over cable)

4.2 INSTALLATION INSTRUCTIONS

The default address of **P 1110** GPIB (My listen Address : MLA) set at the factory is "2", but it can easily changed from the front panel. GPIB Controller is made up of a computer with GPIB I/O interface hardware and an operating system which is compatible with IEEE-488 standard. The GPIB controller sends ASCII command strings on GPIB to control GPIB instrument on GPIB bus. For example, a simple carrier frequency command "BN 0; FR 100 MZ" can be sent to the GPIB Bus by the controller. If the installation is done correctly, the frequency display will change to 100MHz.

4.3 OPERATING INSTRUCTIONS

4.3.1 LOCAL/REMOTE MODE SELECTION

When Power is turned ON, **P 1110** is in LOCAL mode and front panel is active. If a valid GPIB command is sent to GPIB bus, the instrument enters Remote mode. During Remote mode, only Local key(SHIFT[ ]key) is active on the front panel. Unless Local Lockout bus command is sent previously, Pressing Local key(SHIFT[ ]key) returns the full control to the front panel. To return to the LOCAL mode from Local Lockout condition, a GPIB command, RTL(Return to Local), is sent from the controller. Otherwise, the instrument could be hard reset turning Power SW off and on.

4.3.2 GPIB ADDRESS SETTING

MLA (my listen address), the bus address of **P 1110** can be set from the front panel using UTILITY[ ]key. At power up, the address has a default value "2".

4.3.3 GPIB & RS-232C INPUT COMMAND

GPIB input commands are ASCII strings used by the GPIB controller for programming GPIB. When the commands are executed programmatic ally by the controller, **P 1110** performs special functions requested by the controller.

There are 2 types of GPIB input commands; Parameter and Direct commands. These are described in the following sections.

4.3.3.1 PARAMETER COMMANDS

Parameter commands allow the operational parameter setting of **P 1110** (e.g., Frequency, Levels, etc.)
Parameter command is described in Table 4-1 ~ 4-3.

Parameter command format:

<header> <numeric argument> <unit> <terminator>

Table 4-1. Parameter Command Headers

HEADER	DESCRIPTION
BN	Band
BN?	Band Query
FR	Carrier Frequency
FR?	Carrier Frequency Query
FS	Frequency Step Interval
FS?	Frequency Step Interval Query
LE	Output Level
LE?	Output Level Query
LS	Level Step Interval
LS?	Level Step Interval Query
IFR	Intermediate Frequency
IFR?	Intermediate Frequency Query
FM	Frequency Modulation
FM?	Frequency Modulation Query
SN	Internal Frequency
SN?	Internal Frequency Query
SQ	Sequence
SQ?	Sequence Query
RC	Recall
ST	Store

Table 4-2. Parameter Command numeric arguments

0 ~ 9	Number
.	Decimal Point
-	Minus Sign

Table 4-3. Parameter Command Units

UNITS	DESCRIPTION
KZ	Output, Step Frequency, FM Deviation
MZ	Output Frequency, Step Frequency
DM	Output Level dBm
DU	Output Level dBu
UV	Output Level uV
DUE	Outpur Level dBuV emf
DB	Step Level

4.3.3.2 DIRECT COMMANDS

Direct Command is another form of system command requiring no 200 argument. The commands are listed in Table 4-4.

Direct command format: <header> <termination>

Table 4-4. Direct Command Headers

HEADER	DESCRIPTION
DM	dBm
DU	dBu
DUE	dBuV
UV	uV
MR1	Internal 400Hz
MR2	Internal 1kHz
EA	EXT AC
M0	Modulation Off
M1	Modulation On
M?	Modulation On/Off Query
RF0	RF Off
RF1	RF On
RF?	RF On/Off Query
FD	Frequency Step Down
FU	Frequency Step Up
LD	Level Step Down
LU	Level Step Up
CW	CW Mode
IF	IF Mode
IQ	IQ Mode

4.3.3.3 The last input for a parameter command format is made of EOS terminator, which is LF, CR, CR+LF, or EOI. Each completed command is separated by semicolon (;).

