RWC2010C Digital Radio Tester

Operating Manual



Version 1.070
(FW Version 1.070)

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1 General Information

This chapter covers instrument Specifications, Key Features and Safety Consideration.

1.1 Warranty
1.2 Safety Considerations
1.3 General Information
1.4 Power Requirement
1.5 Operating Environment

1.1 Warranty

RedwoodComm Warrants that this product will be free from defects in materials and workmanship for a period of two(2) years from the date of shipment. During the warranty period, RedwoodComm Company will, at its option, either repair or replace products that prove to be defective.
For warranty service or repair, customers must notify RedwoodComm of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customers shall be responsible for packaging and shipping the defective product to the service center designated by RedwoodComm. Customers shall prepay shipping charge to RedwoodComm designated service center and RedwoodComm shall pay shipping charge to return the product to customer. Customer is responsible for all shipping charges including freight, taxes, and any other charge if the product is returned for service to RedwoodComm, if the customer is located outside of Korea.

LIMITATION OF WARRANTY
The foregoing warranty shall not apply to defects resulting from improper or inadequate malignance by buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, accident or abnormal conditions of operations.
RedwoodComm responsibility to repair or replace deductive products is the sole and exclusive remedy provided to the customer for breach of this warranty. RedwoodComm will not be liable for any indirect, special, incidental, or consequential damages irrespective of whether RedwoodComm has advance notice of the possibility of such damages

1.2 Safety Considerations

Review the following safety precautions to avoid injury and prevent damage to this product or any product connected to it.

1.2.1 Injury Precautions

Use Proper Power Cord
To avoid fire hazard, use only the power cord specified for this product.

Avoid Electric Overload
To avoid electric shock or fire hazard, do not apply a voltage to a terminal that is specified beyond the range.

Ground the Product
This product is grounded through the grounding conductor of the power cord. In case no ground is available at

the power outlet, it is recommended to provide a separate grounding path to the instrument by connecting wire
between the instrument ground terminal and an earth ground to avoid electric shock or instrument damage.
Before making connections to the input or output terminals of the product, ensure that the product is properly
grounded.

Do Not Operate Without Covers

To avoid electric shock or product damage, do not operate this product with protective covers removed.

Do Not Operate in Wet/Damp Conditions

To avoid injury or fire hazard, do not operate this product in wet or damp conditions.

Do not use in a manner not specified by the manufacturer

1.2.2 Product Damage Precautions

Use Proper Power Source

Do not operate this product from a power source that applies more than the voltage specified. Main supply voltage fluctuations not to exceed ± 10% of the nominal voltage.

Provided Proper Ventilation

To prevent product overheating, provide proper ventilation.

Do Not Operate With Suspected Failures

If there is damage to this product, have it inspected by qualified service personnel.

Environmental Conditions

Refrain from using this equipment in a place subject to much vibration, direct sunlight, outdoor and where the flat is not level. Also, do not use it where the ambient temperature is outside 5 °C to 40 °C, and altitude is more than 2000m. The maximum relative humidity is 80% for temperatures up to 31 °C decreasing linearity to 50% relative humidity at 40 °C.
Over voltage Installation Category II for mains supply. Pollution Degree 2

1.2.3 Safety Symbols and Terms

Symbols on the Product : The following symbols may appear on the product



Close	Open	ATTENTION	Indicates earth (ground) terminal

WARNING

Warning statements identify conditions or practices that could result in injury or loss of life.

CAUTION

Caution statements identify conditions or practices that could result in damage to this product or other property.

1.3 General Information

RWC2010C Digital Radio Tester supports the **DAB**, **DAB+**, **DMB**, **DRM30**, **DRM+**, **AM**, **FM** and **RDS** system. It provides a very convenient working environment with full control over all system parameters. It supports various kinds of data services such as **SPI, SLS** and more services will be added to adjust to changing markets. RWC2010C has **ETI** and **MDI** file player functions so that specific broadcasting station's DAB/DRM signal could be regenerated in the LAB. It also supports AM/FM radio test functions with fully editable RDS test functions.
In addition, it includes an **RF up-converter**, which supports RF output with 0.1dB step adjustable and Band **LF**, **MF**, **HF**, **I**, **II**, **III** frequency ranges, so it can directly generate broadcasting signals to DUTs so that systems can be easily aligned.

1.3.1 Key Feature

- Support **DAB**, **DAB+**, **DMB**, **DRM30**, **DRM+**, **AM**, **FM**, **RDS** functions
- Built-in **Real-time Multiplexer**
- Easy and Flexible Ensemble Editing
- 64 service components for DAB and 4 streams for DRM Support various kinds of data services such as **SPI, SLS** and so on.
- **Reconfiguration, AF, Announcement**, **Time, EON, TMC** functional tests
- **ETI** and **MDI** file player function with **OFDM Modulator** and **RF up-converter**
- **Service(Seamless) Linking** Test: **DAB-DAB**, **DAB-DRM**, **DAB-FM**, **DRM-FM, FM-FM**
- **Built in Audio Analyzer(SINAD, SNR, THD, THDN)**
- Built-in 256 Gbyte internal memory to store Contents

- Supports various frequency bands
- **BAND I/ II/III** (47MHz ~ 68MHz, 87MHz ~ 108MHz, 174MHz ~ 250MHz)
- **LF/MF/HF BAND** (0.149MHz ~ 30MHz)

1.3.2 Specification

Frequency

- LF/MF/HF Band: 0.149MHz ~ 30MHz
- BAND I/II/III: 47MHz~68MHz, 87MHz~108MHz, 174MHz~250MHz
- Resolution: 1kHz
- Accuracy: 1.5ppm/year @ operating temperature

Output Level

- 0dBm ~ -110dBm (OFDM: -10dBm ~ -120dBm) for BAND I/II/III
- -10dBm ~ -110dBm (OFDM: -20dBm ~ -120dBm) for LF/MF/HF BAND
- Resolution: 0.1dB
- Accuracy: 1dB

VSWR

- Better than 1:1.5

Modulation

- OFDM
- D-QPSK, 16QAM, 64QAM
- FM/AM

Frequency Reference

- Internal Reference & Stability: 10MHz, 1.5ppm/year @ operating temperature
- External Reference: 10MHz (0dBm ~ +20dBm MAX)

Remote Programming Ports

- RJ45 (TCP/IP)
- RS-232C

Miscellaneous

- 5", 800x480, 16M color, TFT LCD display with touch sensor.
- Operating temperature: 5 ~ 40℃
- Line Voltage: 100 to 240 VAC, 50/60Hz
- Dimension: 240(w) x 340(d) x 110(h) mm
- Weight: 5Kg

1.4 Power Requirement

This Tester is a portable instrument and requires no physical installation other than connection to a power source.

Items	Specifications
Provider	Mean Well Enterprise Co., Ltd.
Model	LRS-75-12, 72W
Input voltage	100 VAC - 240 VAC
Input current	1.52A
Frequency	50/60 Hz
Power Consumption	Less than 20 watt

CAUTION: If AC power is beyond the range of operation, the equipment may malfunction or could be permanently damaged. Main supply voltage fluctuations should be not to exceed ±10% of the nominal voltage.

1.5 Operating Environment

Refrain from using this equipment in a place subject to much vibration, direct sunlight, outdoor and where the flat is not level. Also, do not use it where the ambient temperature is outside 5 °C to 40 °C, and altitude is more than 2000m.
The maximum relative humidity is 80% for temperatures up to 31 °C decreasing linearity to 50% relative humidity at 40 °C. Over voltage Installation Category II for mains supply. Pollution Degree 2.
The storage temperature range for this equipment is -20 °C to 70 °C. When this equipment is not used for a long period of time, store it in a dry place away from direct sunlight, covered with vinyl or placed in a cardboard box.

1.6 Ordering Information

C2010C-00: Digital Radio Tester - Full Option
DAB/DAB+/DRM30/DRM+/RDS/FM/AM

C2010C-01: Digital Radio Tester - DAB+DRM
DAB/DAB+/DRM30/DRM+

C2010C-02: Digital Radio Tester - DAB+Analog
DAB/DAB+/RDS/FM/AM

C2010C-03: Digital Radio Tester - DRM+Analog
DRM30/DRM+/RDS/FM/AM

C2010C-04: Digital Radio Tester - DAB Only
DAB/DAB+

C2010C-05: Digital Radio Tester - DRM Only
DRM30/DRM+

C2010C-06: Digital Radio Tester - Analog Only
RDS/FM/AM

2 Basic Operation

This section describes the basic concepts and details of operating RWC2010C Digital Radio Tester. Understanding the basic concepts of your RWC2010C helps you use it effectively.

2.1 Front Panel View
2.2 Rear Panel View
2.3 Basic Operation
2.4 Display Screen
2.5 Frequency and Power Setting
2.6 Ethernet Connection Method
2.7 Firmware Upgrade
2.8 Content Files Download
2.9 Management of Content Files
2.10 Save/Recall

2.1 Front Panel View

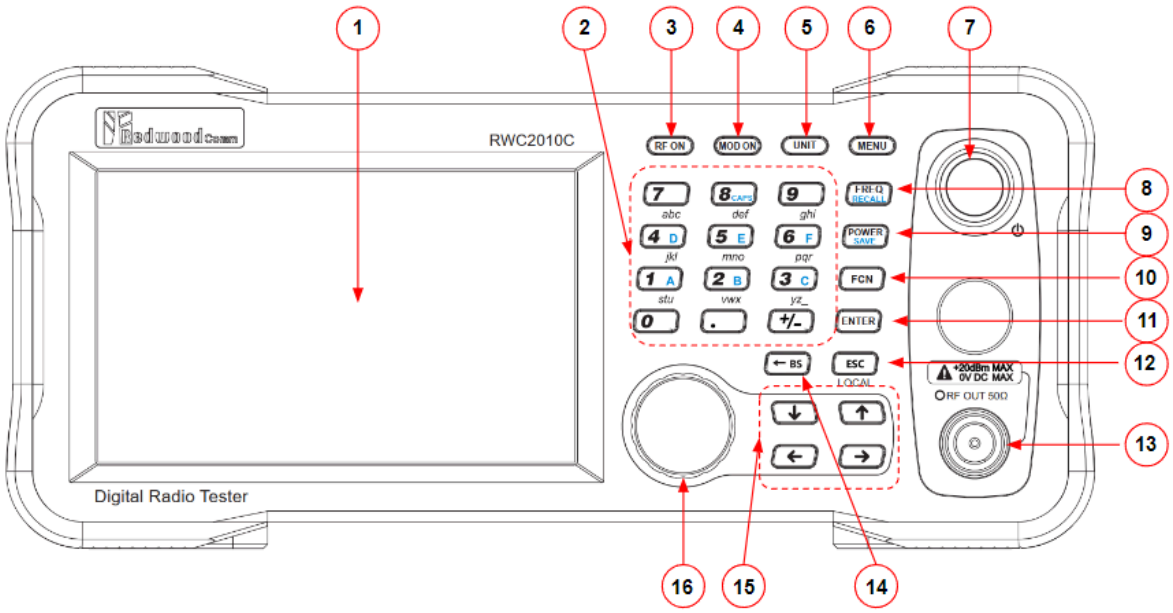


Fig. RWC2010C Front Panel View

2.1.1 Basic Key Function

1. LCD Display and touch sensor
2. 0 ~ 9, . , +/- Number input, dot, plus/minus, Hexadecimal input key with FCN
3. RF ON Shortcut key for RF ON/OFF toggle
4. MODE ON Shortcut key for Modulation ON/OFF toggle
5. UNIT Shortcut key for changing unit
6. MENU Main menu selection key
7. Power switch
8. FREQ/RECALL Shortcut key for modifying the frequency/Recall function key with FCN
9. POWER/SAVE Shortcut key for modifying the power/Save function key with FCN
10. FCN Function key for secondary function with another key
11. ENTER Key for selecting a function, or entering values
12. ESC Key for canceling a function, or values
13. RF Connector
14. ← BS Backspace key for deleting a character
15. ↑↓→← Keys for moving the cursor
16. Rotary knob Cursor move, value change at data input mode / Pushing ENTER function

2.1.2 Selection of Secondary Function

1. Combinational key functions with the blue colored FCN key.
2. FCN + FREQ (= RECALL) Recall one of the stored instrument settings
3. FCN + POWER (= SAVE) Store the current instrument settings into memory
4. FCN + 8 (= CAPS) Upper case input mode
5. FCN + 1 (= A) Hexadecimal A value
6. FCN + 2 (= B) Hexadecimal B value
7. FCN + 3 (= C) Hexadecimal C value
8. FCN + 4 (= D) Hexadecimal D value
9. FCN + 5 (= E) Hexadecimal E value
10. FCN + 6 (= F) Hexadecimal F value

2.2 Rear Panel View

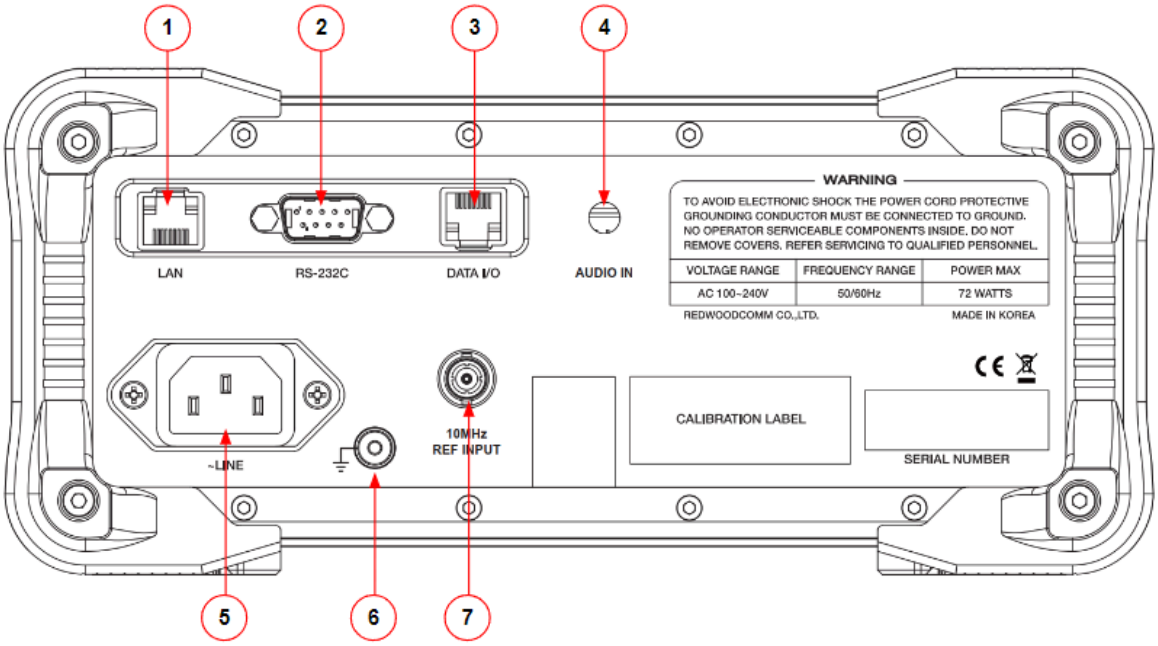


Fig. RWC2010C Rear Panel View

1. LAN Ethernet Interface (RJ45)
2. RS-232C RS-232C Interface
3. DATA I/O Sync data in/out between RedwoodComm instruments
4. Audio Input 3.5 pi Stereo Audio Jack for Audio Analyzer
5. ~LINE 100V – 240V AC Power input
5. GROUND Ground port
7. REF IN 10MHz External reference signal input

2.3 Basic Operation

2.3.1 Main Menu Selection

RWC2010C Digital Radio Tester has six functions in the main menu and each function can be selected by the MENU key. The following figure shows the main menu selection screen. Select a function using the rotary key and press the **ENTER key**.

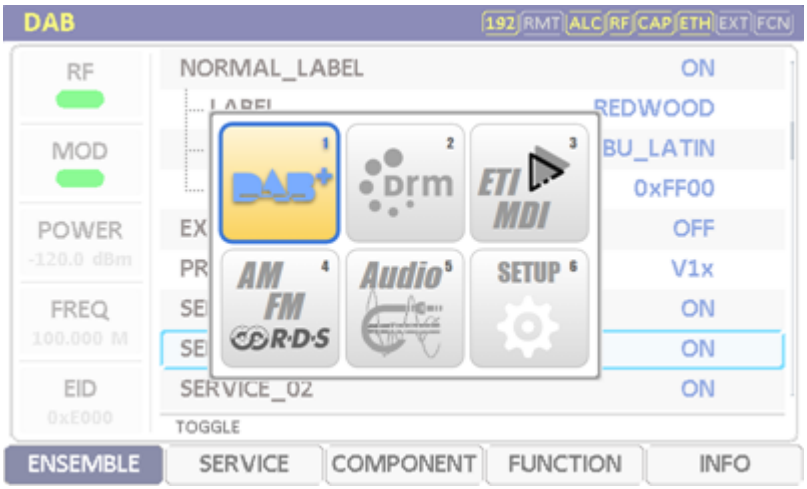


Fig. Screen to select test mode

2.3.2 Rotary Knob

The Rotary Knob moves the cursor to every field on the screen that can be changed. By positioning the cursor in front of a field and pushing the knob to select that field, you can alter that field's setting.

2.3.3 Data Input and Modify

Move the cursor to the desired input field using Rotary Knob or arrow keys.

Push Rotary Knob or **ENTER key** for data input mode. The cursor indicates data input position. If there are only two alternatives, push the rotary knob or **ENTER key** to toggle the data.

Push Rotary knob to enter data and then the new data is entered.

While entering the data, if you press **ESC** or **BS** key, the input data shall be canceled or deleted.

2.3.4 Touch Screen Input

Touch screen allows you to instantly access and alter instrument settings without using the Rotary knob or keying. You can edit parameters or jump to other screens or functions by touching the LCD screen.

2.3.5 Edit String

To edit the string of Ensemble Label, Service Label, Service Component Label, DLS and etc., move the cursor to the Label parameter and set it to input mode by pushing the rotary knob or **ENTER key.** Input cursor will be placed at the end of the string. Push the number key repeatedly, the number and characters are displayed repeatedly.
When the desired number or character is displayed, please wait until the cursor is moved to the next position.
RWC2010C provides HEX editing methods. Using this mode, users could test any kind of characters like Chinese or Korean. Press **UNIT** for HEX editing mode. Place the cursor on the character which you want to modify and rotate the rotary knob.

2.4 Display Screen

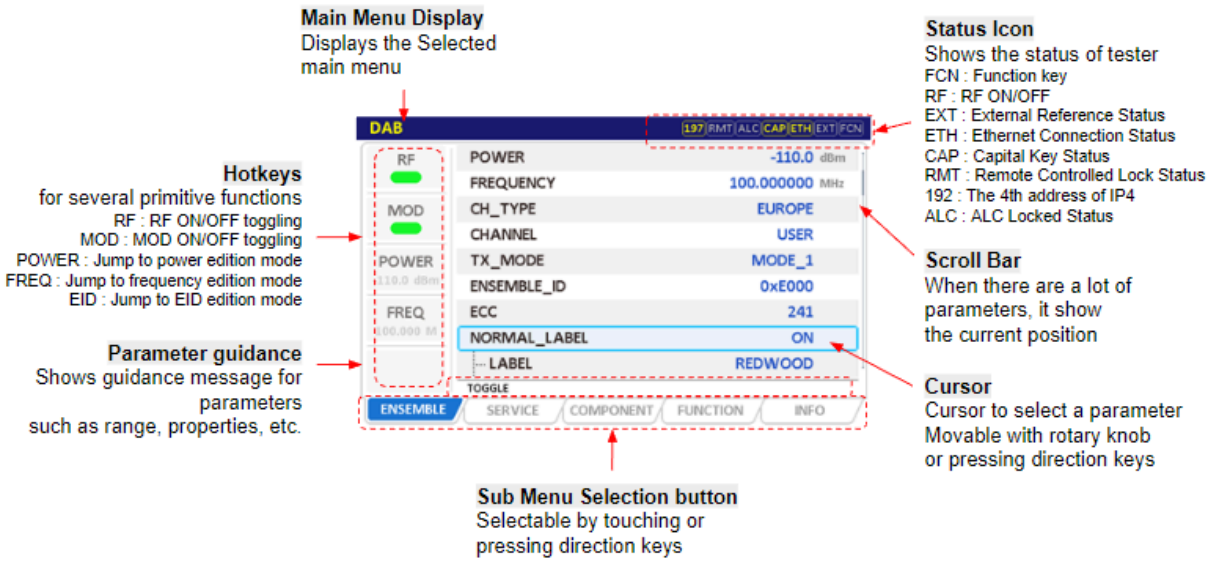


Fig. Information of the Equipment Screen

2.5 Frequency and Power Setting

2.5.1 Overview

On the main screen of every protocol, there are frequency and power parameters. To change these values, place the cursor to the parameter and press **ENTER** key for input mode.
The RF_ON key is for RF ON/OFF. Press the RF_ON key or touch the RF icon on the screen to toggle the RF output state.

2.5.2 Parameter Setting

Power And Frequency

By selecting a parameter or by touching the parameter value area, you can modify the value of power or frequency.

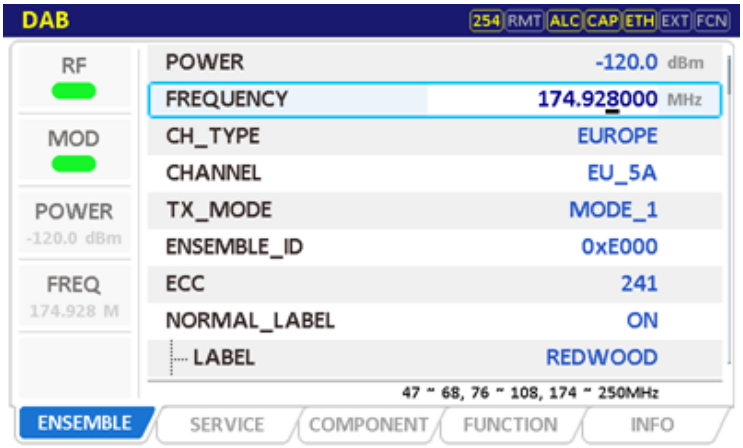


Fig. Screen to change frequency

Hotkeys

Using the **FREQ** hotkey, you can access the frequency parameter easier.
Using the **POWER** hotkey, you can access the power parameter easier.
The MOD_ON key is for Modulation ON/OFF. Press MOD_ON key or touch the MOD icon on the screen to toggle the Modulation status. When modulation is set to OFF, the tester sends a CW signal without modulation.

Step Value

To change the frequency or power values by step value, press **FCN** in cursor input mode and rotate Rotary Knob. The step value parameters are on the 'SETUP/SYSTEM' screen.

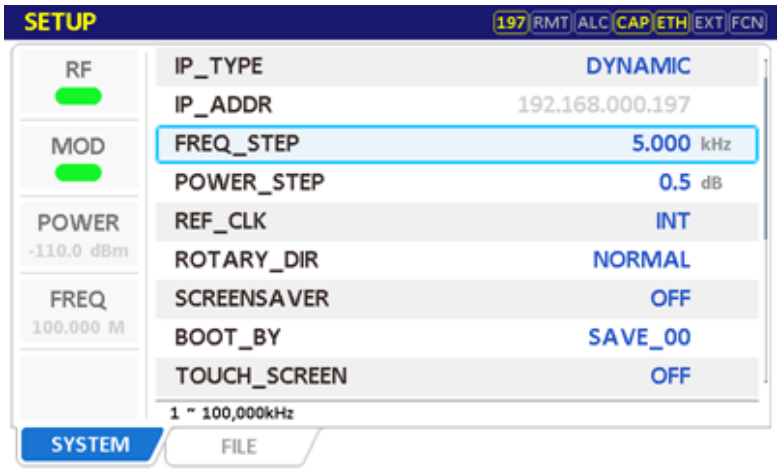


Fig. Step values of Frequency and Power

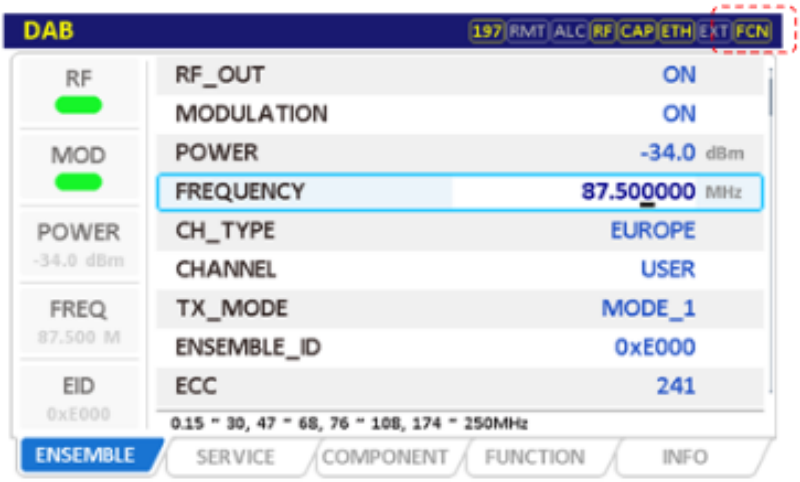


Fig. Screen to change power by step value

Unit

To change the unit of frequency or power parameters, place the cursor on the parameter and press the UNIT key.

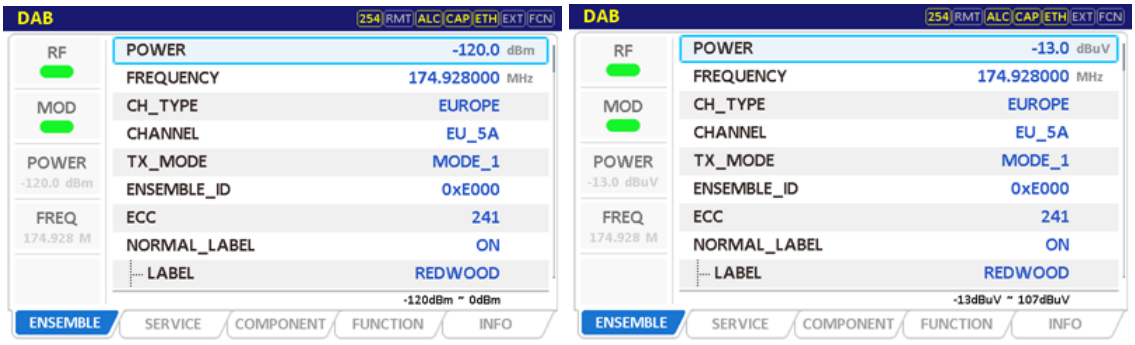


Fig. Screen to change Power Unit

Frequency setting using CHANNEL Table

On the screen of ‘ENSEMBLE’, there are "CHANNEL” and "CH_TYPE” parameters. Select one of EUROPE, KOREA using the "CH_TYPE” parameter and select the channel table using "CHANNEL” parameter. Refer to Appendix for the value of Chanel Table.

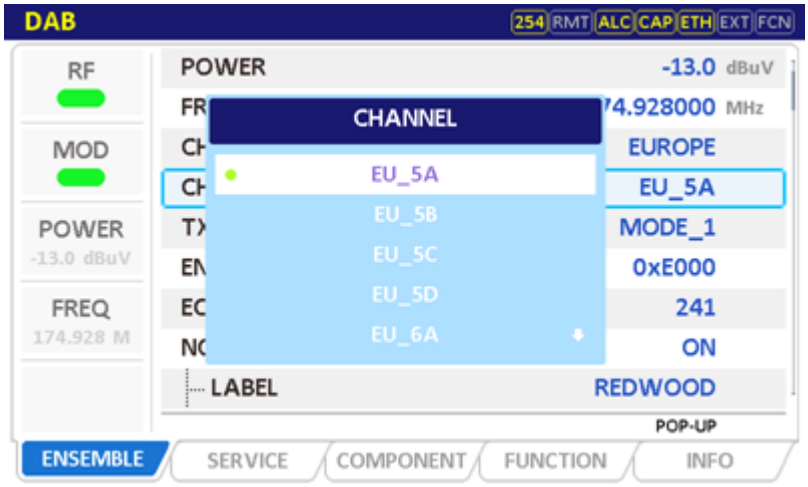


Fig. Screen to select channel

2.6 Ethernet Connection Method

For upgrading, downloading contents files, or remote controlling, RWC2010C should be connected to PC through Ethernet.