4.3.3.4 The argument for ST and RC commands is limited to a number between 0 and 99. It requires no unit.

Table 4-5. GPIB & RS-232C Command List

FUNCTION	DATA	UNIT	COMMENTS
BN	0~2		Band
BN?			Band Query
FR	0~9, .	KZ, MZ	Freqeuncy(Carrier)
FR?			Freqeuncy(Carrier) Query
FS	0~9, .	KZ, MZ	Freqeuncy Step
FS?			Freqeuncy Step Query
FD			Freqeuncy Step Down
FU			Freqeuncy Step Up
IFR	0~9, .	MZ	Intermediate Frequency
IFR?			Intermediate Frequency Query
CW			CW Mode
IF			IF Mode
IQ			IQ Mode
LE	0~9, .	DM,DU,DUE,UV	Level(Carrier)
LE?			Level(Carrier) Query
LS	0~9, .	DB	Level Step
LS?			Level Step Query
LD			Level Step Down
LU			Level Step Up
DM			dBm
DU			dBu
DUE			dBuV
UV			uV
RF0			RF Off
RF1			RF On
RF?			RF On/Off Query
FM	0~9, .	KZ	Frequency Modulation
FM?			Frequency Modulation Query
MR1			INT 400Hz
MR2			INT 1kHz
EA			EXT AC
M0			Modulation Off
M1			Modulation On
M?			Modulation On/Off Query
SN	0~9, .	KZ	Internal Frequency
SN?			Internal Frequency Query
SQ	1~9		Sequence
SQ?			Sequence Recall
RC	0~99		Recall
ST	0~99		Store

☞ Input command is only a capital letter.

4.3.4 EXAMPLES

4.3.4.1 Programming ADDRESS Function

Ex1) Recall stored data from SEQ 1, REGister 10.

"SQ 1"
"RC 10"

Ex2) Store current front panel setting to SEQ 1, REGister 10

"SQ 1"
"ST 10"

4.3.4.2 Programming MODULATION Function

Ex1) Set FM deviation to 90kHz

"FM 90 KZ"

Ex2) Select INT Modulation or External Modulation.

"MR1" ; Internal Source 400Hz
"MR2" ; Internal Source 1kHz
"EA" ; External Source

Ex3) All Modulation OFF.

"M0" ; Mod off (Number 0)

Ex4) All Modulation ON.

"M1" ; Mod on (Number 1)

4.3.4.3 BAND

Ex1) Select the Band III (174MHz~250MHz)

"BN 1"

Ex2) Current band?

"BN?"

4.3.4.4 MODE

Ex1) Select CW Mode

"CW"

Ex2) Select IF Mode

"IF"

Ex3) Select IQ Mode

"IQ"

4.3.4.5 Programming FREQUENCY Function (BandIII selected)

Ex1) Carrier Frequency to 200.123MHz
"FR 200.123 MZ"

Ex2) Set Frequency step value to 1 MHz
"FS 1 MZ"

Ex3) Up or Down the Carrier Frequency using in frequency steps.
"FU" ; Increment one frequency step
"FD" ; Decrement one frequency step

Ex4) Starting at carrier frequency 200MHz, increment the frequency twice and decrement once in 1kHz step.
"FR 200 MZ;FS 1 KZ;FU;FU;FD"

Ex5) current frequency ?
"FR?"

4.3.4.6 Programming LEVEL Function

Ex1) Set output level to -13dBm
"LE -13 DM"

Ex2) Set output level to 100dBμ
"LE 100 DU"

Ex3) Convert units from dBm to dBμ
"DM" ; dBμ to dBm
"DU" ; dBm to dBμ

Ex4) Set step value to 1dB
"LS 1 DB"

Ex5) Up and down level steps
"LU" ; increase one level step
"LD" ; decrease one level step

Ex6) Set level to -13dBm, convert units to dBu, set level step value to 2dB, and decrease level by one step.
"LE -13 DM;DU;LS 2 DB;LD"