- Connect LAN port of PC and RWC2010C Ethernet port by RJ45 cable. If the PC and RWC2010C are connected directly, a crossover cable may be used.
- Turn RWC2010C power ON, go to the ‘SETUP/SYSTEM’ screen and check the "IP_ADDR” value. Please be sure that the "IP_ADDR” value should be different from the PC's IP Address.

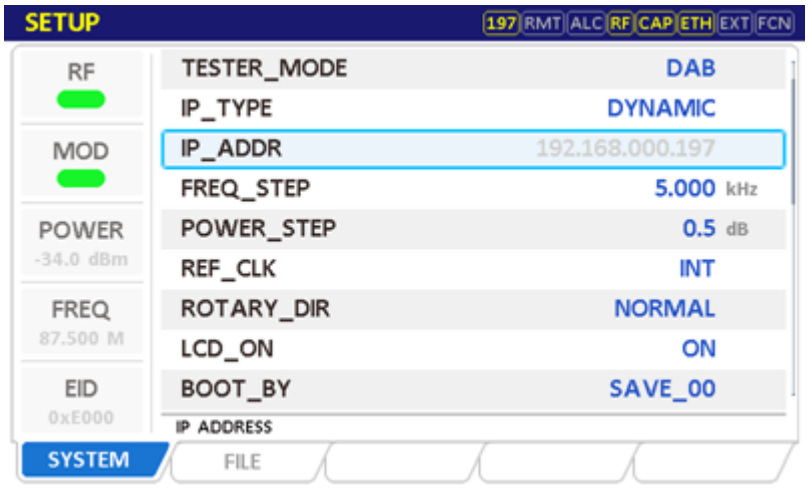


Fig. Screen for setup Remote Port and IP address

- Set up the IP address as follows to use crossover cable.

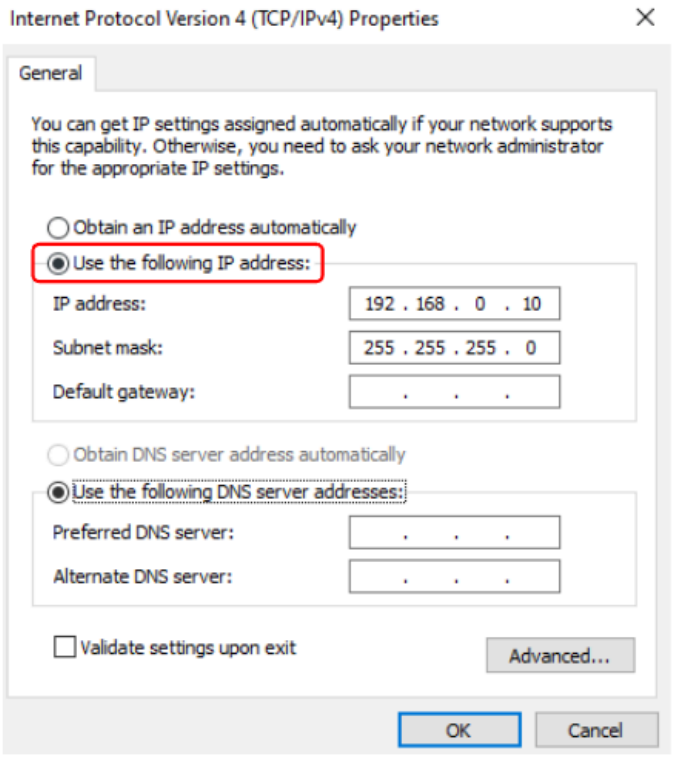


Fig. How to set up the static IP address of PC with Window OS

- Execute one of RWC2010 Application programs on the PC. If there is no application program, please download it from the Web site.

- Set up the IP address same as the RWC2010C's IP address.

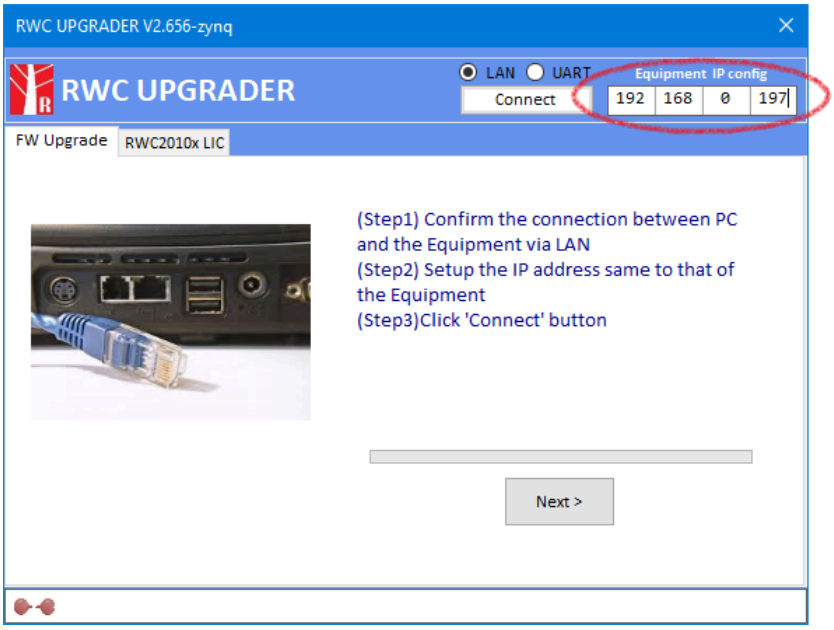


Fig. RWC2010C Application Program

- If the IP setting and connection is done successfully, there will be a "Connected" icon displayed in the left bottom of screen. If there is no "Connected" icon, please try again step 1~5.

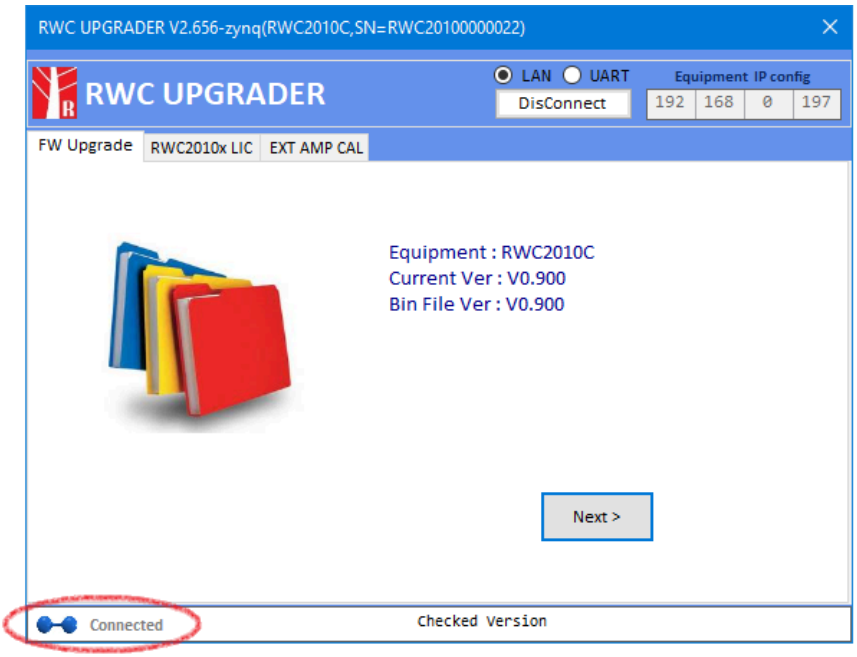


Fig. RWC2010C Application Program

2.7 Firmware Upgrade

As RWC2010C adapted Flash Memory, it is available to upgrade easily by using the PC without changing the Hardware. For upgrading, RWC2010C Application Program shall be used. The program is available to download the upgrade data from RedwoodComm Website or provide it via email. The information for upgrading shall be kept in providing to the user via email or website.

2.7.1 RWC2010C Firmware Upgrade Sequence

- Setup Ethernet connection between RW2010C and PC. Please refer to Clause 2.6 for Ethernet connection.
- Execute "RWC_upgrader.exe" file.
- Press the NEXT button to start Downloading.
- While upgrading, the proceeding status shall be displayed on the RWC2010C GUI screen.
- If Upgrading is completed, the RWC2010C must be rebooted manually. Go to the 'SETUP/SYSTEM' screen to check the new Firmware version.

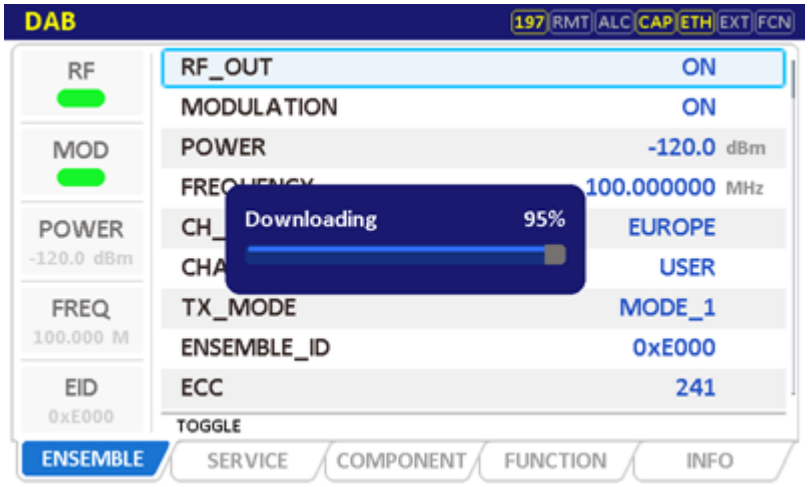


Fig. Upgrade status screen while upgrading

▣ ***CAUTION***: If upgrading fails, repeat the upgrading in Emergency Upgrade Mode. Refer to Emergency Upgrade for detail.

2.7.2 Emergency Firmware Upgrade Sequence

- Failing of Normal Upgrading can affect or disable RWC2010C. In this case, the RWC2010C will be booted in Emergency Upgrade mode.
- If the normal program of the RWC2010C goes into unknown status and cannot enter the emergency upgrade mode, you must first remove the normal program. Keep pressing the 'RF ON' key and 'MENU' key together and turn the RWC2010C power ON. The RWC2010C displays whether the normal program is removed. Please select YES and reboot the RWC2010C for Emergency Upgrade mode booting.
- Repeat the upgrading sequence from the beginning as shown in 2.7.1.

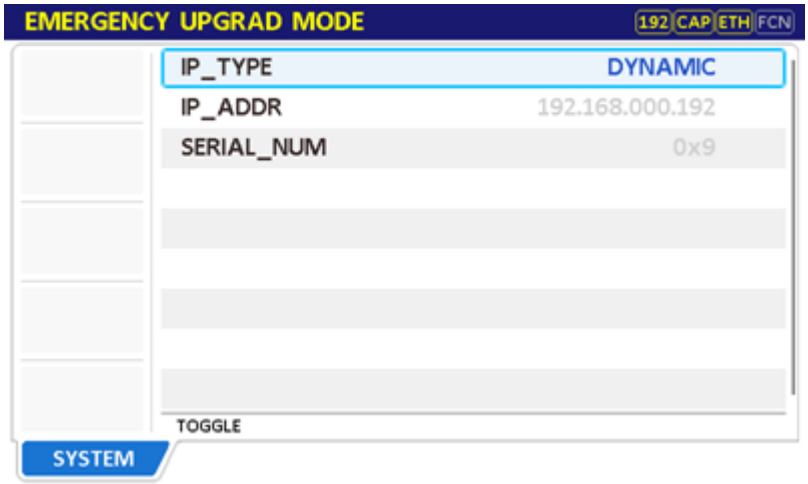


Fig. RWC2010C screen of Emergency Upgrade mode

2.8 Content Files Download

2.8.1 Downloading Files from RedwoodComm's Server

Click the UPDATE LIST button of SERVER, then the FILE MANAGER will update the file list.

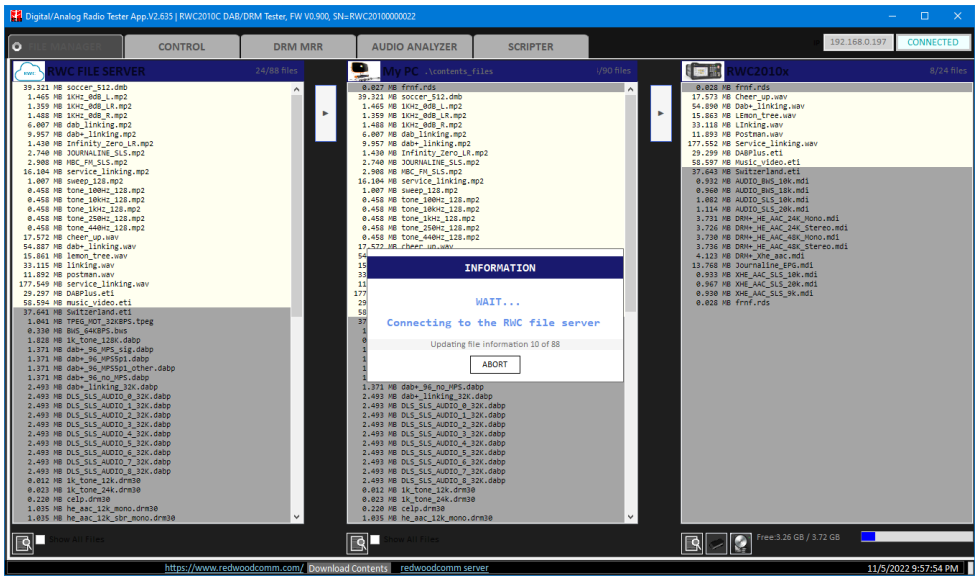


Fig. Updating file list of RWC file server

Users can download content files from the server to the users' PC by clicking the DOWNLOAD button(▸). All Files are selective. The FILE MANAGER shows duplicate files between server and PC with highlighted background color after selecting files.

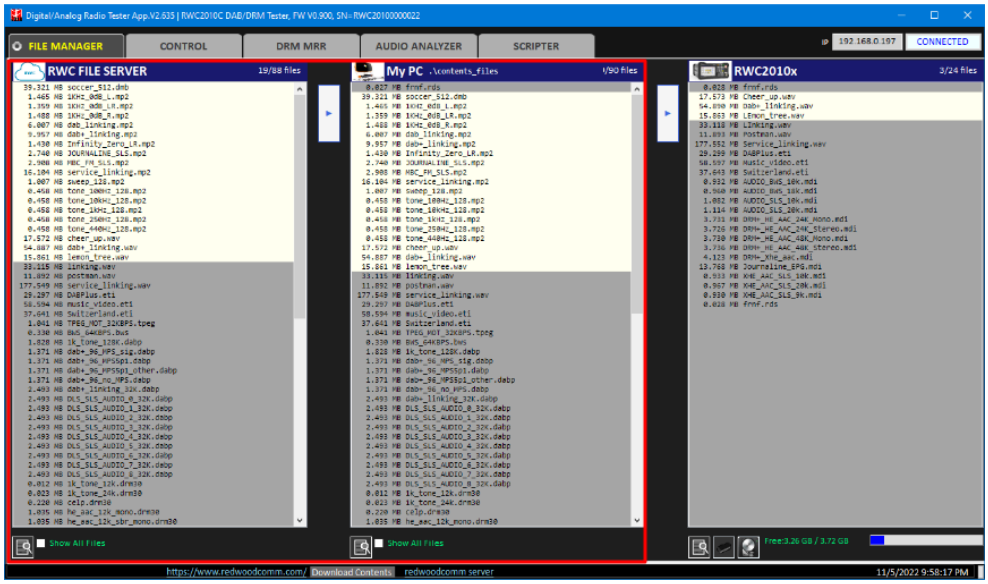


Fig. Getting content files from RWC file server

2.8.2 Downloading Files from PC to RWC2010C

Click the "UPDATE LIST" button of the PC before starting to download, then the FILE MANAGER will update the file list of the user PC. Users can download files from the PC to the RWC2010C by clicking the DOWNLOAD button(▸). All Files are selective. The FILE MANAGER shows

replicated files between the PC and the RWC2010C with highlighted background color after selecting files.

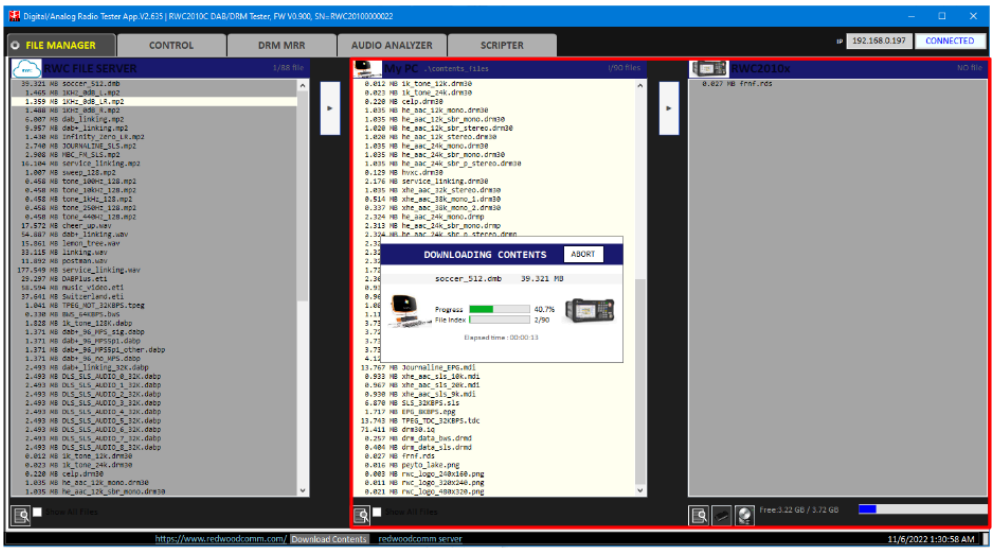


Fig. Downloading content files from User pc to RWC2010C equipment

2.8.3 Internal Storage

RWC2010C has 256 GByte internal storage. All types of content files are saved in it. Users can format it. Free space of the storage displayed in the FILE MANAGER tab.

2.9 Management of Content Files

All content files are listed on the ‘SETUP/FILE’ screen. On this screen, you could modify file names or delete them.

2.9.1 File Configuration

Delete file

To delete the file, please go to the ‘SETUP/FILE’ screen and place the parameter cursor on the file which you want to delete. Then press the ENTER key for the Pop-up menu. The first pop-up menu is the ‘DELETE’. Select it then the file will be deleted.

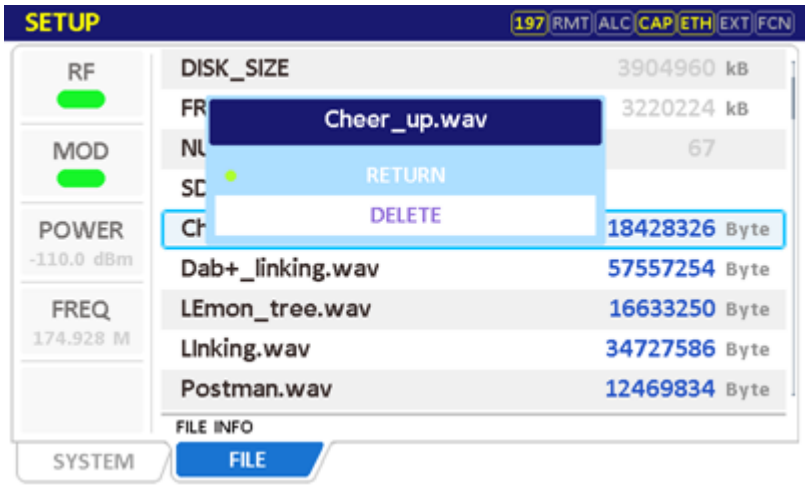


Fig. Screen for file Delete

2.10 Save/Recall

The SAVE and RECALL functions allow you to store different instrument setups and retrieve them later. By saving test setups, you can save time by eliminating the task of re-configuring the RWC2010C. RWC2010C supports up to 10 save/recall sets.

2.10.1 Save Method

Make any changes to the instrument that you want to SAVE in a memory. Then press **FCN** + **POWER** key to execute the Save Pop-up screen as the following figure. Select SAVE buffer number and press **ENTER key**.

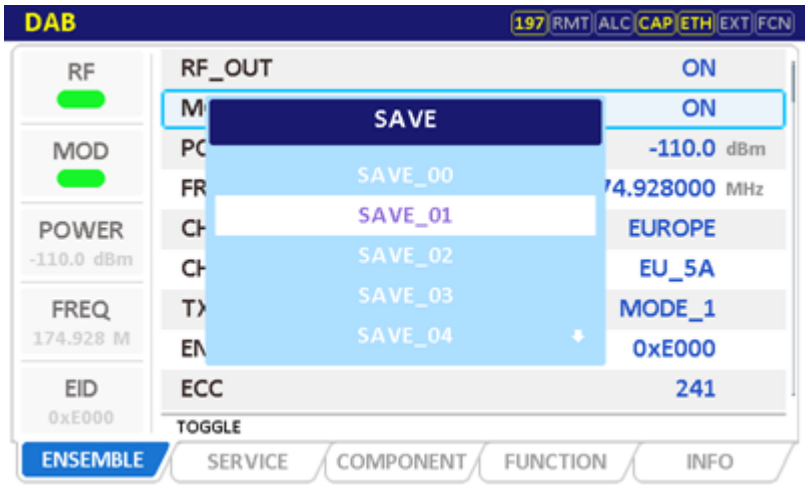


Fig. The screen to save parameter configuration

2.10.2 Recall Method

Then press **FCN** + **FREQ** key to execute the Recall Pop-up screen as the following figure. Select RECALL buffer number and press **ENTER key**. The first recall buffer is RESET. If you select it, RWC2010C will be reset.

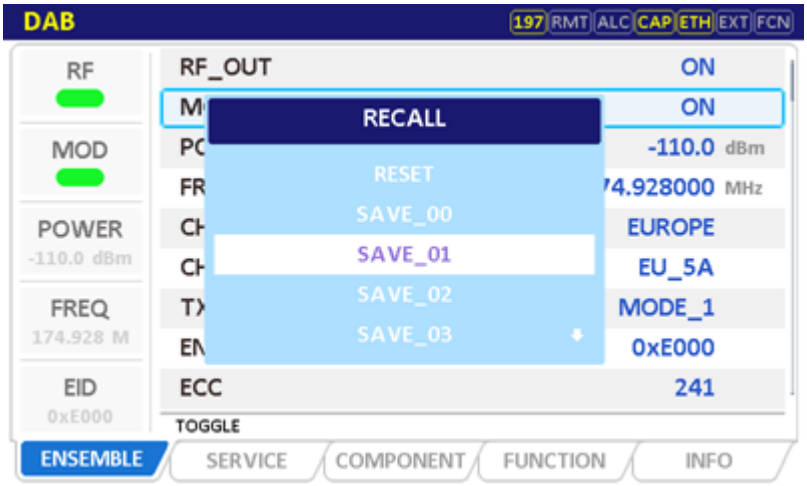


Fig. The screen to recall parameter configuration

2.10.3 Select Saved Configuration for Booting

When restarting the system, one of the Saved configurations will be retrieved. To define saved configuration for booting, go to the 'SETUP/SYSTEM' 'screen and modify' 'BOOT_BY' parameter to desired Save buffer number.

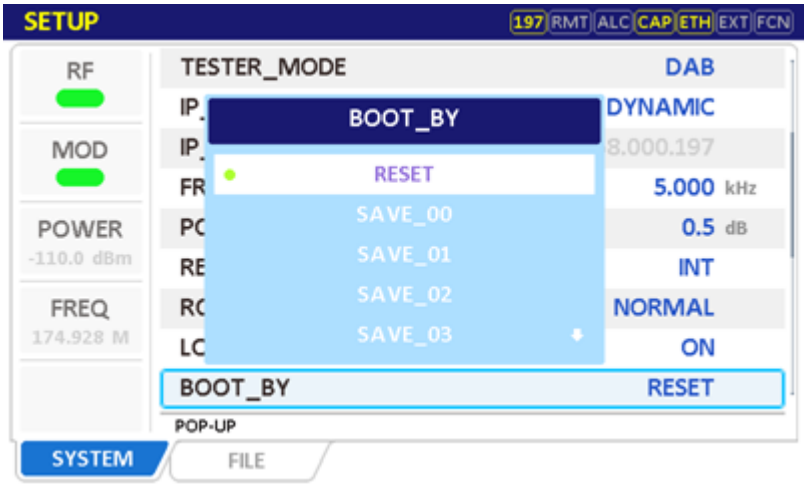


Fig. Screen to setup the BOOT_BY parameter

3 DAB Operation

This section describes the basic concepts and details of DAB related operations. Understanding the basic concepts of your RWC2010C helps you use it effectively.

3.1 DAB Menu Structure
3.2 Editing DAB Ensemble Structure
3.3 Component Mode
3.4 PAD Test
3.5 Functional Test

3.1 DAB Menu Structure

The DAB menu consists of the ENSEMBLE, SERVICE, COMPONENT, FUNCTION and INFO submenu. The ENSEMBLE multiplexer is structured very intuitively with the DAB-ENSEMBLE structure as shown in the following figure. The built-in Ensemble Multiplexer supports up to 64 services and 64 service components. Each service and service component can be completely configured DAB-ENSEMBLE structure just by on and off. All parameters of each SERVICE and SERVICE COMPONENT are editable in each submenu tab.

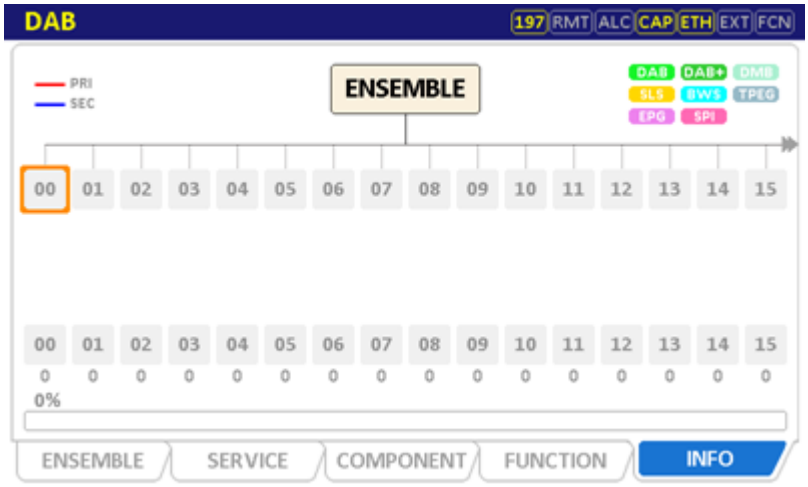


Fig. DAB menu structure of RWC2010C like DAB-ENSEMBLE structure

3.1.1 ENSEMBLE

This submenu contains RF-related parameters and Ensemble-related parameters.

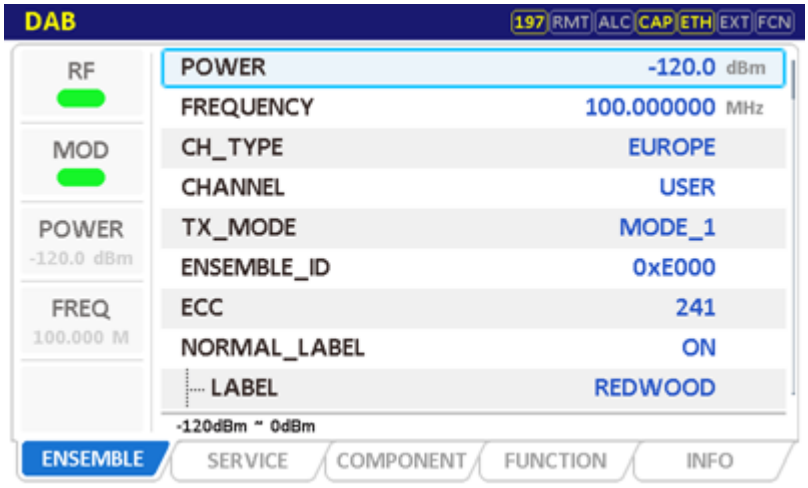


Fig. The screen of ENSEMBLE submenu

3.1.1.1 Parameters

POWER

RF output power for DAB Ensemble. Users can use the UNIT key to select power units in dBm or dBuV.

FREQUENCY

RF output frequency for DAB Ensemble. Users can use the UNIT key to select power units in MHz, kHz or Hz.

CH_TYPE

There are predefined channel tables for Europe and Korea. The user can use this parameter to select one of them.

CHANNEL

The frequency can be set to one of the predefined table values using this parameter. If the user sets the frequency variable, this parameter will display the channel number value if there is a matching value in the table, otherwise, it will be 'USER'.

ENSEMBLE_ID

Unique 16-bit code, shall be allocated to the ensemble and allows unambiguous identification of the ensemble when associated with the Ensemble ECC.

ECC

Extended Country Code defined in TS 101 756.

NORMAL_LABEL

Normal Label of Ensemble can be turned on or off by this parameter.

EXTEND_LABEL

Extended Label of Ensemble can be turned on or off by this parameter.

LABEL, E_LABEL

This parameter stands for the name of Ensemble. The maximum length of the string is 16 in normal mode and 32 in extended mode

CHAR_SET

This parameter stands for the type of Label. For example, setting it as 0 means ‘Complete EBU Latin based repertoire’.

ENCODING_FLAG

This parameter sets the character encoding method such as UTF-8 or UTF-16 for EXTEND_LABEL.

CHAR_FLAG

Sometimes DUTs require the abbreviation form of Label because of LCD limitation. This parameter gives the information of abbreviation of LABEL. There are some examples below.

LABEL: _RedwoodComm
CHAR_FLAG: 0x70F0
Abbreviation LABEL: REDComm

TEXT_CONTROL

TEXT_CONTROL can be useful for precisely representing characters beyond basic ASCII: script direction, contextual forms, combining characters and so on make the correct presentation of e labels and text messages a complex task. Text control provides the base direction of the message and indications of the complexity of the text content. This allows receivers to better determine if they have the necessary capabilities to correctly present the text content.

BIDI_FLAG

This 1-bit flag shall indicate whether the text contains bidirectional text (excluding numerals) as follows: 0 if bidirectional text is not present or 1 if bidirectional text is present.

BASE_DIRECTION

This 1-bit flag shall define the Unicode base direction of the text as follows: 0 for left-to-right (LTR) or 1 for right-to-left (RTL).

CONTEXTUAL_FLAG

This 1-bit flag shall indicate whether contextual characters are used in the text as follows: 0 if contextual characters are not present (presentation characters only) or 1 if contextual characters are present.

COMBINING_FLAG

This 1-bit flag shall indicate whether combining characters are used in the text as follows: 0 if combining characters are not present or 1 if combining characters are present.

PROTOCOL_VER

RWC2010C supports DAB protocol V1.x.x and V2.x.x. The user can use this parameter to set the protocol version of RWC2010C.

SERVICE_00 - SERVICE_63

RWC2010C supports up to 64 services for DAB Ensemble. The user can use these parameters to turn on/off the services.

OFDM_WINDOWING

OFDM windowing is a signal processing technique used to smooth the transitions between consecutive OFDM symbols. The windowing length refers to the duration of this smoothing

process, specifically the length of the tapering window (often a raised-cosine shape) applied to the beginning and/or end of an OFDM symbol. This parameter determines how long the OFDM windowing will be relative to the OFDM symbol.

3.1.2 SERVICE

This submenu contains service-related parameters such as SID, service label, etc. Users can assign primary and secondary components to the service on this Screen.

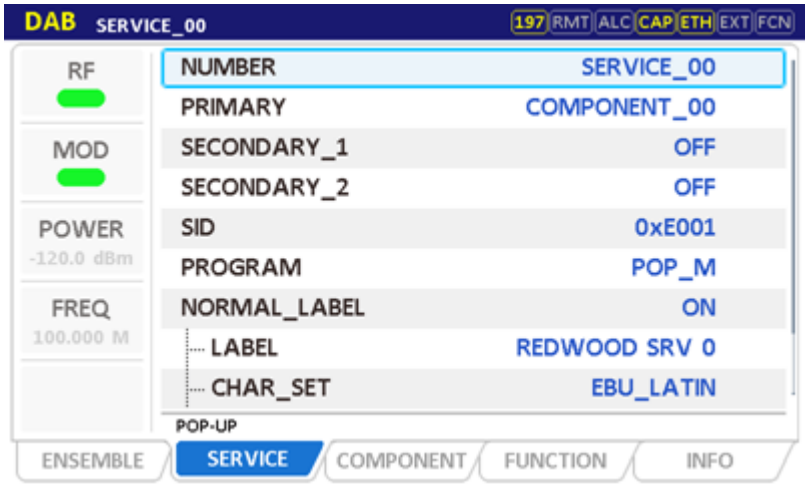


Fig. The screen of SERVICE submenu

3.1.2.1 Parameters

NUMBER

This parameter determines which service to modify.

PRIMARY

Set up the primary component for the service. After setting, users can check the connection on the INFO screen.

SECONDARY_1 - 11

Set up the secondary components for the service. After setting, users can check the connection on the INFO screen.

SID

Unique 16-bit or 32-bit code, shall be allocated to the service and allows unambiguous identification of the service.

ECC

Extended Country Code defined in TS 101 756.

PROGRAM

Program type of the service.

PROGRAM_S/D

It shall indicate that the Programme Type code signalled in the programme type field, represents the current programme contents, as follows:
Static: Programme Type code may not represent the current programme contents;
Dynamic: Programme Type code represents the current programme contents.

NORMAL_LABEL

Normal Label of the service can be turned on or off by this parameter.

EXTEND_LABEL

Extended Label of the service can be turned on or off by this parameter.

LABEL, E_LABEL

This parameter stands for the name of Service. The maximum length of the string is 16 in normal mode and 32 in extended mode

CHAR_SET

This parameter stands for the type of Label. For example, setting it as 0 means ‘Complete EBU Latin based repertoire’.

ENCODING_FLAG

This parameter sets the character encoding method such as UTF-8 or UTF-16 for EXTEND LABEL.

CHAR_FLAG

Sometimes DUTs require the abbreviation form of Label because of LCD limitation. This parameter gives the information of abbreviation of LABEL. There are some examples below.

LABEL: _RedwoodComm
CHAR_FLAG: 0x70F0
Abbreviation LABEL: REDComm

TEXT_CONTROL

TEXT_CONTROL can be useful for precisely representing characters beyond basic ASCII: script direction, contextual forms, combining characters and so on make the correct presentation of e labels and text messages a complex task. Text control provides the base direction of the message and indications of the complexity of the text content. This allows receivers to better determine if they have the necessary capabilities to correctly present the text content.

BIDI_FLAG

This 1-bit flag shall indicate whether the text contains bidirectional text (excluding numerals) as follows: 0 if bidirectional text is not present or 1 if bidirectional text is present.

BASE_DIRECTION

This 1-bit flag shall define the Unicode base direction of the text as follows: 0 for left-to-right (LTR) or 1 for right-to-left (RTL).

CONTEXTUAL_FLAG

This 1-bit flag shall indicate whether contextual characters are used in the text as follows: 0 if contextual characters are not present (presentation characters only) or 1 if contextual characters are present.

COMBINING_FLAG

This 1-bit flag shall indicate whether combining characters are used in the text as follows: 0 if combining characters are not present or 1 if combining characters are present.

3.1.3 COMPONENT

This submenu contains component-related parameters such as component mode, content file, etc.

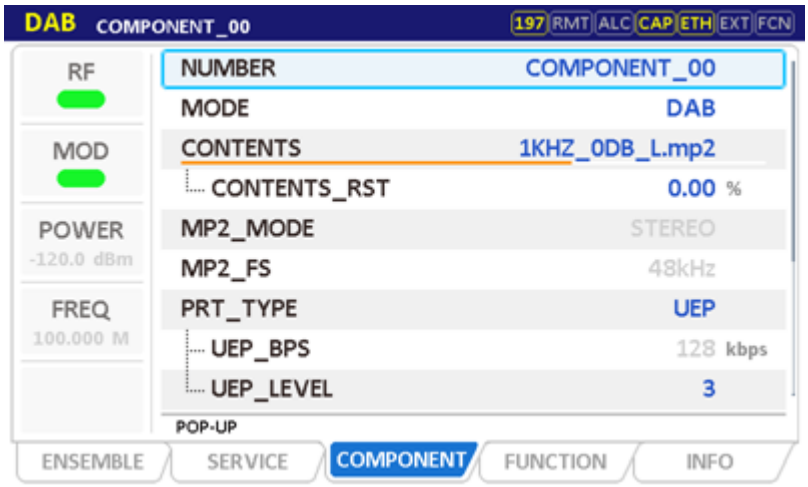


Fig. The screen of COMPONENT submenu

3.1.3.1 Common Parameters

NUMBER

This parameter determines which component to modify.

MODE

This parameter determines the type component. RWC2010C supports DAB, DMB, DAB+, SPI and SLS.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

PRT_TYPE

In DAB protocol, there are UEP and EEP in Protection Mode. UEP stands for Unequaled Error Protection and is used mainly for audio broadcasting. EEP stands for Equaled Error Protection and is used mainly for Data broadcasting. When the "PRT_TYPE" is changed, related Protection Level and BPS parameters will be displayed on the screen.

UEP_BPS, EEP_BPS

This parameter stands for bit rate of Service Component. In the MP2 case, this parameter is set automatically by selecting the content file.

UEP_LEVEL, EEP_LEVEL

This parameter stands for Channel Protection Level. Increasing the protection level to improve Error correction ability will increase the amount of data. So compromise is required.

EEP_OPTION

The DAB protocol defines two types of protection profiles (A and B). This parameter selects one of them for data protection.

NORMAL_LABEL

Normal Label of Service Component can be turned on or off by this parameter.

EXTEND_LABEL

Extended Label of Service Component can be turned on or off by this parameter.

LABEL, E_LABEL

This parameter stands for the name of Service Component. The maximum length of the string is 16 in normal mode and 32 in extended mode

CHAR_SET

This parameter stands for the type of Label. For example, setting it as 0 means 'Complete EBU Latin based repertoire'.

ENCODING_FLAG

This parameter sets the character encoding method.

CHAR_FLAG

Sometimes DUTs require the abbreviation form of Label because of LCD limitation. This parameter gives the information of abbreviation of LABEL. There are some examples below.

LABEL: _RedwoodComm
CHAR_FLAG: 0x70F0
Abbreviation LABEL: REDComm

TEXT_CONTROL

TEXT_CONTROL can be useful for precisely representing characters beyond basic ASCII: script direction, contextual forms, combining characters and so on make the correct presentation of e labels and text messages a complex task. Text control provides the base direction of the message and indications of the complexity of the text content. This allows receivers to better determine if they have the necessary capabilities to correctly present the text content.

BIDI_FLAG

This 1-bit flag shall indicate whether the text contains bidirectional text (excluding numerals) as follows: 0 if bidirectional text is not present or 1 if bidirectional text is present.

BASE_DIRECTION

This 1-bit flag shall define the Unicode base direction of the text as follows: 0 for left-to-right (LTR) or 1 for right-to-left (RTL).

CONTEXTUAL_FLAG

This 1-bit flag shall indicate whether contextual characters are used in the text as follows: 0 if contextual characters are not present (presentation characters only) or 1 if contextual characters are present.

COMBINING_FLAG

This 1-bit flag shall indicate whether combining characters are used in the text as follows: 0 if combining characters are not present or 1 if combining characters are present.

LANGUAGE

This parameter is the Language information of Service Component contents.

SUBCH_ID

This parameter is Physical ID of Service Component, by whose value the Service Component is recognized on the DUT side. This value is user-configurable.

PKT_ADR

This 10-bit field shall identify packets carrying a particular service component within a sub-channel. Address 0 shall be used for padding packets and shall not be assigned to any service component. Up to 1 023 service components may be carried simultaneously in a sub-channel.

BER_DATA

For the BER test, RWC2010C provides a function to transmit packet data by setting all data to 0 or 1. This parameter determines whether the packet data will be 0 or 1.

START_CU_MODE

A variable that determines whether components will be automatically placed one by one from the beginning of the frame or whether the user will place components arbitrarily.

START_CU

This variable allows the customer to arbitrarily change the position where the Components are placed in the Frame. The default is to automatically place the Components one after the other from the beginning of the Frame. For example, if there are three components, these will be placed as follows in default setting.

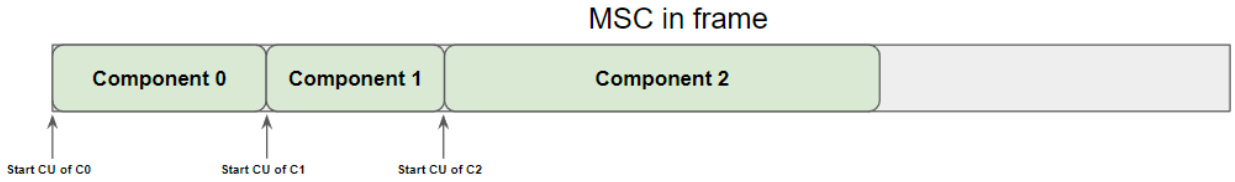


Fig. The example of component placement in default setting

If the Start CU of C1 is increased by customer, Component 1 and Component 2 will be shift as follows.

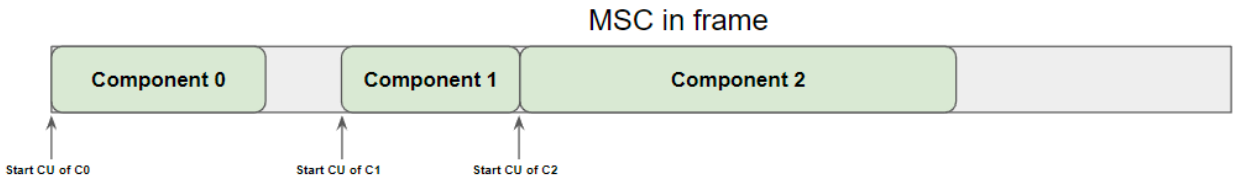


Fig. The example of component placement after modifying the Start CU

3.1.3.2 DAB (MP2) Parameters

MP2_MODE

RWC2010C will decode the selected mp2 content file to show if it is mono or stereo. This parameter is for display only.

MP2_FS

RWC2010C will decode the selected mp2 contents file to show the data rate. This parameter is for display only.

PAD_TYPE

Select the DLS type. When this parameter is set as OFF, RWC2010C does not send a PAD data. When this parameter is set as DLS, RWC2010C sends just a DLS string at the end of Audio Frame. When this parameter is set as DL+, RWC2010C sends not only DLS string but also tag information for enhanced display methods. When this parameter is set as SLS, RWC2010C sends the picture data(PNG) at the end of the Audio Frame. When this parameter is set as SPI, RWC2010C sends the RedwoodComm logo at the end of the Audio Frame.

DLS

DLS stands for Dynamic Label Service. At the end of the MP2 frame, the DLS data for various information such as the lyrics of the song is attached. The maximum length of DLS string is 128. The editing method is the same as the LABEL editing method.

DLS_TOGGLE_BIT

This variable sets the DLS toggle bit. Typically, when the DLS content changes, the DLS toggle bit is toggled to notify terminals of the change.

HEADLINE

It can be set as the Headline part of the beginning of a DLS sentence. This parameter stands for Headline sentence.

HEADLINE_MODE

This parameter indicates whether the Headline is added to the DLS.

DLS_SET

This parameter stands for the type of DLS. For example, setting it as 0 means ‘Complete EBU Latin based repertoire’.

DLS_CLEAR_CMD

Setting this variable to OFF will cause the DLS to be sent, while setting it to ON will cause the Clear command to be sent, clearing any DLS displayed on the terminal.

CMD_TOGGLE_BIT

This variable sets the PAD command toggle bit. Typically, when the PAD command changes, the CMD toggle bit is toggled to notify terminals of the change.

TAG

DL+ provides subsidiary information for DLS named TAG. This parameter determines whether to send TAG information or not.

TAG_TYPE

DL+ provides subsidiary information for DLS named TAG. DAB protocol defines many kinds of TAG type and this parameter stands for one of them.

TAG_START

This parameter points to the start character in the DLS string for the TAG information.

TAG_LENGTH

This parameter stands for the length characters in the DLS string from the start point for the TAG information.

DRC

This parameter determines whether DRC value will be sent.

DRC_VALUE

This value controls the Gain of receiver AMP. The range of this value is 0dB ~ 15.75dB. When this value is increased, the receiver sound will be increased.

XPAD_DATA_LEN

At the end of the audio frame there is a null field, so XPAD is transmitted using this field. The higher this value, the faster the data rate, but there is a risk that the mp2 audio data may be overwritten, so it should be set carefully.

CONTENTS (for XPAD)

Users can download PNG files to internal memory for SLS. This parameter determines which PNG file to play.

TRANSPORT_ID

This 16-bit value shall uniquely identify one data object (file and header information) from a stream of such objects, It may be used to indicate the object to which the information carried in the data group belongs or relates.

EPG_NUM

This value determines the number of EPG entries to send.

EPG_ID_00 - 02

The ID of EPG entry.

SHORT_NAME

The short name of EPG entry.

MEDIUM_NAME

The medium name of EPG entry.

LONG_NAME

The long name of EPG entry.

HOUR
The start time (hour) of EPG entry.

MINUTE
The start time (minute) of EPG entry.

DURATION
The duration of EPG entry.

ASCTY (for DAB)
This parameter stands for Audio Service Component Type and is fixed as 0 to indicate that the Component is DAB Audio.

3.1.3.3 DMB Parameters

DSCTY (for DMB)
This parameter stands for Data Service Component Type and is fixed as 24 to indicate that the Component is DMB mode.

UATY (for DMB)
This parameter is fixed as DMB to indicate that the Component is DMB mode.

3.1.3.4 DAB+ Parameters

ASCTY (for DAB+)
This parameter stands for Audio Service Component Type and is fixed as 63 to indicate that the Component is DAB+ Audio.

3.1.3.5 SPI Parameters

DSCTY (for SPI)
This parameter stands for Data Service Component Type and is fixed as 60 to indicate that the Component is MOT mode.

UATY (for SPI)
This parameter is fixed as SPI to indicate that the Component is in EPG mode.

EPG_NUM
This value determines the number of EPG entries to send.

EPG_ID_00 - 02
The ID of EPG entry.

SHORT_NAME
The short name of EPG entry.

MEDIUM_NAME
The medium name of EPG entry.

LONG_NAME
The long name of EPG entry.

HOUR
The start time (hour) of EPG entry.

MINUTE
The start time (minute) of EPG entry.

DURATION
The duration of EPG entry.

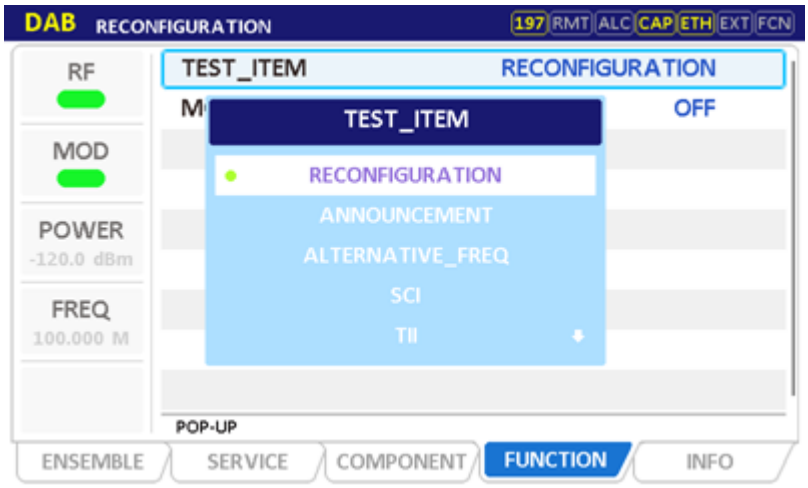
3.1.3.6 SLS Parameters

DSCTY (for MOT)
This parameter stands for Data Service Component Type and is fixed as 60 to indicate that the Component is MOT mode.

UATY (for SLS)
This parameter is fixed as MOT_SLIDESHOW to indicate that the Component is SLS mode.

3.1.4 FUNCTION

This submenu contains parameters related to functional tests.



3.1.4.1 Parameters for Reconfiguration

MODE

RWC2010C can change protocol parameters without or according to the reconfiguration procedure. This parameter determines which method to use for changing the parameter.

EXECUTE

If you run this parameter after changing any reconfiguration-related parameters, the modified parameters will be applied to the reconfiguration procedure.

3.1.4.2 Parameters for Announcement

MODE

This parameter selects one of the announcement test modes: TUNED_ENSEMBLE or OTHER_ENSEMBLE.

SUPPORT

The announcement support information can be turned on or off using this parameter.

NUM_OF_SVC

Announcement information can be notified to specific services of the ensemble. This parameter determines how many services will carry the announcement information.

AN_SOURCE_SVC_00 ~ AN_SOURCE_SVC_63

Announcement information can be notified to specific services of the ensemble. These parameters allow users to select services associated with the announcement information.

ALARM
When this parameter is set as ON, Alarm Announcement support is signaling in this service.

TRAFFIC
When this parameter is set as ON, Traffic Announcement support is signaling in this service.

TRAVEL
When this parameter is set as ON, Travel Announcement support is signaling in this service.

WARNING
When this parameter is set as ON, Waring Announcement support is signaling in this service.

NEWS
When this parameter is set as ON, News Announcement support is signaling in this service.

WEATHER
When this parameter is set as ON, Weather Announcement support is signaling in this service.

EVENT
When this parameter is set as ON, Event Announcement support is signaling in this service.

SPECIAL
When this parameter is set as ON, Special Announcement support is signaling in this service.

RAD_INFO
When this parameter is set as ON, Radio Info Announcement support is signaling in this service.

SPORTS
When this parameter is set as ON, Sports Announcement support is signaling in this service.

FINANCE
When this parameter is set as ON, Finance Announcement support is signaling in this service.

NUM_OF_CLUSTER (for Support)

Announcement support can be assigned to multiple clusters, one of which is used to signal announcement switching. This parameter determines how many clusters this announcement support is allocated.

CLUSTER_ID_xx (for Support)
The unique number for the cluster. For Alarm Announcement, the cluster-ID is fixed at 0xFF.

FIG0/0_ALARM_FLAG
When alarm announcement support is enabled, the ALARM FLAG in FIG0/0 is automatically set to 1. This parameter provides an abnormal testing method by forcing the automatically set ALARM FLAG to be changed to 0 or 1.

AN_SWITCHING
When this parameter is set to ON, the announcement switching signal (FIG0/19) starts to be sent.

NUM_OF_CLUSTER (for Switching)
This parameter determines how many clusters will be used in the announcement switching signal.

CLUSTER_ID_xx (for Switching)
The unique number for the cluster. For Alarm Announcement, the cluster-ID is fixed at 0xFF.

AN_SWITCH_TYPE
This parameter determines one of the enabled announcement support types. It is used for announcement switching signals.

TARGET_CH
It denotes the target channel when Announcement switching runs in Tuned Ensemble mode. The target channel should be in an active state. While this parameter is configured, the Pop-up screen displays the list of active and inactive components with different colors and only active components can be selected.

OE_EID
It denotes the other ensemble ID of the target channel when Announcement switching runs in Other Ensemble mode.

OE_SID
It denotes the Service ID of the target channel when Announcement switching runs in Other Ensemble mode.

3.1.4.3 Parameters for Alternative Frequency Test

NUM

The parameter determines how much alternative frequency information for other Ensembles or services which could have the same or similar as reference service.

TUNED_SVC

This parameter indicates the reference service for alternative frequency information.

OTHER_EID

This parameter is used for EID of Other Ensemble which carries the same or related program as reference service.

OTHER_SID

This parameter is used for SID of Other service which carries the same or related program as reference service.

OTHER_ECC

This parameter is used for Extended Country Code of Other service which carries the same or related program as reference service.

OTHER_FREQ

This parameter is used for frequency of other Ensemble or other systems which carry the same or related program as reference service.

CONTINUITY

This parameter shall indicate whether, or not, there is an appropriate time delay on the audio signal of an alternative service source.

CEI

This parameter stands for Change Event Indicates. If it is set as SHORT_TERM, FIG0/6, FIG0/21, and FIG0/24 will be transmitted in short form.

LSN

This parameter stands for Linkage Set Number which represents a number which shall be common to all Services linked together as a set

S/H

A linkage set is a collection of identifiers (DAB SIds, RDS PI codes, etc.) that correspond to alternative sources of the same content (hard link) or related content (soft link).

LA

Linkage sets are activated and deactivated according to the state of the LA flag. When a linkage set is activated, receivers may switch to any of the alternate sources of the content; when it is deactivated, they shall not. This feature allows service providers to signal linkage sets in advance of their use and control the receiver linkage behavior by changing the state of the LA flag for each linkage set.

ILS

This parameter stands for International Linkage Set indicator to indicate whether the link affects only one country (national) or several countries (international).

3.1.4.4 Parameters for EWS

EWS_ALERT

This variable determines whether to transmit EWS information (FIG 0/15). When set to OFF, FIG 0/15 is not transmitted. When set to HEARTBEAT_ONLY, HEARTBEAT information is transmitted via FIG 0/15 every second to indicate that this is an Ensemble participating in EWS. When this variable is set to START_&_REPEAT, EWS signals such as Trigger, Repeat, and Sustain are transmitted according to the EWS scenario.

EWS_REPEAT_INTERVAL

After transmitting the EWS Trigger signal, the RWC2010C sends the Sustain signal for the duration specified by this variable, then transmits the EWS Repeat signal for 5 seconds. This process is then repeated.

SYNCHRONIZED_ALERT

When this variable is set to ON, the EWS Trigger signal is transmitted only from 0 to 5 seconds of every minute. To provide advance information to other Ensembles before the EWS Trigger signal is transmitted, the EWS Pre-trigger signal is sent for 3 seconds from 55 to 57 seconds. Subsequently, Sustain and Repeat signals are transmitted cyclically. If this variable is set to OFF, the EWS Trigger signal is transmitted immediately for 5 seconds regardless of time synchronization, followed by cyclic transmission of Sustain and Repeat signals.

SECOND

Displays second information for reference during SYNCHRONIZED ALERT testing.

EWS_MODE

This variable selects whether the EWS information is transmitted from the current Ensemble or from other Ensemble.

EWS_SUBCHID

This variable sets the Sub-channel ID for EWS Alert broadcasting.

EWS_OE_EID

This variable sets the Other Ensemble ID when the EWS_MODE is set to OTHER_ENSEMBLE.