CHAPTER 5

MANUAL UPDATE

5.1 Remote Controller (op-305)

5.2 Up date the REAR Panel Design

Chapter 5

MANUAL Updates

5.1 How to use Remote Controller (OP-305)

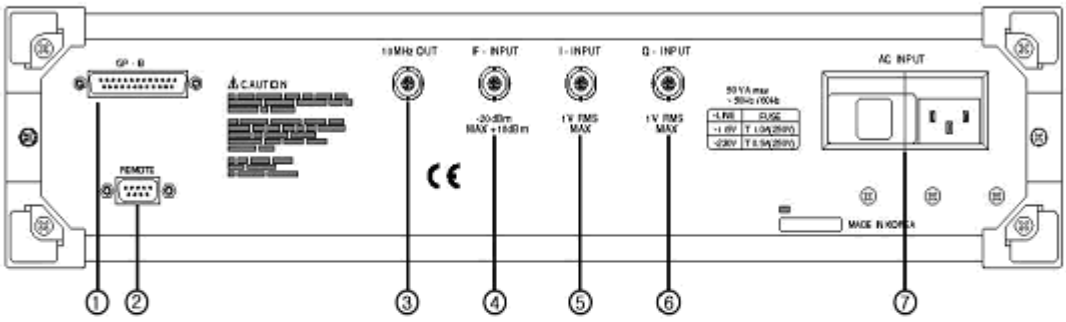
5.1.1 Function of OP-305 (Remote Controller)

Button	Function
Left button	Memory Recall : Register No -- increase
Middle button	RF On/OFF
Right button	Memory Recall : Register No -- decrease

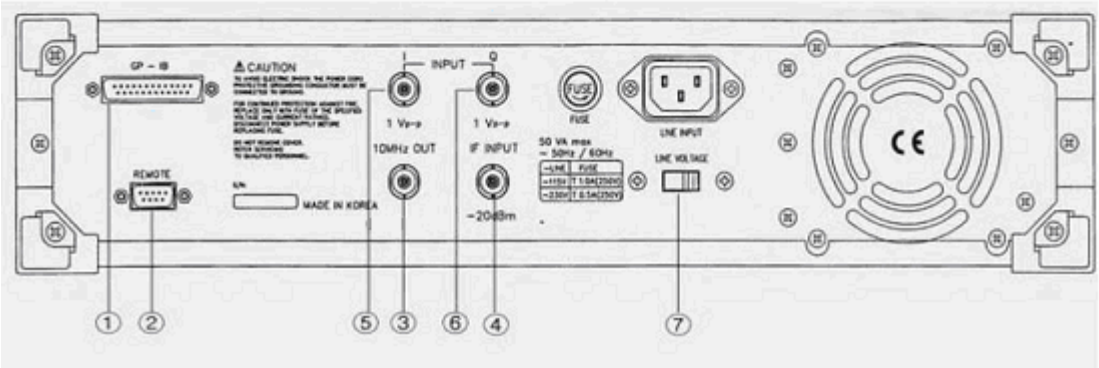
5.1.2 Layout of OP-305 (Remote Controller)

5.2 Update the REAR Panel Design

[Before]



[After]



APPENDIX

APPENDIX

A.1 CHANNEL PLAN

APPENDIX A : CHANNEL PLAN

FREQUENCY TABLE (MHz)

No	Band III		Band L
1	174.928 MHz		1452.960 MHz
2	176.640 MHz		1454.672 MHz
3	178.352 MHz		1456.384 MHz
4	180.064 MHz		1458.096 MHz
5	181.936 MHz		1459.808 MHz
6	183.648 MHz		1461.520 MHz
7	185.360 MHz		1463.232 MHz
8	187.072 MHz		1464.944 MHz
9	188.928 MHz		1466.656 MHz
10	190.064 MHz		1468.368 MHz
11	192.352 MHz		1470.080 MHz
12	194.064 MHz		1471.792 MHz
13	195.936 MHz		1473.504 MHz
14	197.648 MHz		1475.216 MHz
15	199.360 MHz		1476.928 MHz
16	201.072 MHz		1478.640 MHz
17	202.928 MHz		1480.352 MHz
18	204.640 MHz		1482.064 MHz
19	205.264 MHz		1483.776 MHz
20	206.352 MHz		1485.488 MHz
21	207.008 MHz		1487.200 MHz
22	208.064 MHz		1488.912 MHz
23	209.936 MHz		1490.624 MHz
24	211.648 MHz		
25	213.360 MHz		
26	215.072 MHz		
27	216.928 MHz		
28	218.640 MHz		
29	220.352 MHz		
30	222.064 MHz		
31	223.936 MHz		
32	225.648 MHz		
33	227.360 MHz		
34	229.072 MHz		
35	230.784 MHz		
36	232.496 MHz		
37	234.208 MHz		
38	235.776 MHz		
39	237.488 MHz		
40	239.200 MHz		