EWS_SEVERITY

This variable sets the EWS Alert severity to either Level 1 or Level 2.

EWS_INCIDENT_ID

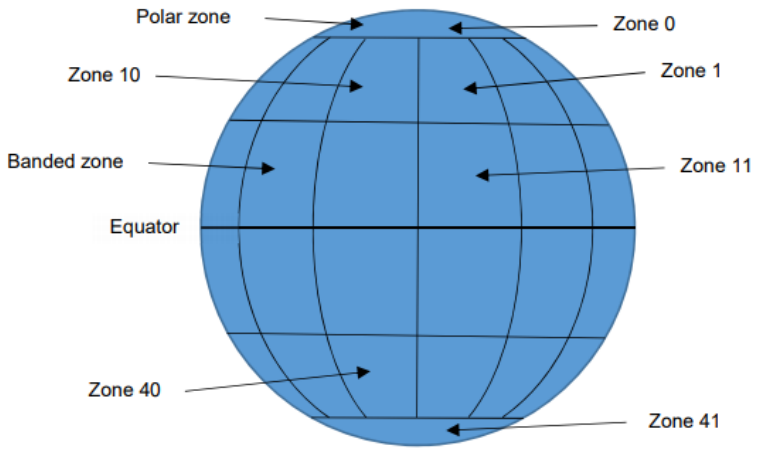
This variable sets the EWS Alert Incident ID.

EWS_NUM_OF_LOCATION

This can transmit location information for specific areas where the EWS Alert signal will apply. If this value is set to 0, no location information is transmitted, which means the alert applies to all areas covered by the current Ensemble.

EWS_ZONE_00 - EWS_ZONE_03

The globe can be divided into 42 zones, and this variable transmits the zone number for the current location. For more details, refer to TS 104 089 Annex F.



EWS_DIGIT_1 - EWS_ZONE_6

The DIGIT_1 variable divides the zone into 16 subdivisions to select a region, then further divides the selected region into 16 subdivisions. This hierarchical subdivision process can continue up to 6 levels. For more details, refer to TS 104 089 Annex C.

EWS_NUM_OF_DIGIT

This variable determines how many subdivision levels to apply beyond DIGIT_1. For more details, refer to TS 104 089 Annex C.

EWS_SCF

This variable determines whether to use the Sub-codes field. For more details, refer to TS 104 089 Annex C.

EWS_SUB_CODES

It shall specify between 2 and 15 spherical rectangles that are the sub-areas of the area specified by the zone and coded digits. For more details, refer to TS 104 089 Annex C.

3.1.4.5 Parameters for SCI

MODE

SCI is used to provide information on pending ensemble reconfigurations ahead of time. SCI will be sent when this parameter is set to ON.

CHANGE_FLAG

This 2-bit field shall indicate future changes to a service element, as follows: REMAIN(the service will remain in the ensemble with a new SId or will be moved to or from another ensemble); ADD(the service element will be added to the ensemble); REMOVE(the service element will be removed from the ensemble); REMOVE_ALL(the service element will be removed from all ensembles).

SERVICE

This parameter determines the service for SCI information.

PART_TIME_FLAG

This 1-bit flag shall indicate whether the service element is on-air or off-air continuously or cycles through on-air and off-air periods, as follows: 24_HOUR: the service element is on-air or off-air continuously (i.e. 24 hours/day); PART_TIME: the service element cycles on-air and off-air (i.e. part-time).

SID_FLAG

This parameter determines whether the SID field is present.

SID

This 16-bit or 32-bit field shall identify the service.

EID_FLAG

This parameter determines whether the EID field is present.

EID

This 16-bit field shall identify the Ensemble.

YEAR, MONTH, DAY, HOUR, MINUTE, SECOND

These parameters are passed as the MJD for the specific time the service component change occurs.

3.1.4.6 Parameters for TII

TII

TII signal is transmitted instead of every second NULL signal when this parameter is set to ON.

SUB_ID, MAIN_ID

These parameters set up a Transmitter ID.

3.1.4.7 Parameters for TIME

TIME

TIME information will be sent when this parameter is set to ON.

YEAR, MONTH, DAY, HOUR, MINUTE, LTO

To set up the current time.As time goes on, internal time related parameters are updated automatically but not refreshed on the screen. To refresh these parameters, go to another screen and return to this screen again.

3.1.5 INFO

The RWC2010C DAB sub-munu supports the INFO function so that the user can easily see the structure of the ENSEMBLE set by the user. This screen not only shows the structure, but also lets you edit the structure.
Go to the 'INFO' screen to see the current Ensemble structure graphically. In this example, there is a very simple Ensemble which consists of one Service (SERVICE_00) and one Component (COMPONENT_00). When you select or touch the SERVICE or COMPONENT block, the EDIT/ON(OFF)/ESC pop-up window and the connected primary and secondary component information are popped up. By selecting or touching the EDIT function, you can jump to the SERVICE or COMPONENT tab. And the service can be turned ON or OFF by toggling ON and OFF.

At the bottom of the screen, there is a bar which shows the occupied frame rate. Occupation Rate should be less than 100%, so be careful when you add components in the Ensemble. If the Occupation Rate is more than 100%, it shows a warning message on the screen.

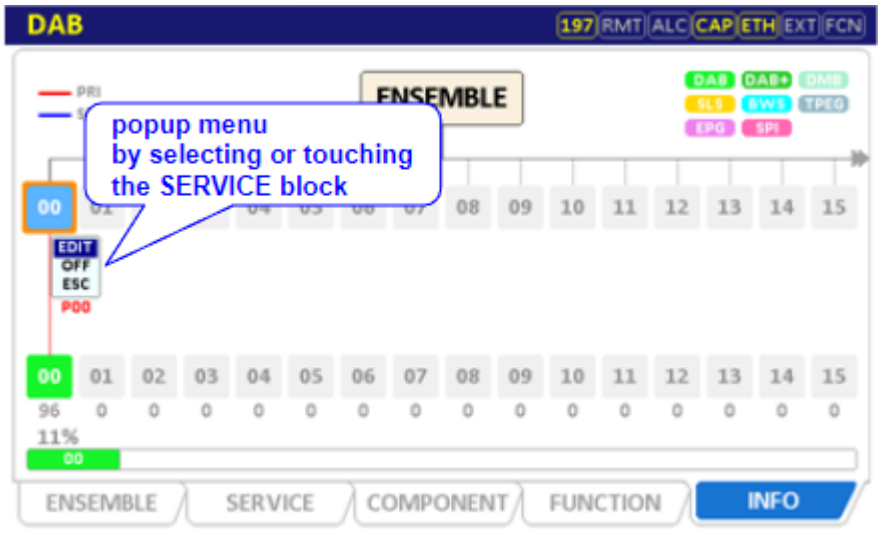


Fig. The INFO screen of DAB function

3.2 Editing DAB Ensemble Structure

3.2.1 Overview

You can modify channel type, transmission mode, ensemble id, ECC, labels and add or remove services. RWC2010C supports 64 Services to consist of Ensemble. it also supports 64 components to consist of services. You can add or remove all services or components by simple toggling in the ENSEMBLE or the SERVICE tab. It provides a simple way with a text/graphic editor.

3.2.2 Adding/Removing Service to the Ensemble

To add a new Service to the Ensemble, go to the 'DAB/ENSEMBLE' screen and place the cursor on the SERVICE parameter which you want to add., and press the ENTER key to turn it on. The following figure shows when the SERVICE_02 is added to the Ensemble.

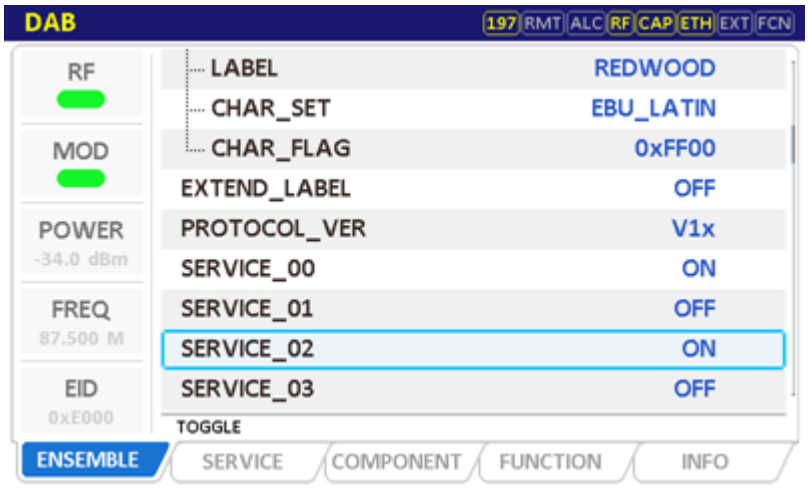


Fig. The screen of adding SERVICE to the Ensemble

After adding Services, go to the 'INFO' Screen to check the modified Ensemble structure. Using the same method, you can add or delete Services.

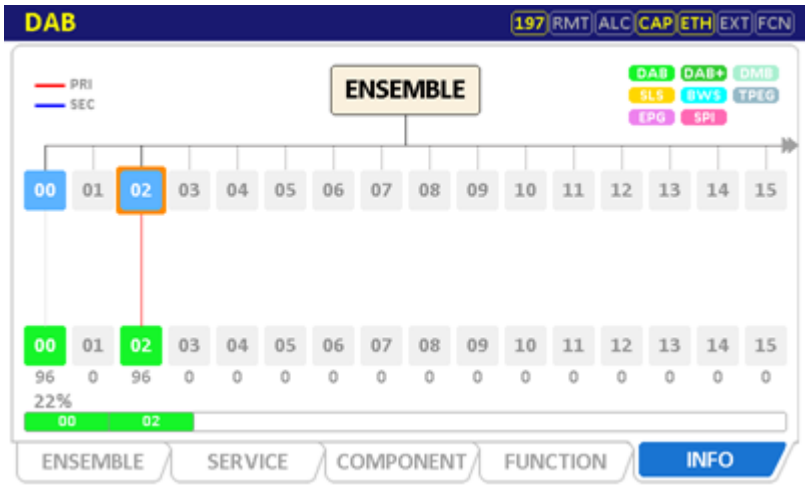


Fig. Screen of Ensemble structure after adding service

There is another way to add or delete SERVICE. On the INFO screen, please move the cursor to the SERVICE which you want to add or delete using the rotary knob and press the **ENTER key**.

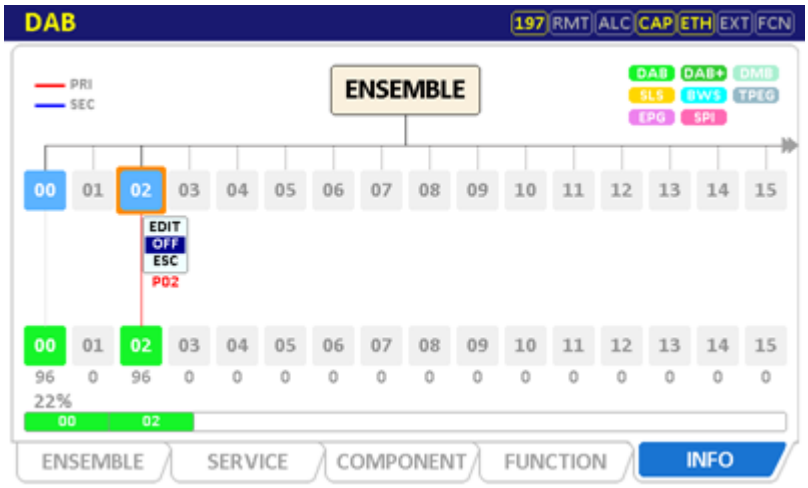


Fig. Screen of Editing Ensemble structure

3.2.3 Adding/Removing Component to the Service

Every SERVICE could have one Primary Service Component and several Secondary Service Components. RWC2010C can transmit 64 Services simultaneously. Each Service could have one Primary Service Component and two Secondary Service Components.

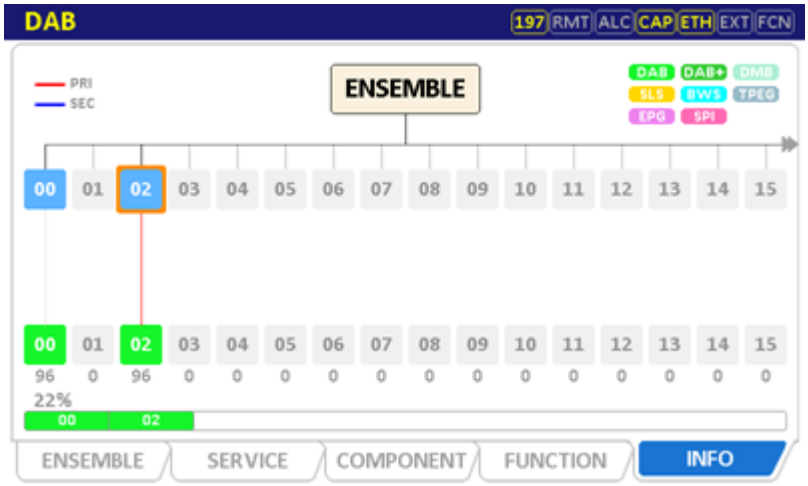


Fig. Screen of Ensemble structure after adding service

Upper figure shows that SERVICE_00 has COMPONENT_00 as Primary and does not have a secondary component. SERVICE_02 also has COMPONENT_02 as Primary and does not have Secondary Component. To change COMPONENT_07 as a primary component of SERVICE_02, go to the screen of ‘DAB/SERVICE’ and select SERVICE_02 using the "NUMBER” parameter. Move the

parameter cursor on the "PRIMARY" and set it as COMPONENT_07. After changing Components, go to the 'INFO' Screen to check the modified Ensemble structure.

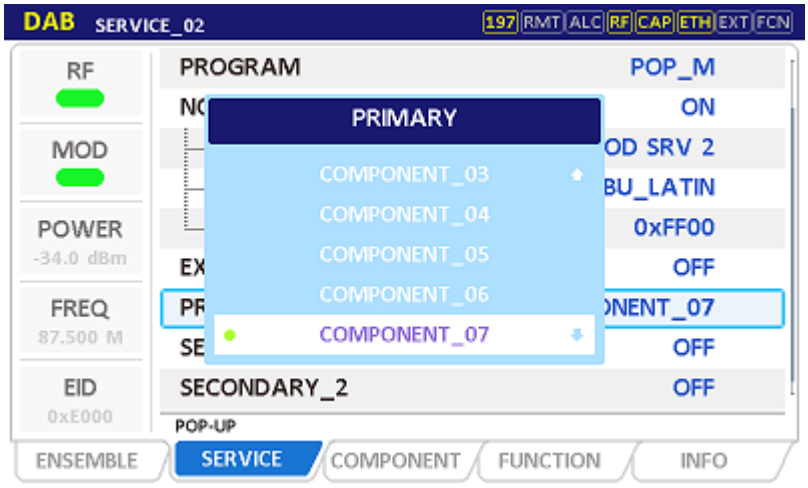


Fig. The screen of changing SERVICE COMPONENT structure

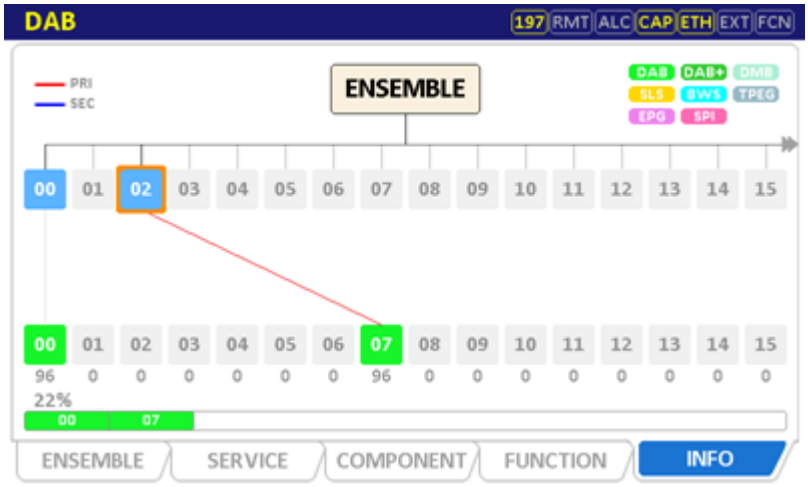


Fig. Screen of Ensemble structure after changing component

Secondary Components can be added or removed by the same method. On the information screen, the Primary component is connected by a red line and the Secondary component is connected by blue line..

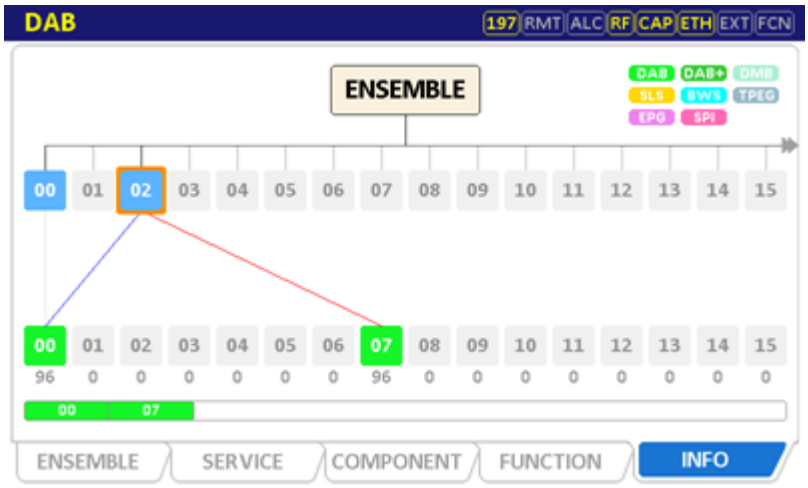


Fig. Screen of Ensemble structure after adding secondary component

3.3 Component Mode

3.3.1 DAB (MP2)

This section describes the method of setting the Service Component as DAB (MP2 Audio) mode. Go to the ‘DAB/COMPONENT’ screen. The first parameter on this screen is "NUMBER" which determines which component to modify. Component type is configured by the "MODE” parameter. RWC2010C supports various types of components like DAB, DMB, DAB+, SLS, SPI, etc…. By setting the MODE as DAB, the component is configured as the DAB and some parameters are automatically set for DAB mode. There is the "CONTENTS” parameter for selecting DAB contents downloaded in the memory. By selecting the desired file to transmit, RWC2010C will decode the file and set the audio related parameters automatically. The orange color bar below the CONTENTS parameter shows the status of file transmitting.

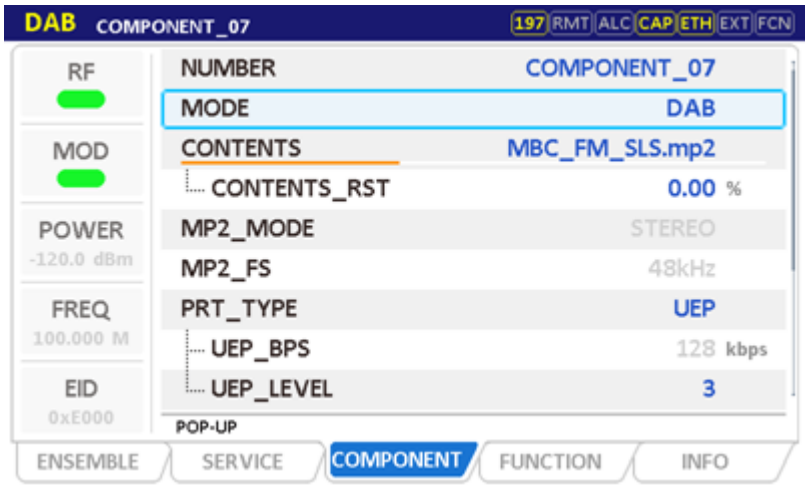


Fig. The screen of Service Component

Basic setting for DAB broadcasting is completed. If required, modify other protocol related parameters and test them for your purpose.

3.3.2 DMB

This section describes the method of setting the Service Component as DMB mode.
Go to the ‘DAB/COMPONENT’ screen. The first parameter on this screen is "NUMBER" which determines which component to modify. Component type is configured by the "MODE” parameter. RWC2010C supports various types of components like DAB, DMB, DAB+, SLS, SPI etc…. By setting the MODE as DMB, the component is configured as the DMB and some parameters are automatically set for DMB mode. There is the "CONTENTS" parameter for selecting DMB contents downloaded in the memory. The orange color bar below the CONTENTS parameter shows the status of file transmitting

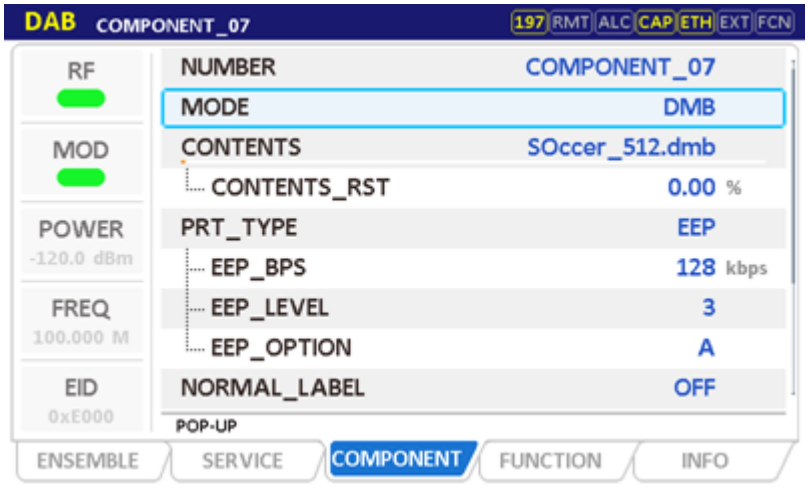


Fig. The screen of Service Component

Basic setting for DMB broadcasting is completed. If required, modify other protocol related parameters and test them for your purpose.

> ▣ **CAUTION**: For proper operation, you should know the BPS of selected content file and set "EEP_BPS" or "UEP_BPS" as the same value.

3.3.3 DAB+

This section describes the method of setting the Service Component as DAB+ mode.
Go to the 'DAB/COMPONENT' screen. The first parameter on this screen is "NUMBER" which determines which component to modify. Component type is configured by the "MODE" parameter. RWC2010C supports various types of components like DAB, DMB, DAB+, SLS, SPI etc…. By setting the MODE as DAB+, the component is configured as the DAB+ and some parameters are automatically set for DAB+ mode. There is the "CONTENTS" parameter for selecting DAB+ contents downloaded in the memory. The orange color bar below the CONTENTS parameter shows the status of file transmitting

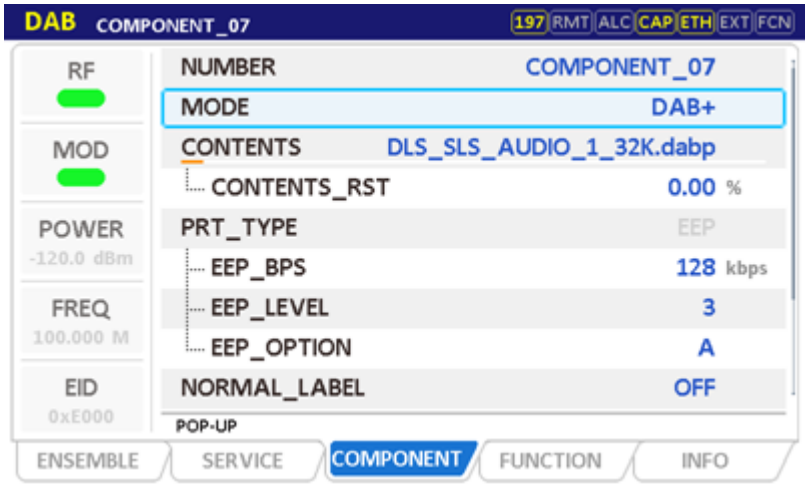


Fig. The screen of Service Component

Basic setting for DAB+ broadcasting is completed. If required, modify other protocol related parameters and test them for your purpose.

> ▣ **CAUTION**: For proper operation, you should know the BPS of selected content file and set "EEP_BPS" or "UEP_BPS" as the same value.

3.3.4 SPI

This section describes the method of setting the Service Component as SPI mode. Service Programme Information (SPI) is an application formerly known as electronic programme guide (EPG), but goes beyond a mere programme guide. SPI of RWC2010C periodically broadcasts future program schedules service names, identification, frequencies and multimedia (RedwoodComm station logo).
Go to the 'DAB/COMPONENT' screen. The first parameter on this screen is "NUMBER" which determines which component to modify. Component type is configured by the "MODE" parameter. RWC2010C supports various types of components like DAB, DMB, DAB+, SLS, SPI etc…. By setting the MODE as SPI, the component is configured as the SPI and some parameters are automatically set for SPI mode.

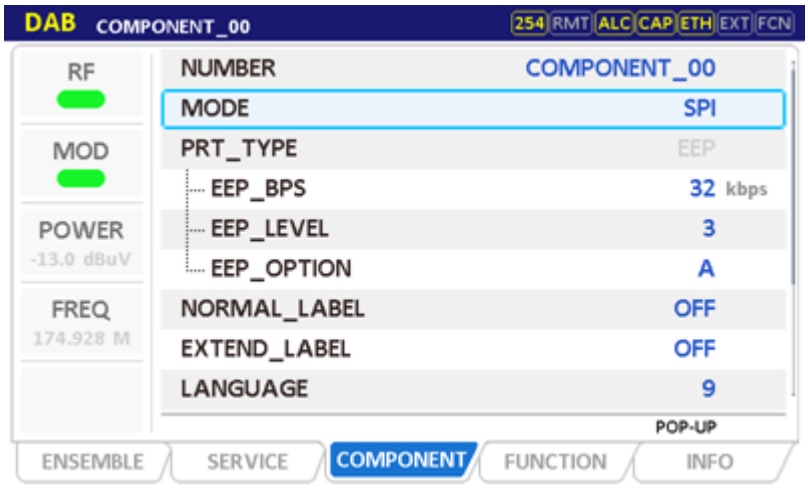


Fig. The screen of Service Component

3.3.5 SLS

This section describes the method of setting the Service Component as SLS mode. This data channel periodically broadcasts picture data which is related to the current service program.
Go to the 'DAB/COMPONENT' screen. The first parameter on this screen is "NUMBER" which determines which component to modify. Component type is configured by the "MODE" parameter. RWC2010C supports various types of components like DAB, DMB, DAB+, SLS, SPI, etc. By setting the MODE as SLS, the component is configured as the SLS and some parameters are automatically set for SLS mode. There is the "CONTENTS" parameter for selecting PNG picture files downloaded in the memory. The orange color bar below the CONTENTS parameter shows the status of file transmitting.

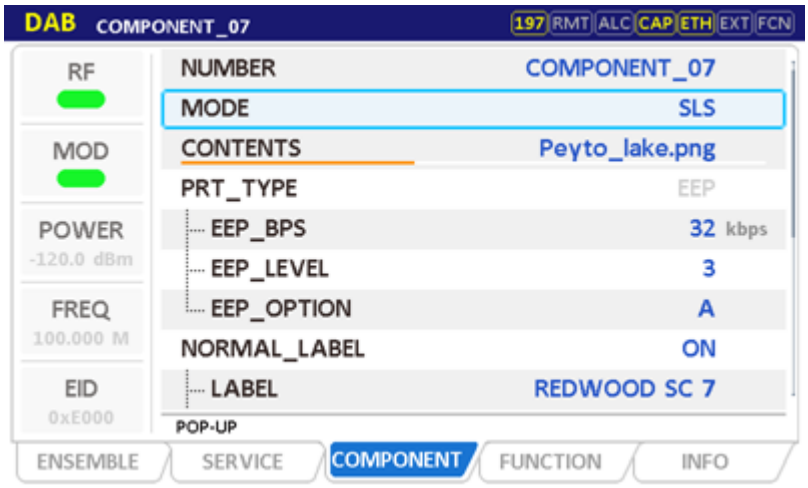


Fig. The screen of Service Component

Basic setting for SLS broadcasting is completed. If required, modify other protocol related parameters and test them for your purpose.

3.4 PAD Test

PAD stands for Program Associated Data. Data traveling in the PAD channel is intimately related to the audio program. RWC2010C provides DLS, DL+, DRC, SLS, and SPI through the PAD channel

3.4.1 DLS

DLS (Dynamic Label Service) allows the service provider to send text messages with information such as track playing, now/next, news headlines, weather, sport results, etc. To test the DLS, please set the Component as DAB (refer to 3.3.1) because the PAD service is provided in DAB mode. Set the PAD_TYPE parameter as DLS for DLS service through the PAD channel.

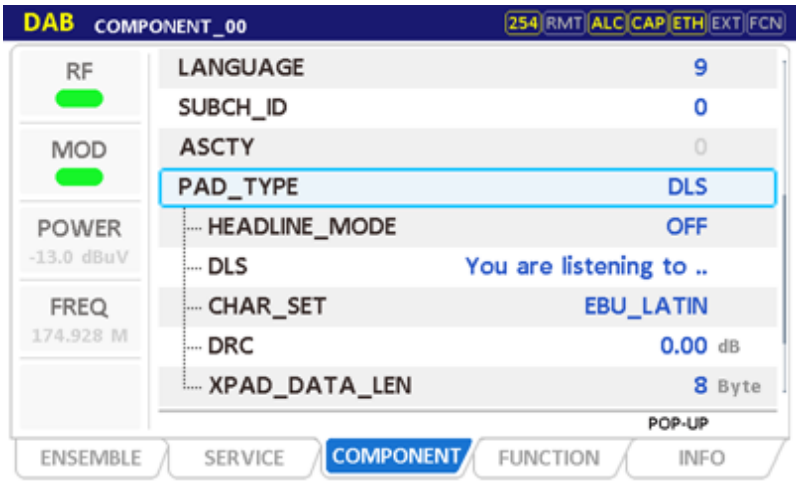


Fig. The screen for DLS setup

DLS can consist of up to 128-byte characters. Headlines can be added as part of the DLS. When Headlines is ON, the maximum bytes for DLS plus Headline must be 128 bytes or less. Editing is easy and multi-language editing is possible using the PC App program. For details, please refer to the PC application manual.

3.4.2 DL+

To serve all the different interests of listeners using the DLS, the service provider has to send DL messages frequently and with different contents, one after the other, each message replacing the one before. DL Plus solves this dilemma by allowing the Listener to select the kind of information he is interested in. For that purpose DL messages are complemented by tags which identify specific content of the DL message by its content type.
Set the PAD_TYPE parameter as DL+ for DL Plus service through the PAD channel. The DLS parameters and four TAG items are displayed. Each TAG item consists of a type, a start, and a length. The start indicates the starting position of the tag string within the DLS string.

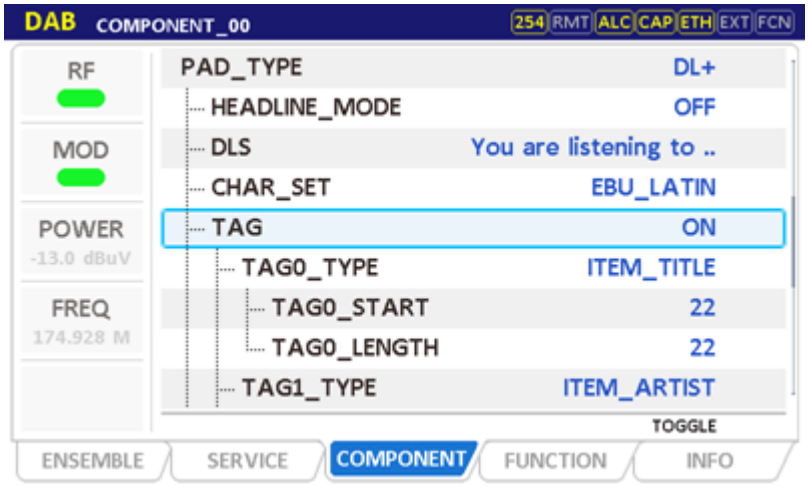


Fig. The screen for DL+ setup

3.4.3 SLS

SLS (Slide Show) allows the service provider to send image files related to the audio program. Set the PAD_TYPE parameter as SLS. There is the "CONTENTS" parameter for selecting PNG picture files downloaded in the memory. The orange color bar below the CONTENTS parameter shows the status of file transmitting.

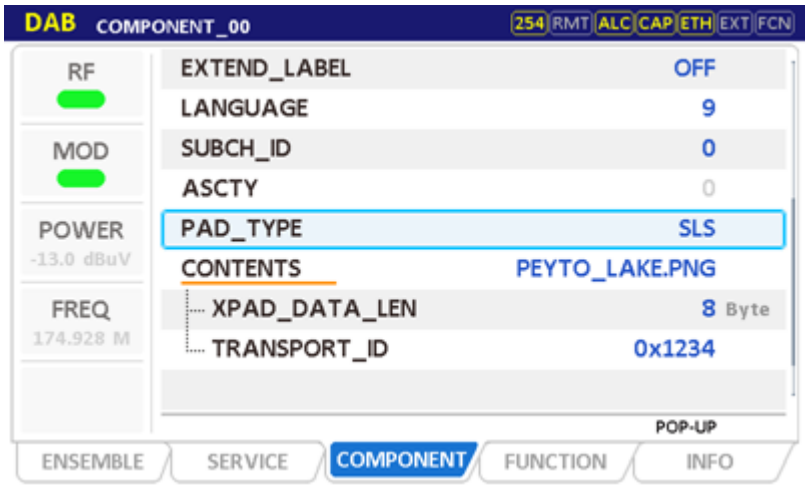


Fig. The screen for SLS setup

3.4.4 SPI

This section describes the method of setting the PAD channel as SPI mode. Service Programme Information (SPI) is an application formerly known as electronic programme guide (EPG), but goes beyond a mere programme guide. SPI of RWC2010C periodically broadcasts future program schedules service names, identification, frequencies and multimedia (RedwoodComm station logo).

By setting the PAD_TYPE as SPI, the PAD channel is configured as the SPI and some parameters are automatically set for SPI mode.

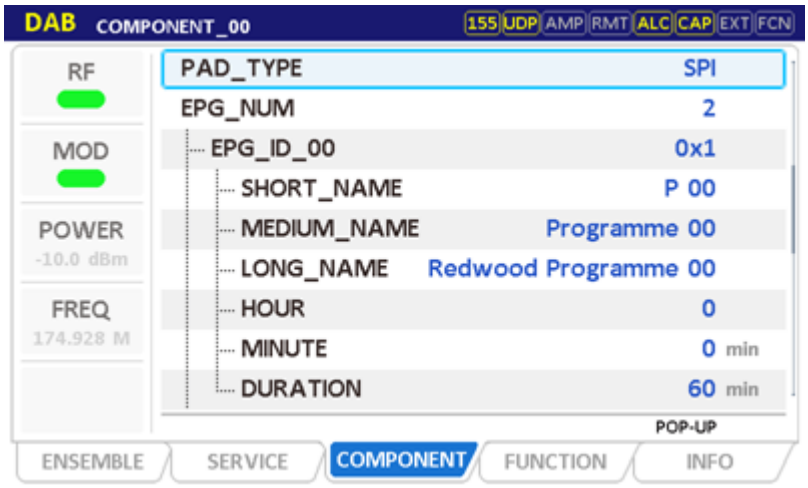


Fig. The screen for SPI setup

The simple schedule of the program can be edited in the GUI by setting the EPG_ID, HOUR, MINUTE and Duration of each item.

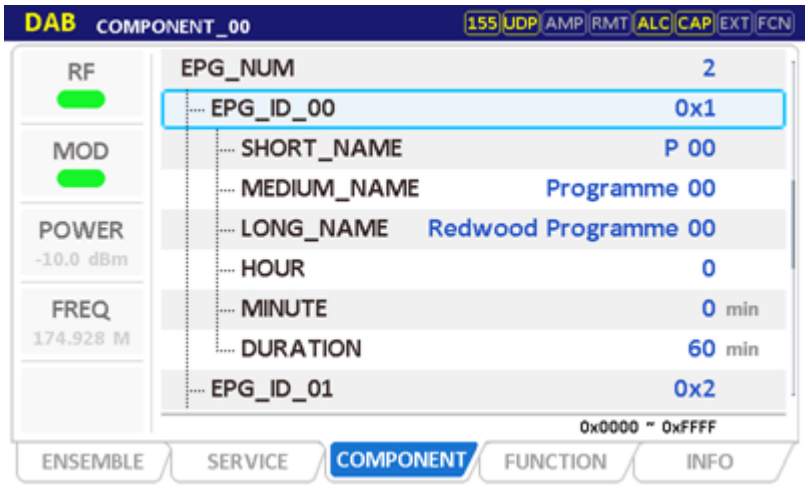


Fig. The screen of EPG configuration

3.4.5 DRC

The DRC(Dynamic Range Control) data can be used in the receiver to set the gain of the variable gain amplifier. It can make quieter sounds easier to hear when the listener is in a noisy environment.

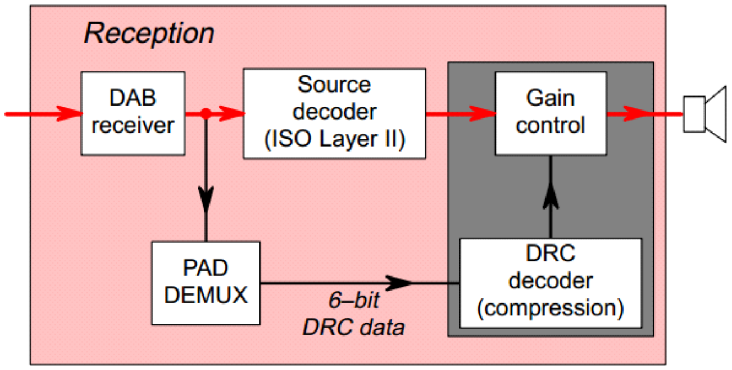


Fig. Block Diagram of DRC

To test the DRC, please set the Component as DAB (refer to 3.3.1) because the PAD service is provided in DAB mode. Set the PAD_TYPE parameter as DLS or DL+ for DRC test through the PAD channel.

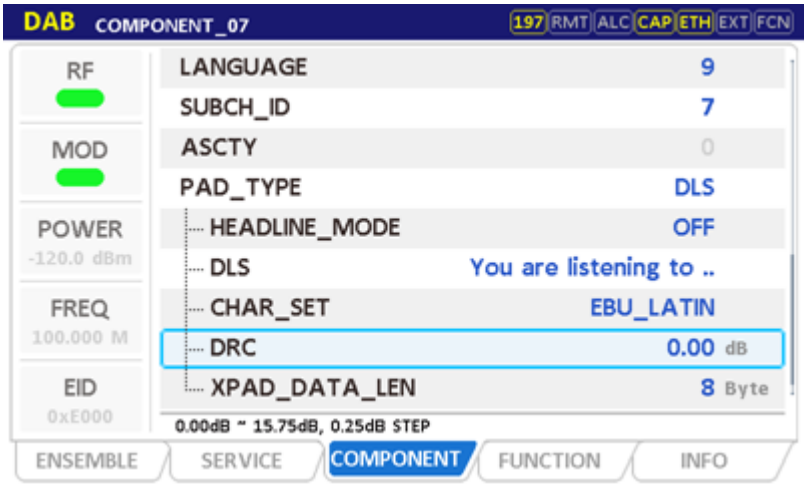


Fig. The screen for DRC setup

3.5 Functional Test

3.5.1 Announcement Test

Announcement is a period of elevated interest within an audio programme. It is typically a spoken audio message, often with a lead-in and lead-out audio pattern (for example, a musical jingle). It may refer to various types of information such as traffic, news, sports and others. The signaling of announcements is to allow a receiver to provide the user with an announcement mode, including specific functions such as raising a reduced volume during the

announcement message or switching from another playback source to the radio programme for the announcement message and other features. The receiver resumes the original state and playback function after the end of the announcement. Regular announcements are signaled as one of general information, such as traffic, news or weather. Alarm announcements signal that an emergency message is broadcast which has a higher priority than regular announcements. Alarm announcements are treated separately in the present document, as both the signaling and the expected receiver behavior are different.
An announcement may occur during a service in the tuned ensemble, but may also occur during a service in another ensemble.

To test the announcement function, go to the 'DAB/FUNCTION' screen and set up the "TEST_ITEM" as ANNOUNCEMENT. The announcement test screen will be displayed as follows. RWC2010C supports turned ensemble announcement tests as well as other ensemble announcement tests by setting the MODE parameter.
Each service can have its own announcement support (FIG0/18) parameters. Select the service which will have announcement support features using AN_SOURCE_SVC_xx parameter. Enables or disables announcement support information types (alarms, traffic information, etc.). This announcement support configuration can be assigned to one or more clusters. Clusters are used for announcement switching signals (FIG0/19). If the announcement switching has the same cluster-ID, the radio may go to the target service defined in the announcement switching signal.

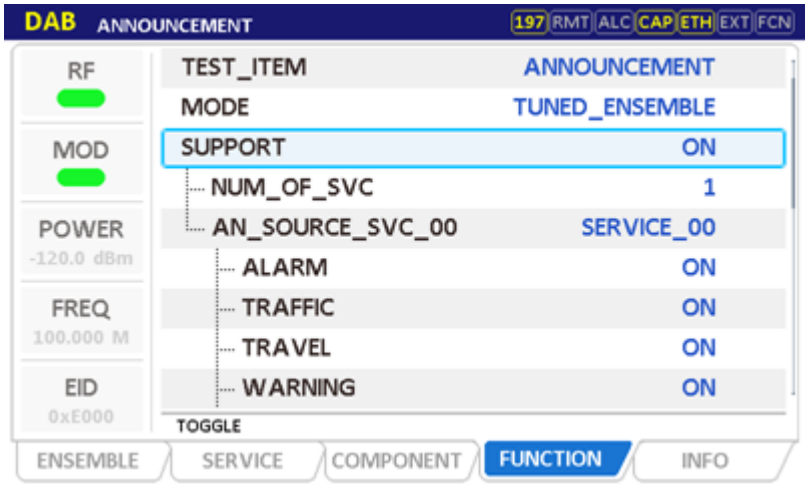


Fig. The screen for announcement support setting

For the announcement switching test in RWC2010C, the desired announcement switching type is set using the AN_SWITCH_TYPE parameter, and the target service is set using the TARGET_CH parameter. Set one of the cluster IDs used in the announcement support settings to the announcement switching cluster-ID. For Alarm Announcement, the cluster-ID is fixed at 0xFF. When all parameters are set as desired, set the AN_SWITCHING parameter to ON to start sending the signal of announcement switching.

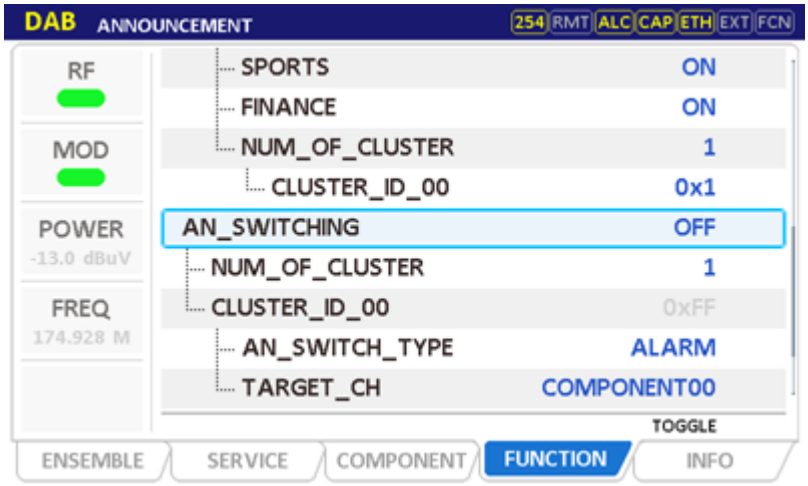


Fig. The screen for announcement switching setting

3.5.2 Reconfiguration Test

The ensemble information provides the required mechanisms for changing the multiplexer configuration whilst maintaining continuity of services. Such a multiplexer re-configuration is achieved by sending at least the relevant part of the MCI of the future multiplexer configuration in advance as well as the MCI for the current configuration. When the sub-channel organization changes, the relevant part of the MCI is encoded in FIG 0/1 and, for sub-channels applying additional FEC for packet mode, FIG 0/14. When the service organization changes, the relevant part of the MCI is encoded in FIG 0/2, FIG 0/3, FIG 0/4, and FIG 0/8. Accordingly, every MCI message includes a C/N flag signaling whether its information applies to the current or to the next multiplexer configuration

To test the reconfiguration function with the RWC2010C, two steps are required. First of all, current ensemble configuration should be done with the same method explained in the preceding sections. Then go to the ‘DAB/FUNCTION’ screen and set the "TEST_ITEM parameter as RECONFIGURATION and” set the "MODE” parameter as ON.

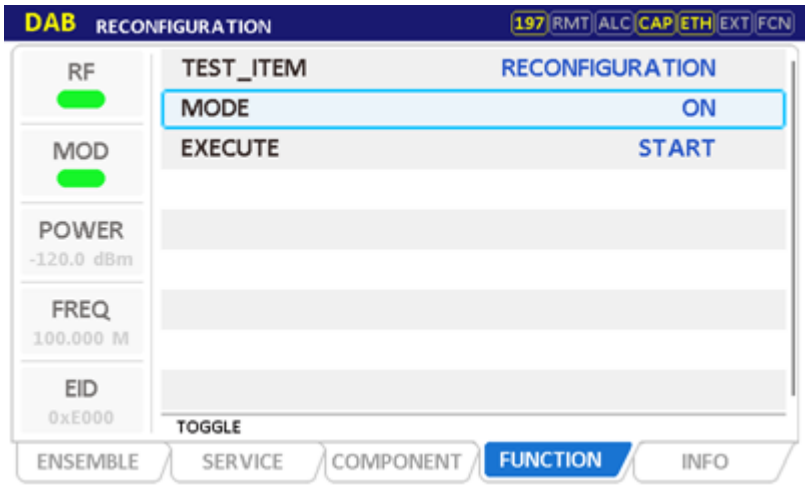


Fig. DAB menu screen for Reconfiguration setting

After that, go to the ENSEMBLE, SERVICE or COMPONENT screen. You will see the color of some parameters is in green. Those parameters are reconfiguration related parameters. So modify some of those parameters if you want to change the multiplexer configuration in future. You will see that the color of modified parameters is in Red. Following 2 figures show the screens before modifying parameters and after modifying parameters.

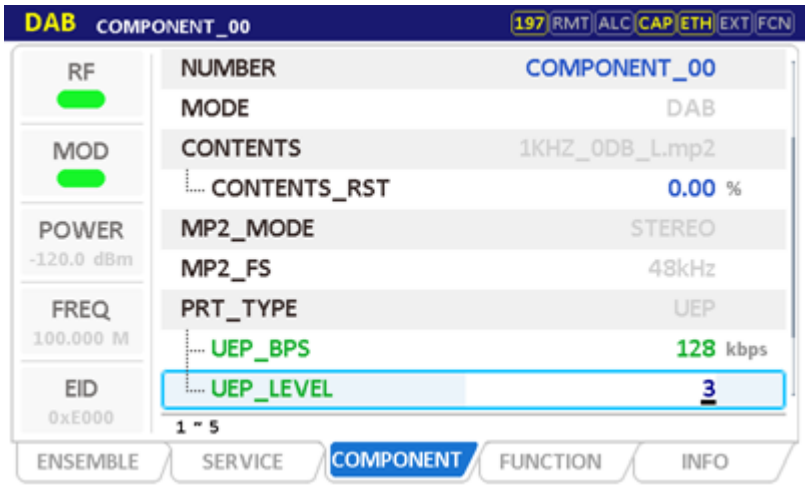


Fig. DAB COMPONENT screen (before modifying reconfiguration parameters)

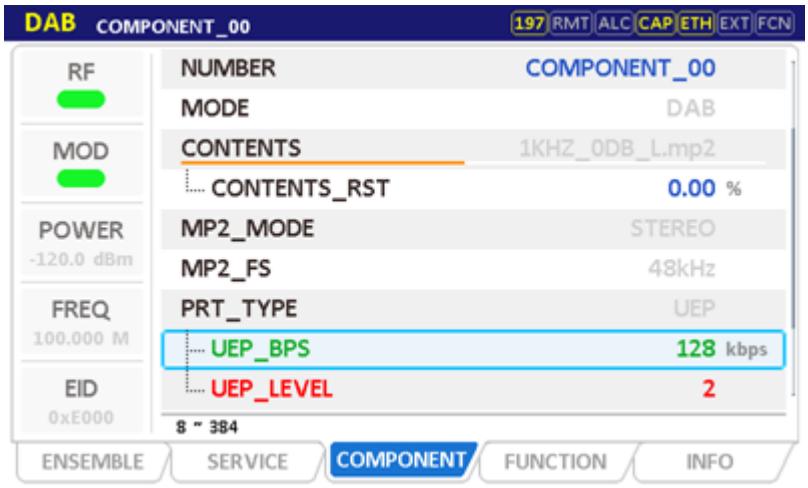


Fig. DAB COMPONENT screen (after modifying reconfiguration parameters)

Please keep in mind that the modified red color parameters are not applied to the broadcasting Ensemble. To apply them to the broadcasting Ensemble with proper reconfiguration procedures, go to the ‘DAB/RECONFIG’ screen again. And move the parameter cursor on the "EXECUTE” parameter and push the ENTER key. It takes about 5 seconds to finish the reconfiguration procedures. You will see an orange color bar below the "EXECUTE” parameter which shows the status of reconfiguration. During these procedures, the DUT should maintain continuity of service decoding.

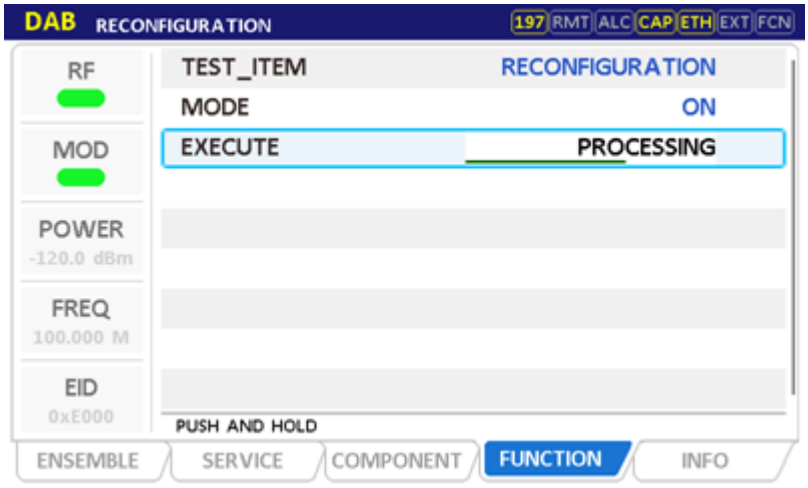


Fig. The screen during the Reconfiguration is running

3.5.3 Alternative Frequency (AF) Test

Alternative frequency (AF) is an option that allows a receiver to re-turn to a different frequency that provides the same station or related, when the first signal becomes too weak.

The DAB system can signal alternative frequencies for the DAB system or other systems like DRM, FM_RDS, AM, DRM to allow the receiver to counter reception problems by automatically and quickly switching to an alternative frequency providing better reception conditions.

To test the alternative frequency function, go to the ‘DAB/FUNCTION’ screen and set up the "TEST_ITEM” as ALTERNATIVE_FREQ. The alternative frequency test screen will be displayed as follows. RWC2010C signals alternative frequency information according to the setting of AF parameters.

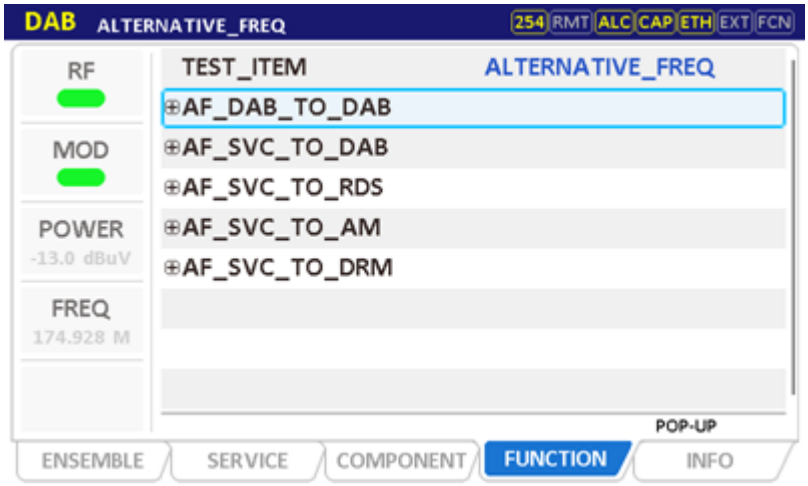


Fig. The screen for alternative frequency test

3.5.3.1 DAB to DAB AF Setting

The service provider may signal a list of geographically adjacent alternative ensembles using FIG 0/24 on which the current and other services can be found. The EID, frequency and other other ensemble related parameters are editable on GUI.

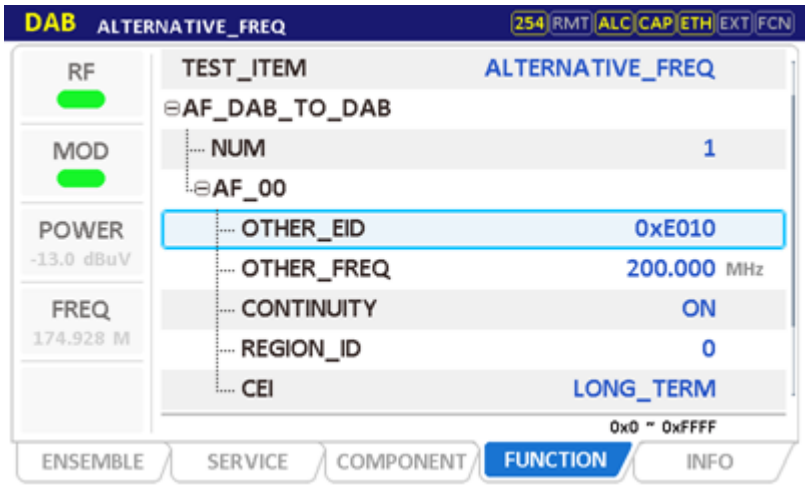


Fig. The screen for DAB to DAB AF setting

3.5.3.2 Service to DAB AF Setting

Although not identical to the current ensemble, if there is the same service or related to the current program, the service provider may provide the EID, frequency, and SID of the specific service in the other ensemble so that the target service can be found easier.

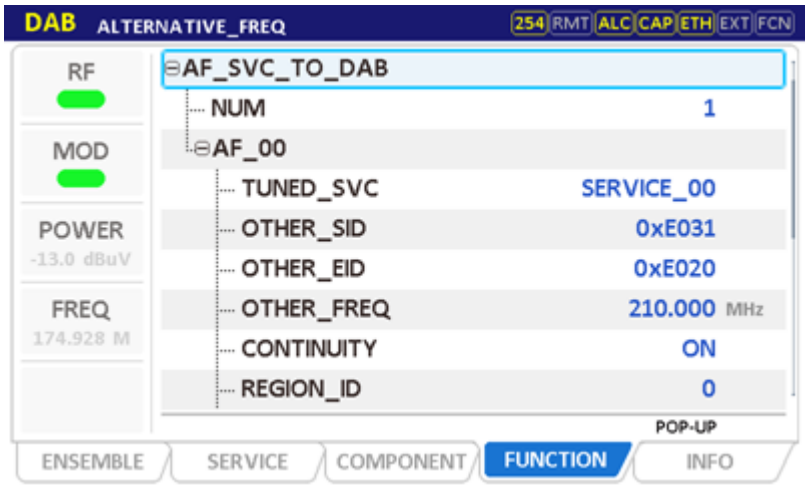


Fig. The screen for Service to DAB AF setting

3.5.3.3 Service to FM-RDS AF Setting

If there is the same program or related to the current program in FM RDS, the service provider may provide the PID and frequency of FM RDS.

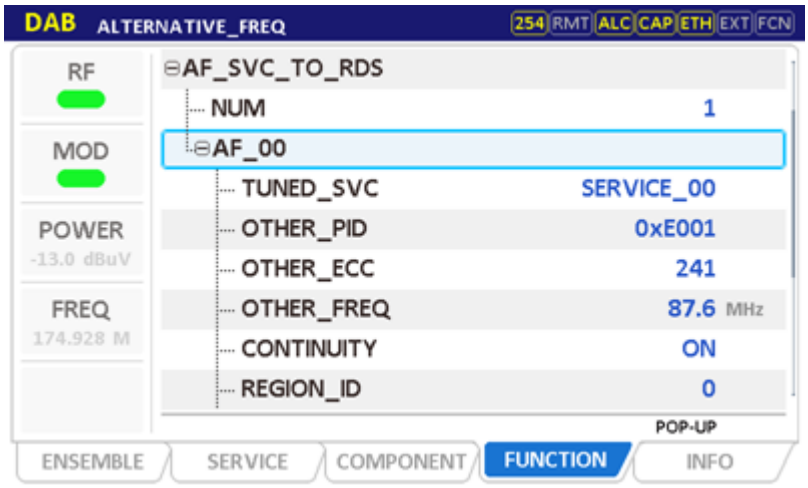


Fig. The screen for Service to FM-RDS AF setting

3.5.3.4 Service to AM AF Setting

If there is the same program or related to the current program in AM, the service provider may provide the frequency of AM.

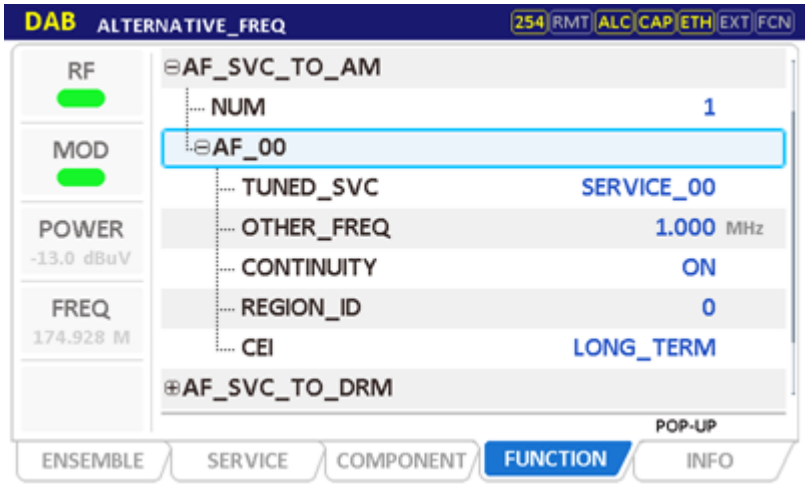


Fig. The screen for Service to AM AF setting

3.5.3.5 Service to DRM AF Setting

If there is the same program or related to the current program in DRM, the service provider may provide the SID and frequency of DRM.

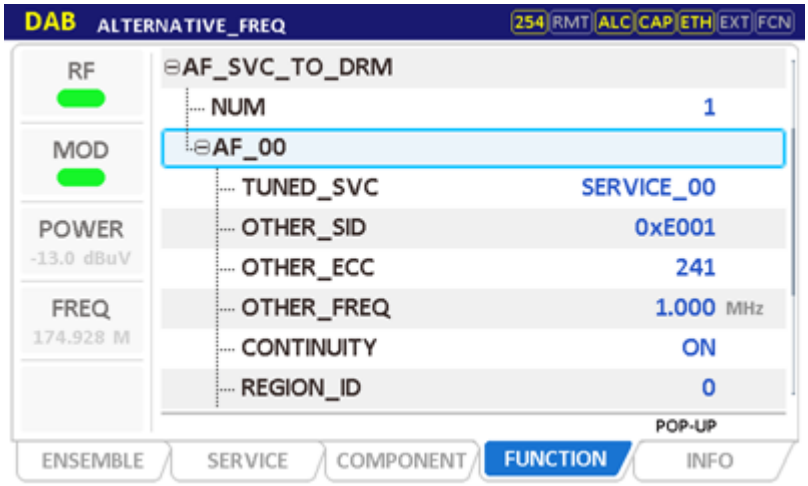


Fig. The screen for Service to DRM AF setting

3.5.4 Emergency Warning System (EWS) Test

The DAB EWS provides alert messages which consist primarily of audio information about the nature and extent of the emergency and instructions on how to react. The alert message may

also include textual information, as the dynamic label, and optionally additional multimedia content when linked to the audio service. The alert message can be targeted to a specific geographic area such that receivers within the signalled alert area will respond, even when tuned to other DAB services, other media or when in a very low-power sleep mode, yet receivers outside the signalled alert area will not respond, allowing the user to continue with their chosen activity.

Using the RWC2010C, various EWS test scenarios can be performed. You can choose whether to test Synchronized Alerts, which transmit Trigger signals only at minute boundaries to enable reception by terminals in sleep mode, or to transmit Trigger signals immediately regardless of time synchronization. Additionally, you can select whether to test EWS signals transmitted from the current Ensemble or from another Ensemble.

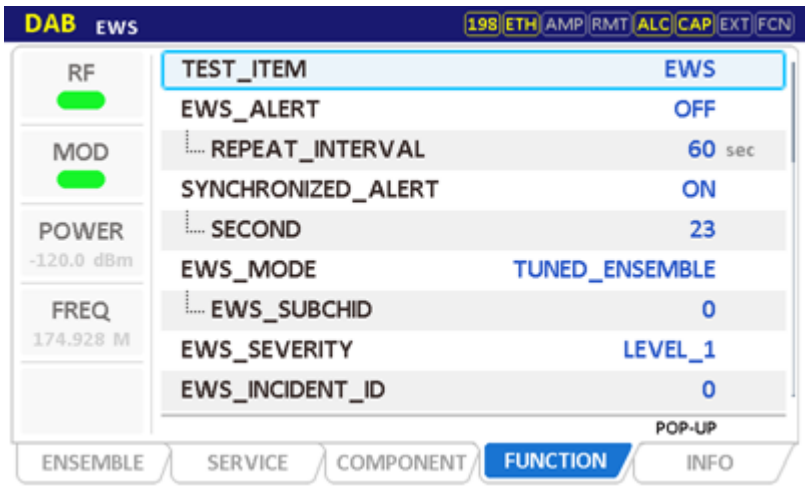


Fig. The screen for alternative frequency test

3.5.4.1 Transmitting Heartbeat signal

HEARTBEAT information is transmitted via FIG 0/15 every second to indicate that this is an Ensemble participating in EWS. When EWS_ALERT is set to HEARTBEAT_ONLY, the RWC2010C transmits the Heartbeat signal every second.

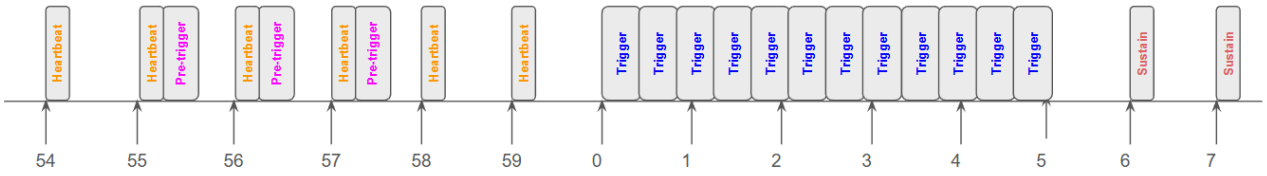
3.5.4.2 Transmitting Trigger signal and Repeat Signal

When EWS_ALERT is set to START_&_REPEAT, the RWC2010C transmits EWS signals according to a predefined scenario. The transmission scenario varies depending on the SYNCHRONIZED_ALERT setting.

<u>Sceanrio for Synchronized ON alert</u>

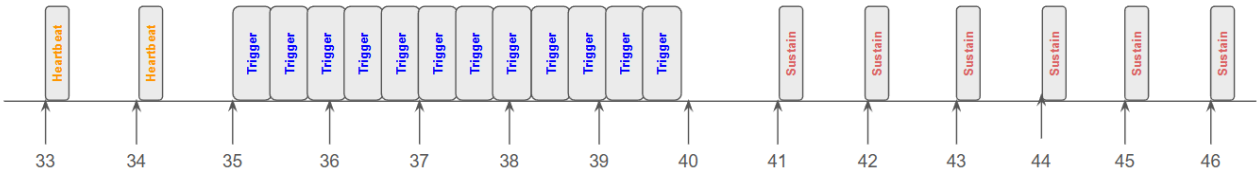
This scenario is designed to enable EWS signal reception not only by radios that are currently powered on, but also by radios in sleep mode. To conserve battery, radios in sleep mode briefly monitor FIG 0/15 only at minute boundaries, and if no Alert signal is detected, they return to sleep mode. Therefore, the RWC2010C is implemented to

transmit the necessary information synchronized with the time information transmitted via FIG 0/10.
When EWS_ALERT is set to START_&_REPEAT, the RWC2010C waits until second 55, then transmits the Pre-trigger signal every second from second 55 to 57. This signal is intended to be received by other Ensembles to help them prepare for the OE (Other Ensemble) Trigger signal. After the minute boundary, the Trigger signal is transmitted from second 0 to 5. Subsequently, the Sustain signal is transmitted every second for the duration defined by the EWS_REPEAT_INTERVAL variable, followed by transmission of the Repeat signal for 5 seconds. The Sustain and Repeat transmissions then continue cyclically.



Sceanrio for Synchronized OFF alert

This scenario is designed for cases where the alert severity is low, targeting only radios that are currently powered on to receive the EWS signal. Therefore, time synchronization is not required. When EWS_ALERT is set to START_&_REPEAT, the RWC2010C immediately transmits the Trigger signal for 5 seconds. Subsequently, the Sustain signal is transmitted every second for the duration defined by the REPEAT_INTERVAL variable, followed by transmission of the Repeat signal for 5 seconds. The Sustain and Repeat transmissions then continue cyclically.



3.5.4.3 Transmitting Update signal and Repeat Signal

When EWS_ALERT is set to START_&_REPEAT and the EWS scenario is started, UPDATE_&_REPEAT and END are added as selectable options for the EWS_ALERT variable. Setting EWS_ALERT to UPDATE_&_REPEAT at the desired update timing causes the RWC2010C to transmit the Update signal for 5 seconds, then resume cyclic transmission of Sustain and Repeat signals.

3.5.4.4 Transmitting End Signal

When EWS_ALERT is set to START_&_REPEAT and the EWS scenario is started, UPDATE_&_REPEAT and END are added as selectable options for the EWS_ALERT variable. Setting EWS_ALERT to END at the desired timing causes the RWC2010C to transmit the End signal for 2 seconds, then automatically transitions to a mode that transmits the Heartbeat signal every second.

For usage of other variables, please refer to the variable descriptions in Section 3.1.4.4.

3.5.5 SCI

SCI (Service Component Information) is used to provide information on pending ensemble reconfigurations ahead of time. Receivers should make use of advance information for user information, e.g. an upcoming service being added to the service list with a date and time of its coming into operation. SCI can also provide information on ensemble reconfigurations that have occurred already, in some cases this information is essential to a receiver to discover the change after the fact.
Either future or past changes can be edited in the GUI as follows:

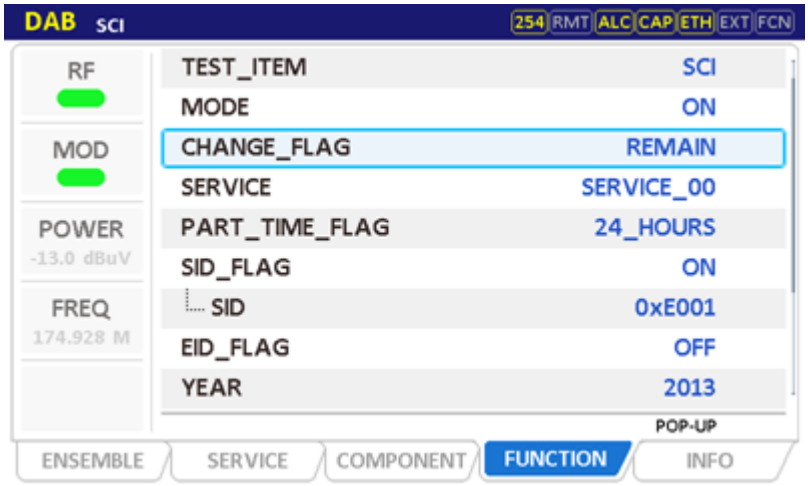


Fig. The screen for SCI setting

3.5.6 TII

TII (Transmitter Identification Information) stands for transmitter ID. TII signal is transmitted instead of every second NULL signal. This function is optional in specification. The RWC2010C supports on/off of the TII signal. It also supports "TII_PATTERN" and "TII_COMB" parameters to set up a Transmitter ID.

Go to the ‘DAB/FUNCTION’ screen and set up the "TEST_ITEM” as TII and "TII” as ON. Users could test TII using "TII_COMB”, "TII_PATTERN” parameters.



Fig. TII setup parameters in DAB/DMB Ensemble screen

3.5.6 Time Information

DAB specification supports transmitting time information. The RWC2010C transmits time information as follows.

To set up the current time, go to the ‘DAB/FUNCTION’ screen and set up the "TEST_ITEM” as TIME and "TIME” as ON. And set up "YEAR”, "MONTH”, "DAY”, "HOUR”, "MINUTE”, "LTO” parameters. As time goes on, internal time related parameters are updated automatically but not refreshed on the screen. To refresh these parameters, go to another screen and return to this screen again.

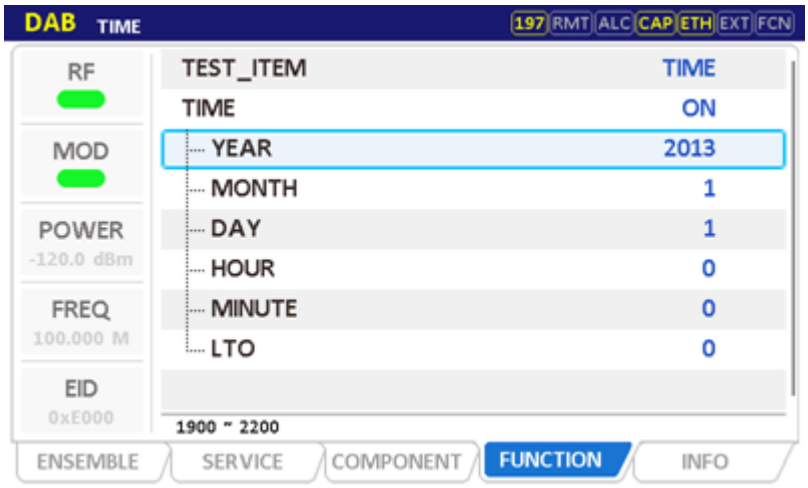


Fig. DAB/DMB menu screen for time information

4 DRM Operation

This section describes the basic concepts and details of DRM related operations. Understanding the basic concepts of your RWC2010C helps you use it effectively.

4.1 DRM Menu Structure
4.2 Editing DRM Multiplexer Structure
4.3 Stream Type
4.4 Functional Test

4.1 DRM Menu Structure

The DRM menu consists of the MULTIPLEX, SERVICE, STREAM, FUNCTION and INFO submenu. The multiplexer is structured very intuitively with the DRM multiplexer structure as shown in the following figure. The built-in Multiplexer supports up to 4 services and 4 streams. Each service and stream can be completely configured DRM multiplexer structure just by on and off. All parameters of each SERVICE and STREAM are editable in each submenu tab.

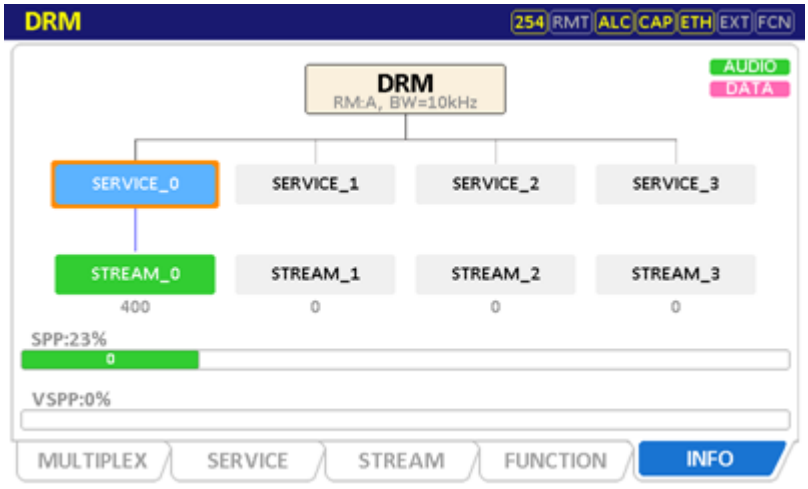


Fig. DRM menu structure of RWC2010C

4.1.1 MULTIPLEX

This submenu contains RF-related parameters and Multiplexer-related parameters.

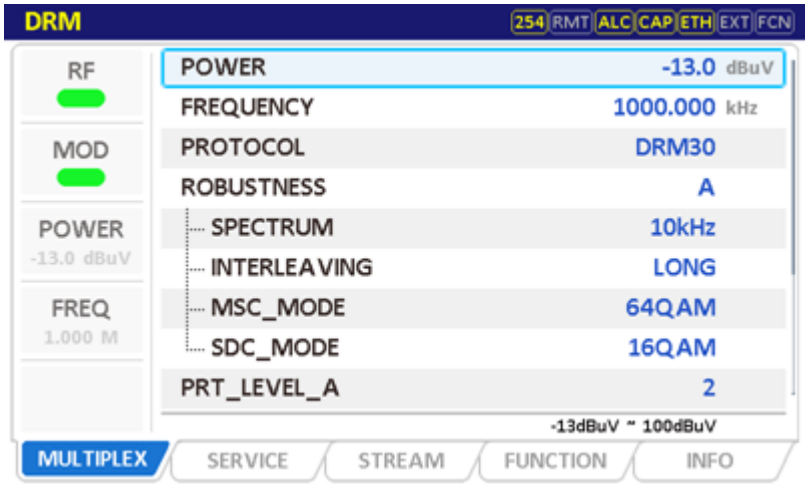


Fig. The screen of MULTIPLEX submenu

4.1.1.1 Parameters

POWER

RF output power for DRM Multiplexer. Users can use the UNIT key to select power units in dBm or dBuV.

FREQUENCY

RF output frequency for DRM Multiplexer. Users can use the UNIT key to select power units in MHz, kHz or Hz.

PROTOCOL

RWC2010C supports DRM30 for AM band and DRM+ for FM band broadcasting.

ROBUSTNESS

The OFDM parameter set (A, B, C, D and E) is defined in DRM specification. This parameter is defined for different propagation-related transmission conditions to provide various robustness modes for the signal. In a given bandwidth, the different robustness modes provide different available data rates.

SPECTRUM

This parameter specifies the nominal channel bandwidth.

INTERLEAVING

This parameter indicates the depth of the time interleaving as follows: long for 2 s or short for 400 ms.

MSC_MODE

This parameter indicates the modulation mode in use for the MSC.

SDC_MODE

This parameter indicates the modulation mode in use for the SDC.

PRT_LEVEL_A

This parameter indicates the protection level for higher protection part (part A).

PRT_LEVEL_B

This parameter indicates the protection level for lower protection part (part B).

PRT_LEVEL_HIER

This parameter indicates the protection level for hierarchical frame (part B).

SERVICE_0 - SERVICE_3

RWC2010C supports up to 4 services for DRM Multiplexer. The user can use these parameters to turn on/off the services.

4.1.2 SERVICE

This submenu contains service-related parameters such as SID, service label, etc. Users can assign streams to the service on this Screen.

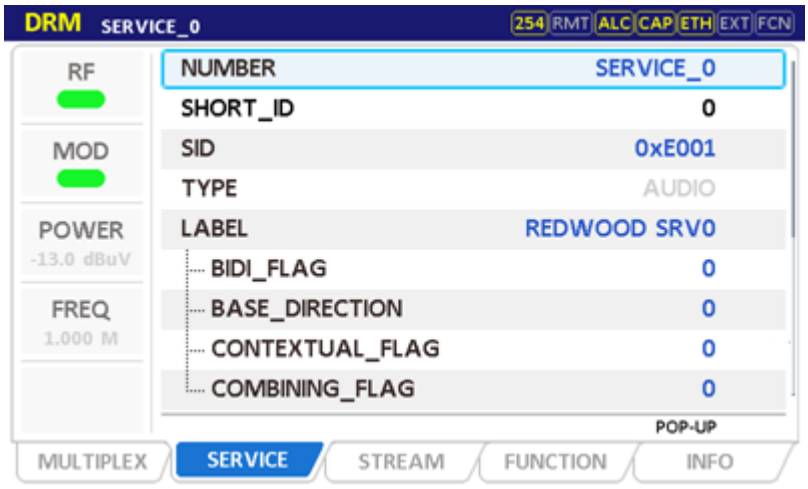


Fig. The screen of SERVICE submenu

4.1.2.1 Parameters

NUMBER

This parameter determines which service to modify.

SHORT_ID

This 2-bit field indicates the short identifier assigned to this service and used as a reference in the SDC. The Short Id is assigned for the duration of the service and is maintained through multiplex reconfigurations.

SID

Unique 16-bit code which shall be allocated to the service and allows unambiguous identification of the service.

LABEL

This parameter stands for the name of Service. The maximum length of the string is 16-byte.

BIDI_FLAG

This 1-bit flag shall indicate whether the text contains bidirectional text (excluding numerals) as follows: 0 if bidirectional text is not present or 1 if bidirectional text is present.

BASE_DIRECTION

This 1-bit flag shall define the Unicode base direction of the text as follows: 0 for left-to-right (LTR) or 1 for right-to-left (RTL).

CONTEXTUAL_FLAG

This 1-bit flag shall indicate whether contextual characters are used in the text as follows: 0 if contextual characters are not present (presentation characters only) or 1 if contextual characters are present.

COMBINING_FLAG

This 1-bit flag shall indicate whether combining characters are used in the text as follows: 0 if combining characters are not present or 1 if combining characters are present.

LANGUAGE

This parameter is the Language information of Service.

LANGUAGE_CODE

This parameter identifies the language of the target audience of the service according to ISO 639-2.

COUNTRY_CODE

This parameter identifies the country of origin of the service according to ISO 3166.

PRG_TYPE

Program type of the service.

AUDIO_CA

This 1-bit flag shall indicate whether conditional access is used for the audio.

DATA_CA

This 1-bit flag shall indicate whether conditional access is used for the data.

LINK_1

Set up the first stream for the service. After setting, users can check the connection on the INFO screen.

LINK_2

Set up the second stream for the service. After setting, users can check the connection on the INFO screen.

4.1.3 STREAM

This submenu contains stream-related parameters such as stream type, contents, etc.

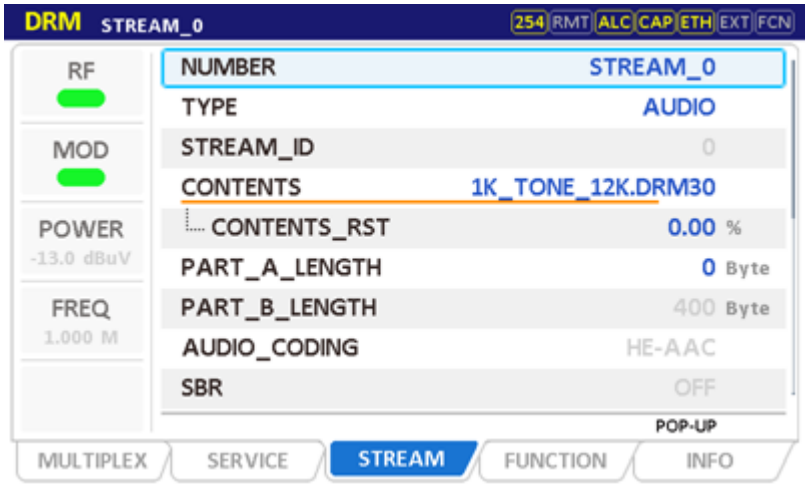


Fig. The screen of STREAM submenu

4.1.3.1 Common Parameters

NUMBER

This parameter determines which component to modify.

TYPE

This parameter determines the type stream. RWC2010C supports AUDIO, DATA_PRBS, and DATA_PACKET.

STREAM_ID

This parameter is Physical ID of Stream. The stream is recognized by this value in DUTs. In RWC2010C, this value is allocated automatically and just shows the value as unchangeable.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

PART_A_LENGTH, PART_B_LENGTH

In DRM protocol, there are UEP and EEP in Protection Mode. UEP stands for Unequaled Error Protection and is used mainly for audio broadcasting. EEP stands for Equaled Error Protection and is used mainly for Data broadcasting. PART_A_LENGTH stands for Higher

Protected Part and PART_B_LENGTH stands for Lower Protected Part. If users set the PART_A_LENGTH parameter as 0, DRM transmission mode will be EEP. Protection level of PART_A and PART_B is editable on ‘DRM/ENSEMBL’ screen using "PRT_LEVEL_A” and "RPT_LEVEL_B” parameters.

4.1.3.2 Audio Parameters

AUDIO_CODIG

RWC2010C will decode the selected DRM audio content file to show if it is HE-AAC or xHE-AAC. This parameter is for display only.

SBR

RWC2010C will decode the selected DRM audio content file to show if its SBR. This parameter is for display only.

AUDIO_FS

RWC2010C will decode the selected DRM audio content file to show the data rate. This parameter is for display only.

AUDIO_MODE

RWC2010C will decode the selected DRM audio content file to show if it is mono or stereo. This parameter is for display only.

SURROUND

RWC2010C will decode the selected DRM audio content file to show if it is surround mode. This parameter is for display only.

TEXT_FLAG

This parameter indicates whether a text message is present or not.

HEADLINE_MODE

This parameter indicates whether the Headline is added to the TEXT

HEADLINE

It can be set as the Headline part of the beginning of a TEXT sentence. This parameter stands for Headline sentence.

TEXT

At the end of the audio frame, the text data for various information such as the lyrics of the song is attached. The maximum length of the text string is 128. The editing method is the same as the LABEL editing method.

BIDI_FLAG

This 1-bit flag shall indicate whether the text contains bidirectional text (excluding numerals) as follows: 0 if bidirectional text is not present or 1 if bidirectional text is present.

BASE_DIRECTION

This 1-bit flag shall define the Unicode base direction of the text as follows: 0 for left-to-right (LTR) or 1 for right-to-left (RTL).

CONTEXTUAL_FLAG

This 1-bit flag shall indicate whether contextual characters are used in the text as follows: 0 if contextual characters are not present (presentation characters only) or 1 if contextual characters are present.

COMBINING_FLAG

This 1-bit flag shall indicate whether combining characters are used in the text as follows: 0 if combining characters are not present or 1 if combining characters are present.

4.1.3.3 DATA_PRBS Parameters

PATTERN

There are two PRBS test definitions in DRM specification (ETSI TS 102 349). Using this parameter, users could select SYNC or ASYNC PRBS test. Also fixed Patterns (all zero, all one and so on) are available.

4.1.3.4 DATA_PACKET Parameters

DATA_UNIT

This field indicates whether the data stream is composed of single packets or data units as follows: 0 for single packets or 1 for data units.

PACKET_ID

This two-bit field, coded as unsigned integer, indicates the Packet Id carried in the header of packets intended for this service. When FEC is added to a packet mode stream, packet Id = 3 is reserved for transporting error correction information for the whole packet mode data stream.

ENHANCEMENT FLAG

This field indicates whether enhancement data is available in another channel.

APPLICATION_DOMAIN

This field indicates the source of the data application specification. The interpretation of this field is given in ETSI TS 101 968.

4.1.4 FUNCTION

4.1.4.1 Parameters for Reconfiguration

MODE

RWC2010C can change protocol parameters without or according to the reconfiguration procedure. This parameter determines which method to use for changing the parameter.

EXECUTE

If you run this parameter after changing any reconfiguration-related parameters, the modified parameters will be applied to the reconfiguration procedure.

4.1.4.2 Parameters for Announcement

MODE

This parameter defines whether announcement information will be transmitted or not.

TARGET_SYSTEM

It denotes the target system when Announcement switching runs. The target system may be in an active state.

SOURCE_SERVICE

It denotes which service is related with Announcement signal. If set as ALL_SERVICE, all services will listen to the announcement signal.

TARGET_SERVICE

It denotes the target stream when Announcement switching runs. The target stream should be in an active state.

SWITCH_TRAVEL

When this parameter is set as ON, Travel Announcement switching is signaling in this service.

SWITCH_NEWS

When this parameter is set as ON, News Announcement switching is signaling in this service.

SWITCH_WEATHER

When this parameter is set as ON, Weather Announcement switching is signaling in this service.

SWITCH_WARNING

When this parameter is set as ON, Warning Announcement switching is signaling in this service.

SUPPORT_TRAVEL

When this parameter is set as ON, Travel Announcement switching is signaling in this service.

SUPPORT_NEWS

When this parameter is set as ON, News Announcement switching is signaling in this service.

SUPPORT_WEATHER

When this parameter is set as ON, Weather Announcement switching is signaling in this service.

SUPPORT_WARNING

When this parameter is set as ON, Warning Announcement switching is signaling in this service.

OTHER_FREQ

This parameter sets the frequency of other broadcast systems.

OTHER_SID

This parameter sets the SID of other broadcast systems.

REGION

Other broadcast systems can be restricted to certain geographic areas. The region definition feature allows the definition of geographic areas by longitude/latitude plus extent. When this parameter sets as NO_RESTRICTION, region related information will not be broadcasted. When this parameter sets as RESTRICTION, Region definition data will be broadcasted using SDC type 7. When this parameter sets as RESTRICTION_DETAIL, detailed region definition data will be broadcasted using SDC type 13.

LATITUDE

This parameter specifies the southerly point of the area in degrees, as 2’s complement number between -90 (south pole) and +90 (north pole).

LONGITUDE

This parameter specifies the westerly point of the area in degrees, as a 2's complement number between -180 (west) and +179 (east).

LATITUDE_EXT

This parameter specifies the size of the area to the north, in 1° steps; the value of Latitude plus the value of Latitude Extent shall be equal or less than 90.

LONGITUDE_EXT

This parameter specifies the size of the area to the east, in 1° steps; the value of Longitude plus the value of Longitude Extent may exceed the value +179.

SCHEDULE

Other broadcast systems can be restricted to certain times. The schedule definition feature is based on a weekly schedule. When this parameter sets as NO_RESTRICTION, schedule related information will not be broadcasted. When this parameter sets as RESTRICTION, schedule definition data will be broadcasted using SDC type 4.

START_TIME

This parameter indicates the time from when the frequency is valid. The time is expressed in minutes since midnight UTC. Valid values range from 0 to 1 439 (representing 00:00 to 23:59).

DURATION

This parameter indicates how long the frequency is valid starting from the indicated Start Time. The time is expressed in minutes. Valid values range from 1 to 16 383.

MONDAY

This parameter indicates whether the frequency schedule applies to Monday or not.

TUESDAY

This parameter indicates whether the frequency schedule applies to Tuesday or not.

WEDNESDAY

This parameter indicates whether the frequency schedule applies to Wednesday or not.

THURSDAY

This parameter indicates whether the frequency schedule applies to Thursday or not.

FRIDAY

This parameter indicates whether the frequency schedule applies to Friday or not.

SATURDAY

This parameter indicates whether the frequency schedule applies to Saturday or not.

SUNDAY

This parameter indicates whether the frequency schedule applies to Sunday or not.

4.1.4.3 Parameters for Alternative Frequency Test

NUM

The parameter determines how much alternative frequency information for other DRM or services which could have the same or similar as reference service. If it is set as 0, RWC2010C will not transmit AF information.

SYNC_MUX

This parameter indicates whether the AF multiplexer is broadcast synchronously or not.

SAME_SERVICE

This parameter indicates whether the specified other service should be considered the "same service" (e.g. carrying the identical audio program) or an "alternative service" (e.g. a different audio programme either from the same broadcaster offering a similar programme or from another broadcaster.

OTHER_SID

This parameter sets the SID of other broadcast systems.

OTHER_FREQ

This parameter sets the frequency of other broadcast systems.

TUNED_SVC

This parameter indicates the reference service for alternative frequency information.

REGION

Other broadcast systems can be restricted to certain geographic areas. The region definition feature allows the definition of geographic areas by longitude/latitude plus extent. When this parameter sets as NO_RESTRICTION, region related information will not be broadcasted. When this parameter sets as RESTRICTION, Region definition data will be broadcasted using SDC type 7. When this parameter sets as RESTRICTION_DETAIL, detailed region definition data will be broadcasted using SDC type 13.

LATITUDE

This parameter specifies the southerly point of the area in degrees, as 2’s complement number between -90 (south pole) and +90 (north pole).

LONGITUDE

This parameter specifies the westerly point of the area in degrees, as a 2's complement number between -180 (west) and +179 (east).

LATITUDE_EXT

This parameter specifies the size of the area to the north, in 1° steps; the value of Latitude plus the value of Latitude Extent shall be equal or less than 90.

LONGITUDE_EXT

This parameter specifies the size of the area to the east, in 1° steps; the value of Longitude plus the value of Longitude Extent may exceed the value +179.

SCHEDULE

Other broadcast systems can be restricted to certain times. The schedule definition feature is based on a weekly schedule. When this parameter sets as NO_RESTRICTION,

schedule related information will not be broadcasted. When this parameter sets as RESTRICTION, schedule definition data will be broadcasted using SDC type 4.

START_TIME

This parameter indicates the time from when the frequency is valid. The time is expressed in minutes since midnight UTC. Valid values range from 0 to 1 439 (representing 00:00 to 23:59).

DURATION

This parameter indicates how long the frequency is valid starting from the indicated Start Time. The time is expressed in minutes. Valid values range from 1 to 16 383.

MONDAY

This parameter indicates whether the frequency schedule applies to Monday or not.

TUESDAY

This parameter indicates whether the frequency schedule applies to Tuesday or not.

WEDNESDAY

This parameter indicates whether the frequency schedule applies to Wednesday or not.

THURSDAY

This parameter indicates whether the frequency schedule applies to Thursday or not.

FRIDAY

This parameter indicates whether the frequency schedule applies to Friday or not.

SATURDAY

This parameter indicates whether the frequency schedule applies to Saturday or not.

SUNDAY

This parameter indicates whether the frequency schedule applies to Sunday or not.

4.1.4.4 Parameters for TIME

TIME

TIME information will be sent when this parameter is set to ON.

YEAR, MONTH, DAY, HOUR, MINUTE, LTO

To set up the current time.As time goes on, internal time related parameters are updated automatically but not refreshed on the screen. To refresh these parameters, go to another screen and return to this screen again.

4.2 Editing DRM Multiplexer Structure

RWC2010C supports 4 Services and 4 Streams to consist of Multiplexer. Go to 'INFO' screen to see the current Multiplexer structure graphically. In this example, there is a very simple Multiplexer which consists of one Service (SERVICE_0) and one Stream (STREAM_0). At the bottom of the screen, there are bars which show the occupied frame rate. Occupation Rate should be less than 100%, so be careful when you add components in the Multiplexer. If the Occupation Rate is more than 100%, it shows a warning message on the screen.

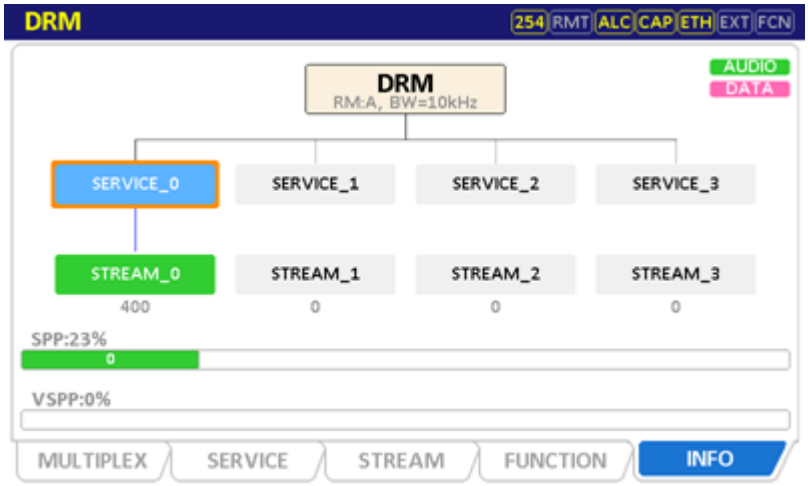


Fig. INFO screen to show Multiplexer structure

4.2.1 Adding/Removing Service to the Multiplexer

To add a new Service to the Multiplexer, go to the 'DRM/MULTIPLEX' screen and place the cursor on the SERVICE parameter which you want to add., and press the ENTER key to turn it on. The following figure shows when the SERVICE_1 is added to the Multiplexer.

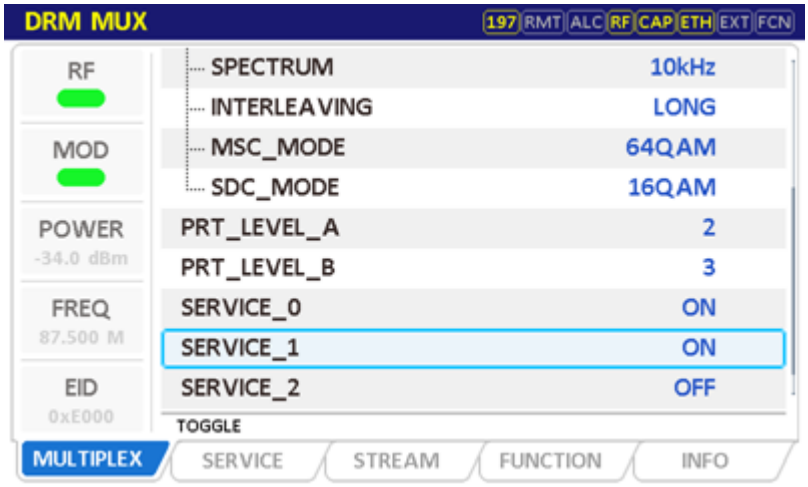


Fig. The screen of adding SERVICE to the Multiplexer

After adding Services, go to the 'INFO' Screen to check the modified Multiplexer structure. Using the same method, you can add or delete Services.

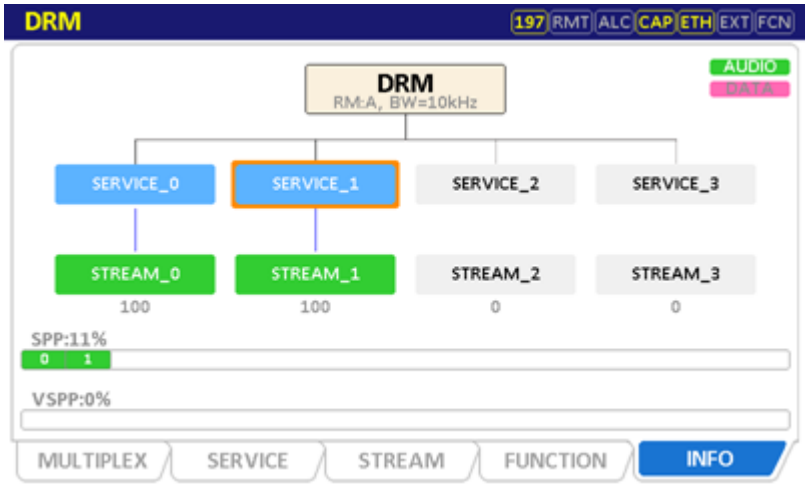


Fig. Screen of Multiplexer structure after adding service

There is another way to add or delete SERVICE. On the INFO screen, please move the cursor to the SERVICE which you want to add or delete using the rotary knob and press **ENTER key**.

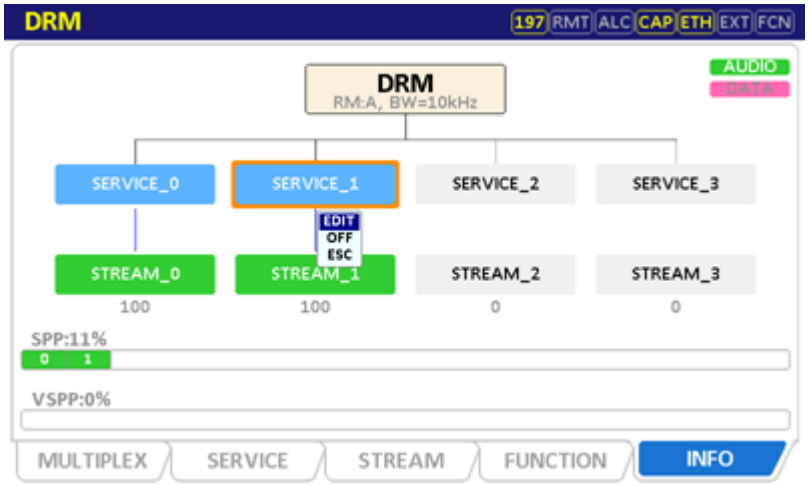


Fig. Screen of Editing Multiplexer structure

4.2.2 Adding/Removing Stream to the Service

Each Service could be connected to multiple Streams. To add one more Stream to the Service, go to the 'DRM/SERVICE' screen and place the cursor on the LINK_1 parameter and set it to any

stream which users want to add to this service. The following figure shows when the STREAM_1 is added to the SERVICE_0

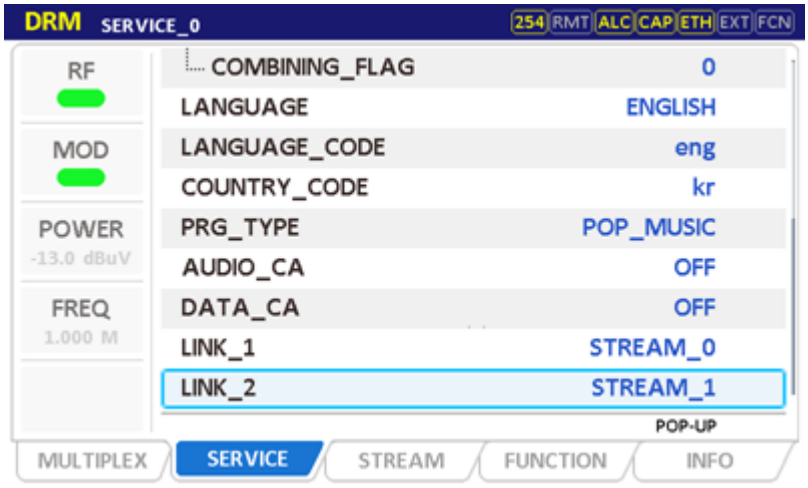


Fig. Screen of Editing Multiplexer structure

After adding Stream, go to the 'INFO' Screen to check the modified Multiplexer structure.

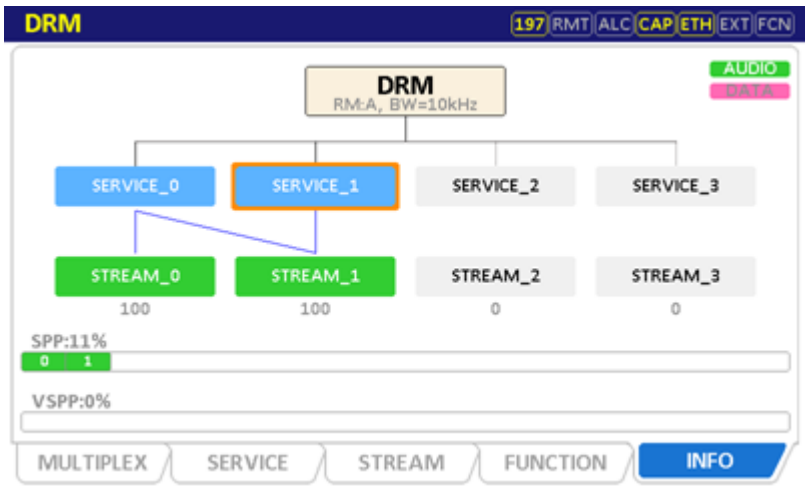


Fig. Screen of Multiplexer structure after adding service

4.3 Stream Type

4.3.1 DRM Audio Test

This section describes the method of setting the Stream as DRM Audio mode.
Go to the 'DRM/STREAM' screen. The first parameter on this screen is "NUMBER" which determines which component to modify. STREAM type is configured by the "TYPE" parameter.

RWC2010C supports three types of stream like AUDIO, DATA_PRBS and DATA_PACKET. By setting the TYPE as AUDIO, the stream is configured as the AUDIO and some parameters are automatically set for AUDIO mode. There is the "CONTENTS" parameter for selecting DRM audio contents downloaded in the memory. By selecting the desired file to transmit, RWC2010C will decode the file and set the audio related parameters automatically. The orange color bar below the CONTENTS parameter shows the status of file transmitting.

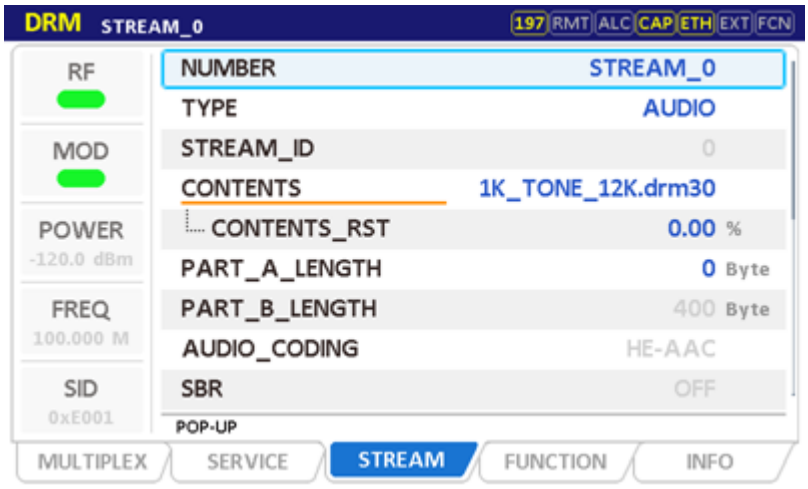


Fig. The screen of Stream Component

Basic setting for DRM audio broadcasting is completed. If required, modify other protocol related parameters and test them for your purpose.

4.3.2 DRM Packet Data Test

This section describes the method of setting the Stream as DRM PACKET Data mode.
Go to the 'DRM/STREAM' screen. The first parameter on this screen is "NUMBER" which determines which component to modify. STREAM type is configured by the "TYPE" parameter. RWC2010C supports three types of service like AUDIO, DATA_PRBS, DATA_PACKET. By setting the TYPE as DATA_PACKET, the stream is configured as a Data channel automatically. Select the proper content file for SLS DATA Packet test.

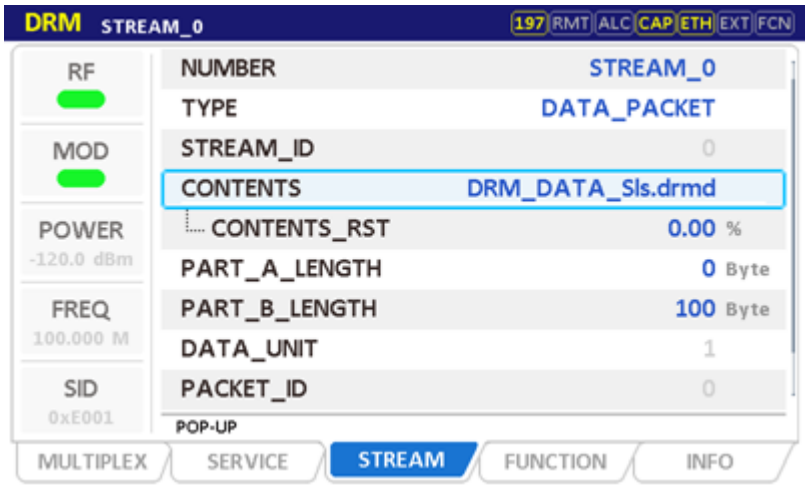


Fig. The screen of Stream Component

4.3.3 DRM PRBS Data Test

This section describes the method of setting the Stream as DRM PRBS Data mode.
Go to the ‘DRM/STREAM’ screen. The first parameter on this screen is "NUMBER" which determines which component to modify. STREAM type is configured by the "TYPE” parameter. RWC2010C supports three types of stream like AUDIO, DATA_PRBS, DATA_PACKET. By setting the TYPE as DATA_PRBS, the stream is configured as the pattern data according to the setting of the PATTERN parameter and some parameters are automatically set for DATA mode. RWC2010C can transmit PRBS test pattern data according to the specification of ETSI TS 102 349. Using this mode, a BER test could be performed.

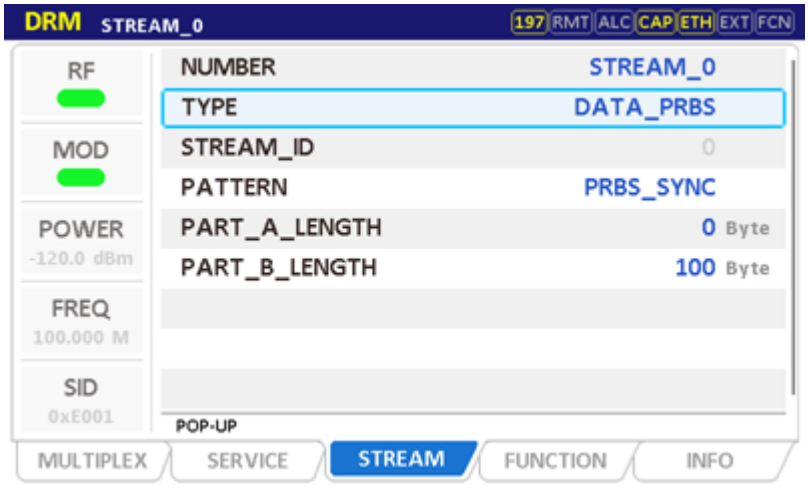


Fig. The screen of Stream Component

4.4 Functional Test

4.4.1 Announcement Test

Announcement is a function for a compulsory situation or automatic service switching functions. For example, if there is an emergency situation, then an announcement function is activated. This function changes the channel for every listener so that they can hear the emergency message or announcement. Alternatively, it can also be used by the user to set the channel to change to a specific program at a specific time.
To test the Announcement function, go to the ‘DRM/FUNCTION’ screen and set up the "TEST_ITEM” as ANNOUNCEMENT. The Announcement test screen will be displayed as follows. There are four support flags (TRAVEL, NEWS, WEATHER, WARNING) to indicate whether these are supported in this service or not. Please set some of these parameters as ON. To start Switching Announcement signals, set switch flags (TRAVEL, NEWS, WEATHER, WARNING) as ON. Target service systems could be various kinds of broadcasting systems like the same DRM Multiplexer, other DRM Multiplexer, AM, FM_RDS or DAB.

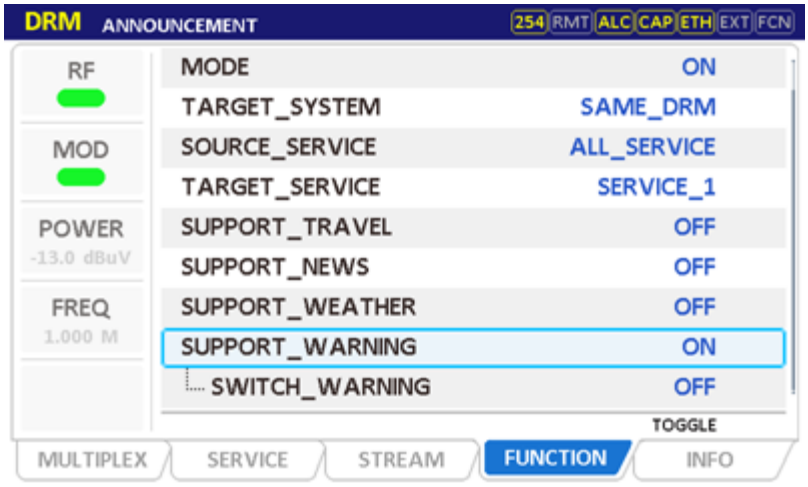


Fig. DRM menu screen for announcement test

This Announcement signal could be assigned to each one service or all services by the "SOURCE_SERVICE” parameter. To use the same DRM Multiplexer, target service should be turned on. For example,turn on two DRM services like the following figures. Please tune the DUT (Radio) on Service_0 and set the TARGET_SHORT_ID as 1. And set the START parameter as ON. Then the DUT should change the service from SERVICE_0 to SERVICE_1.
To use other systems, set the TARGET_SYSTEM parameter as the system which the user wants to use. In this case, one more RWC2010C or other system emulator is required.

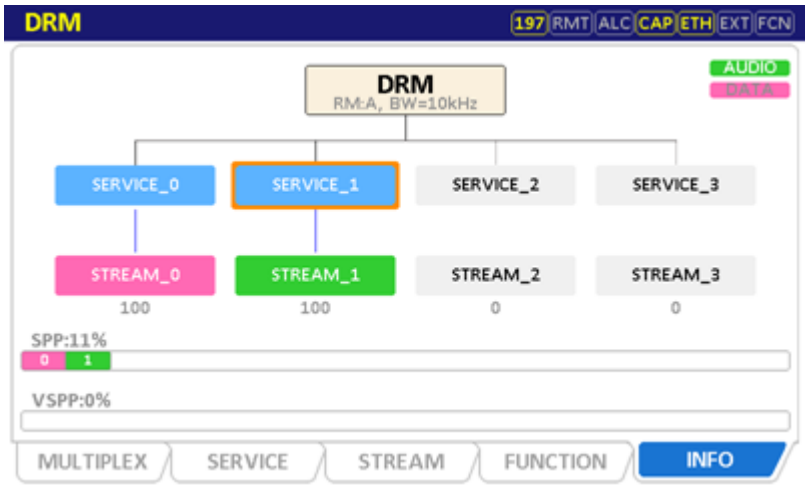


Fig. DRM INFO screen for announcement test

4.4.2 Reconfiguration Test

The ensemble information provides the required mechanisms for changing the multiplexer configuration whilst maintaining continuity of services. The multiplexer may be reconfigured at transmission super frame boundaries. A reconfiguration of the multiplexer occurs when the channel parameters in the FAC are changed, or when the services in the multiplexer are reorganized. The new configuration is signaled ahead of time in the SDC and the timing is indicated by the reconfiguration index in the FAC.

To test the reconfiguration function with the RWC2010C, two steps are required. First of all, current ensemble configuration should be done with the same method explained in the preceding sections. Then go to the ‘DRM/FUNCTION’ screen and set the "TEST_ITEM parameter as RECONFIGURATION and” set the "MODE” parameter as ON.

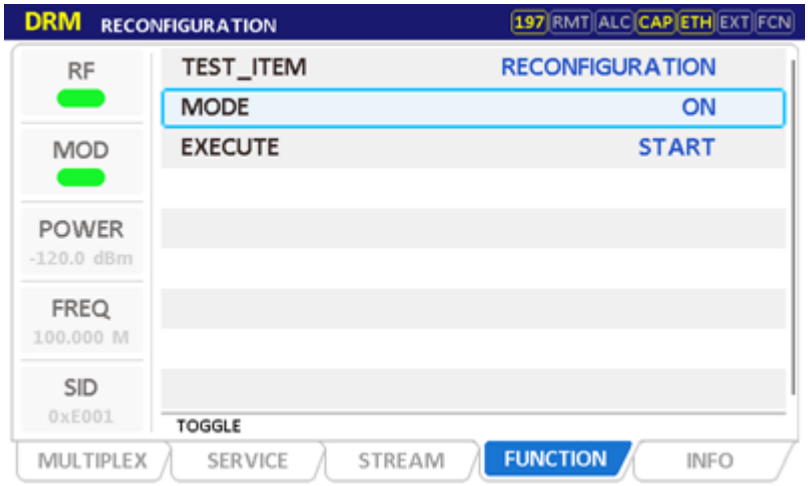


Fig. DRM menu screen for Reconfiguration setting

After that, go to the MULTIPLEX or SERVICE screen. You will see the color of some parameters is in green. Those parameters are reconfiguration related parameters. So modify some of those parameters if you want to change the multiplexer configuration in future. You will see that the color of modified parameters is in Red. Following 2 figures show the screens before modifying parameters and after modifying parameters.

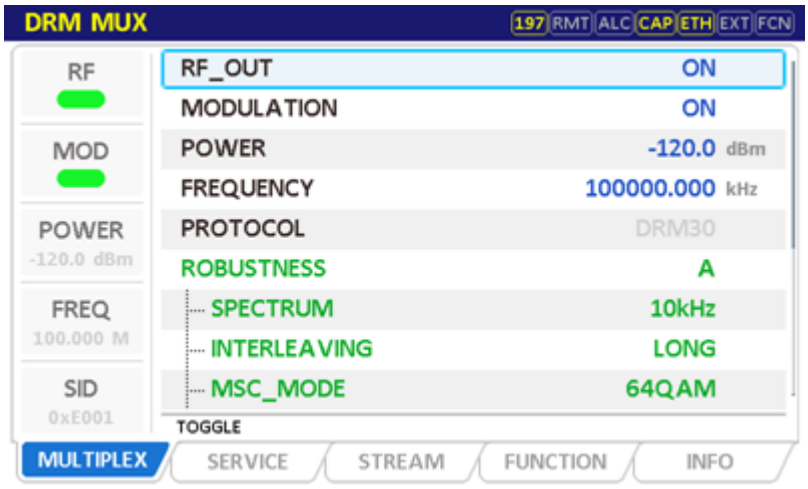


Fig. DRM MULTIPLEX screen (before modifying reconfiguration parameters)

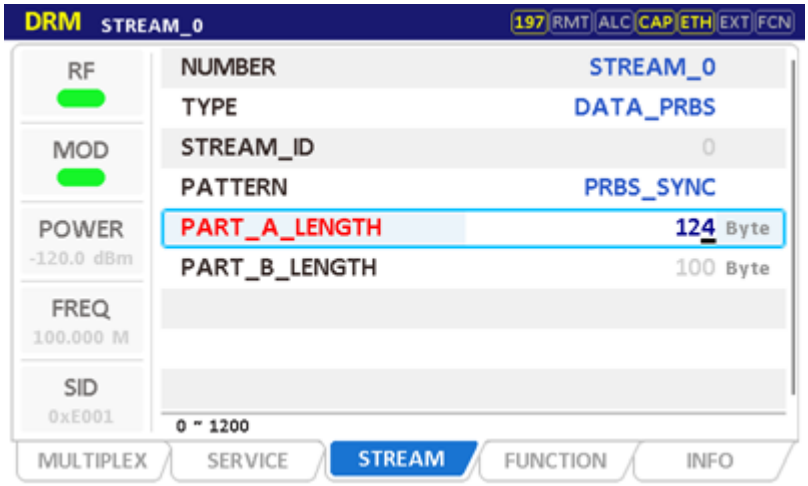


Fig. DRM MULTIPLEX screen (after modifying reconfiguration parameters)

Please keep in mind that the modified red color parameters are not applied to the broadcasting Multiplexer. To apply them to the broadcasting Multiplexer with proper reconfiguration procedures, go to the ‘DRM/FUNCTION’ screen again. And move the parameter cursor on the "EXECUTE” parameter and push the ENTER key to start it. It takes about 5 seconds to finish the reconfiguration procedures. You will see an orange color bar below the "EXECUTE” parameter

which shows the status of reconfiguration. During these procedures, the DUT should maintain continuity of service decoding.
After checking the reconfiguration operation, click the "EXECUTE" parameter again to terminate the RECONFIGURATION test.

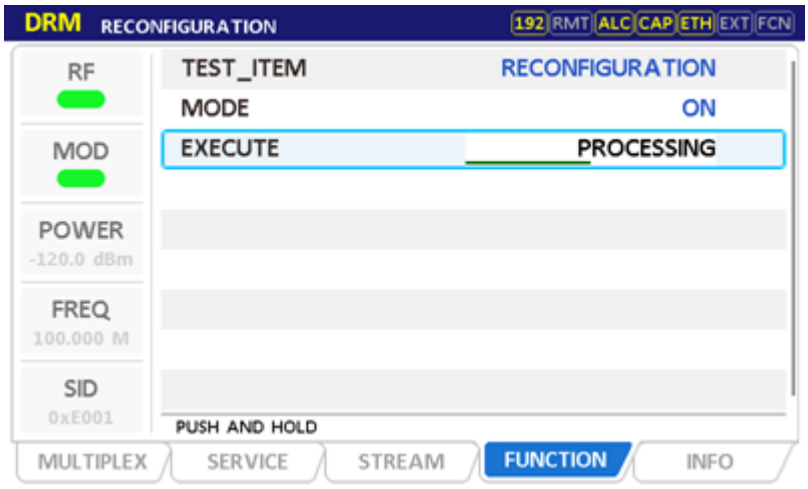


Fig. The screen during the Reconfiguration is running

4.4.3 Alternative Frequency Test

Alternative frequency (AF) is an option that allows a receiver to re-turn to a different frequency that provides the same station or related, when the first signal becomes too weak. The DRM system can signal alternative frequencies for the whole DRM multiplexer or some DRM services of the tuned DRM multiplexer to allow the receiver to counter reception problems by automatically and quickly switching to an alternative frequency providing better reception conditions.

To test the alternative frequency function, go to the 'DRM/FUNCTION' screen and set up the "TEST_ITEM" as ALTERNATIVE_FREQ. The alternative frequency test screen will be displayed as follows. RWC2010C signals alternative frequency information according to the setting of AF parameters.

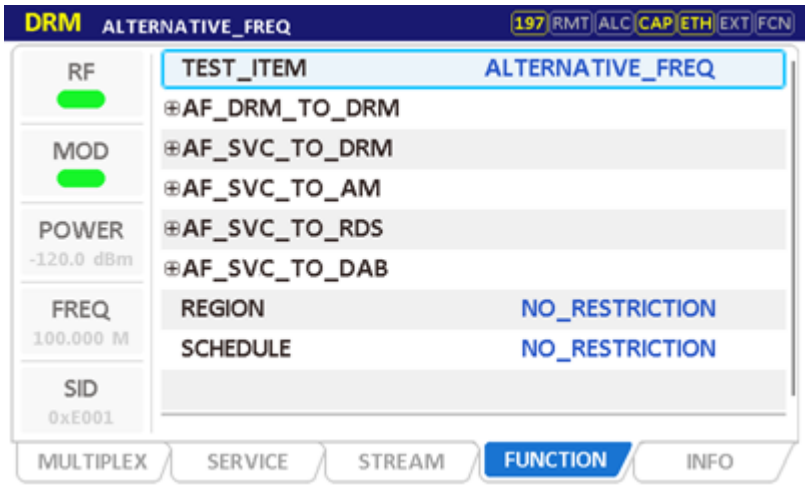


Fig. The screen for alternative frequency test

4.4.3.1 DRM to DRM AF Setting

The service provider may signal a list of geographically adjacent alternative DRM multiplexer. The frequency of other DRM multiplexer is editable on GUI.

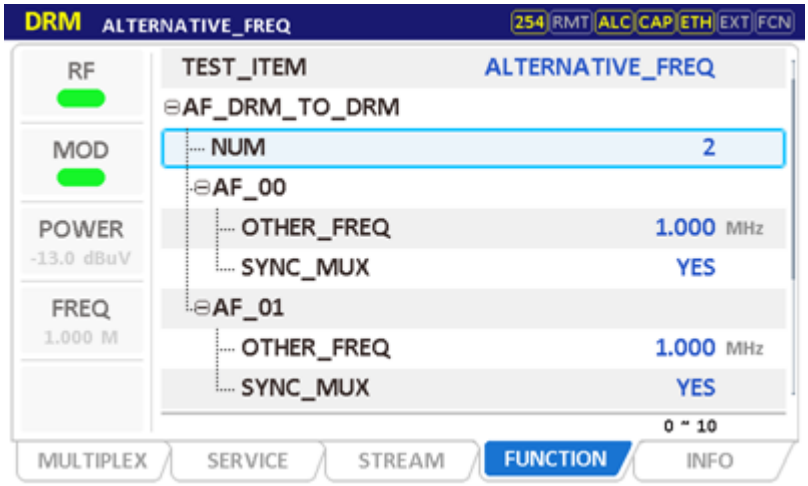


Fig. The screen for DRM to DRM AF setting

4.4.3.2 Service to DRM AF Setting

Although not identical to the current multiplexer, if there is the same service or related to the current program, the service provider may provide the frequency, and SID of the specific service in the other multiplexer so that the target service can be found easier.

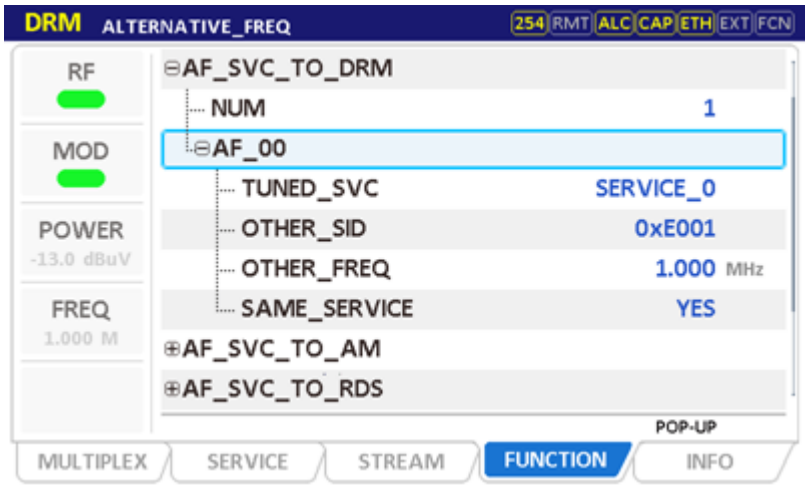


Fig. The screen for Service to DRM AF setting

4.4.3.3 Service to FM-RDS AF Setting

If there is the same program or related to the current program in FM RDS, the service provider may provide the SID and frequency of FM RDS.

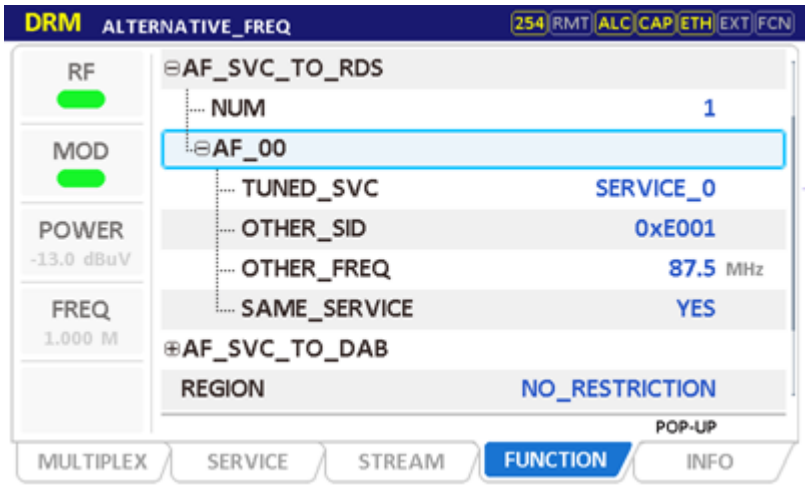


Fig. The screen for Service to FM-RDS AF setting

4.4.3.4 Service to AM AF Setting

If there is the same program or related to the current program in AM, the service provider may provide the frequency of AM.

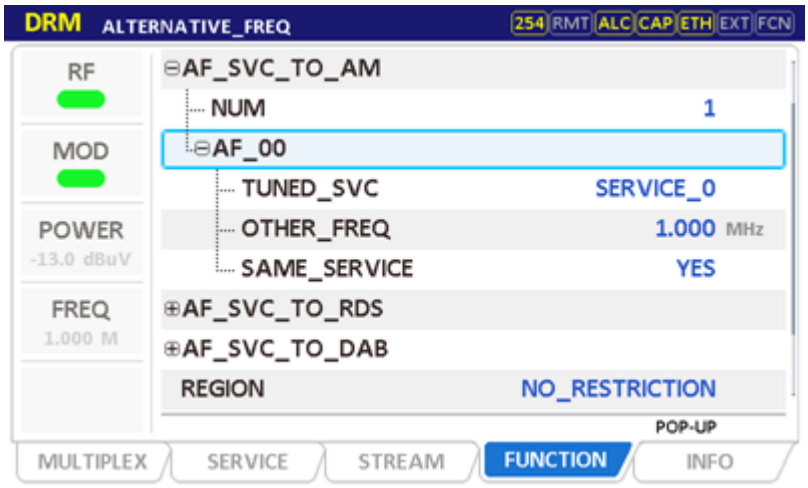


Fig. The screen for Service to AM AF setting

4.4.3.5 Service to DRM AF Setting

If there is the same program or related to the current program in DAB, the service provider may provide the SID and frequency of DAB.

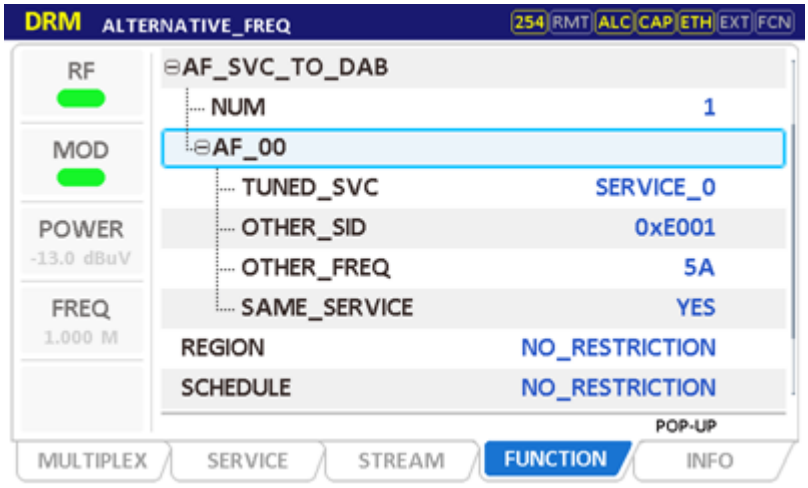


Fig. The screen for Service to DRM AF setting

4.4.3.6 AF Restriction

If there are regional restrictions and/or time restrictions of AF, the service provider may notify. Users can edit these restrictions as follows using RWC2010C:

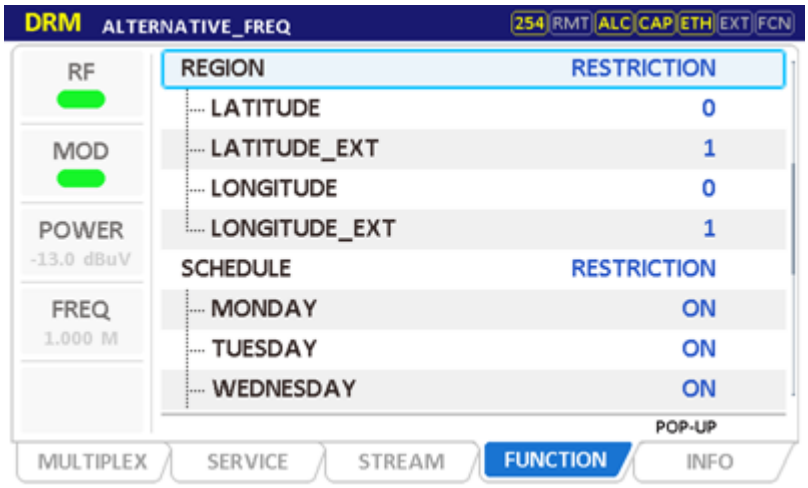


Fig. The screen for the restriction of region and schedule

4.4.4 Time Information

DRM specification supports transmitting time information. The RWC2010C transmits time information as follows.

To set up the current time, go to the 'DRM/FUNCTION' screen and set up the "TEST_ITEM" as TIME and "TIME" as ON. And set up "YEAR", "MONTH", "DAY", "HOUR", "MINUTE", "LTO" parameters. As time goes on, internal time related parameters are updated automatically but not refreshed on the screen. To refresh these parameters, go to another screen and return to this screen again.

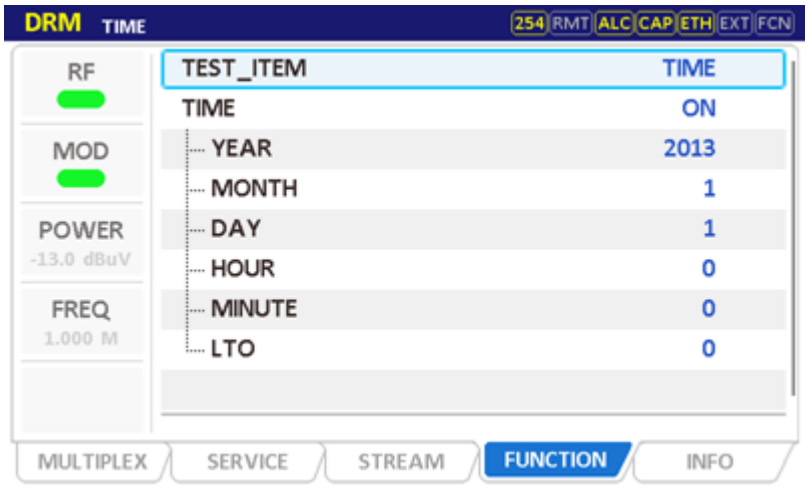


Fig. DRM menu screen for time information

5 ETI/MDI Operation

This section describes the test method using ETI file for DAB, MDI file for DRM or IQ file for DRM30. Understanding the basic concepts of your RWC2010C helps you use it effectively.

5.1 ETI File Transmission
5.2 MDI File Transmission
5.3 IQ File Transmission

5.1 ETI File Transmission

5.1.1 ETI Configuration

ETI stands for Ensemble Transport Interface. Using this function, the user can generate almost the same as a real Ensemble signal in the Lab. RWC2010C supports ETI(NI, G703).
To play ETI files, set the test mode as ETI/MDI using the MENU key and go to the ETI Configure screen, and set the "MODE" parameter as ETI. Select desired ETI content file using the "CONTENTS" parameter. This screen contains only RF-related parameters as all protocol-related parameters are defined in the ETI file. So, you just need to set the RF frequency and power for the ETI transmission and select the desired ETI file for testing.

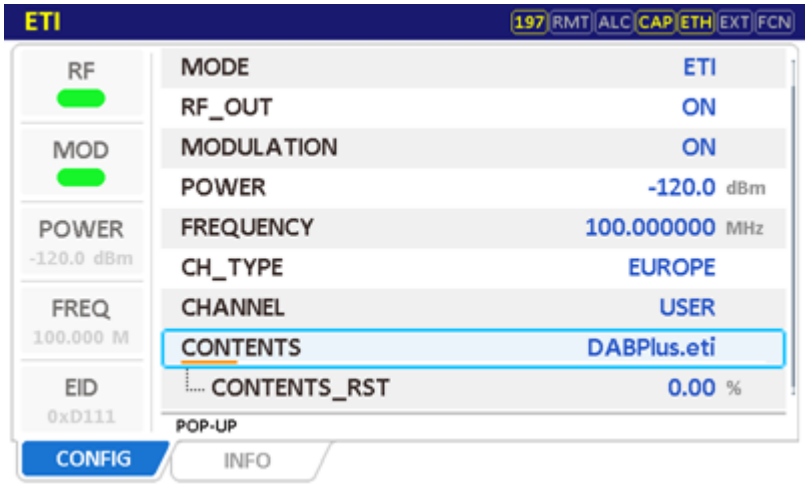


Fig. ETI Setup Screen

5.1.2 ETI File Information

While the ETI is transmitting, you can check the file information and status such as TX Mode, Ensemble ID, Label, etc… To see the ETI file information, go to the 'ETI/INFO' screen by pressing the **[INFO]** tab.

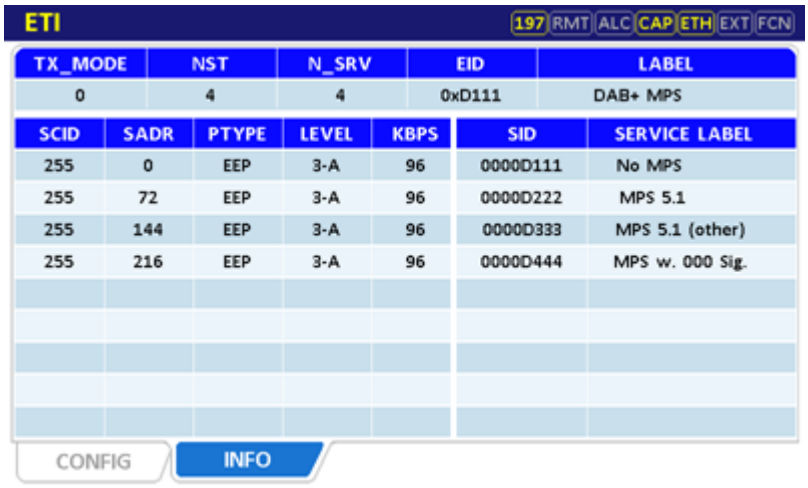


Fig. ETI INFO Screen

5.1.3 Parameters

POWER

RF output power for ETI Player. Users can use the UNIT key to select power units in dBm or dBuV.

FREQUENCY

RF output frequency for DAB Ensemble. Users can use the UNIT key to select power units in MHz, kHz or Hz.

CH_TYPE

There are predefined channel tables for Europe and Korea. The user can use this parameter to select one of them.

CHANNEL

The frequency can be set to one of the predefined table values using this parameter. If the user sets the frequency variable, this parameter will display the channel number value if there is a matching value in the table, otherwise, it will be 'USER'.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

TII

TII signal is transmitted instead of every second NULL signal when this parameter is set to ON.

SUB_ID, MAIN_ID

These parameters set up a Transmitter ID.

5.2 MDI File Transmission

Using this function, the user can generate almost the same as a real DRM signal in the Lab.

5.2.1 MDI Configuration

To play MDI files, set the test mode as ETI/MDI using the MENU key and go to the ETI Configure screen, and set the "MODE" parameter as MDI. Select desired MDI content file using the "CONTENTS" parameter. This screen contains only RF-related parameters as all protocol-related parameters are defined in the MDI file. So, you just need to set the RF frequency and power for the MDI transmission and select the desired MDI file for testing.

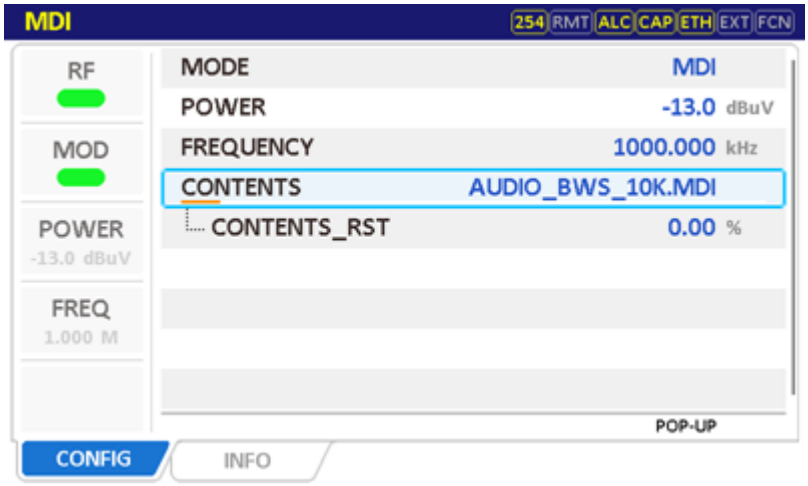


Fig. MDI Setup Screen

5.2.2 MDI File Information

While the MDI is transmitting, you can check the file information and status such as Robustness Mode, Spectrum BW, Label, etc… To see the MDI file information, go to the 'MDI/INFO' screen by touching the **[INFO]** tab area.

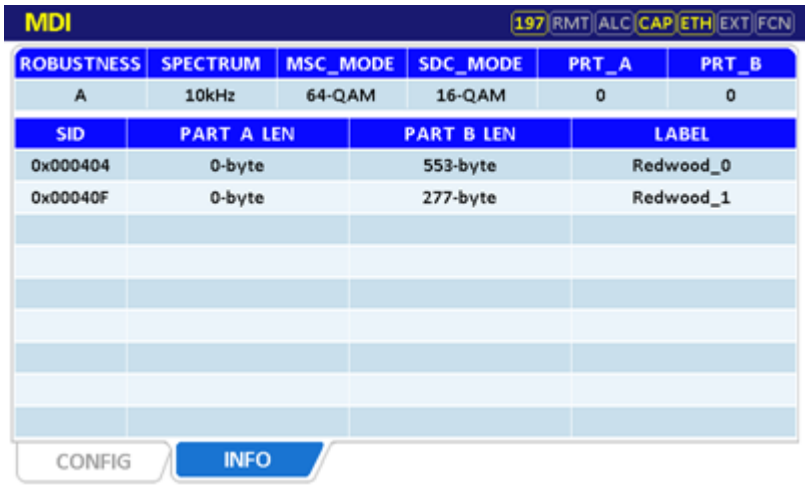


Fig. MDI INFO Screen

5.2.3 Parameters

POWER

RF output power for MDI Player. Users can use the UNIT key to select power units in dBm or dBuV.

FREQUENCY

RF output frequency for MDI Player. Users can use the UNIT key to select power units in MHz, kHz or Hz.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

AF_CRC_CHECK

This parameter determines whether to check AF CRC or not when transmitting MDI file.

5.3 IQ File Transmission

Using this function, users can play IQ files to generate DRM30 signals. RWC2010C supports 48kHz, 192kHz and 250kHz sampling rate IQ files.

5.3.1 Configuration

To play IQ files, set the test mode as ETI/MDI using the MENU key and go to the ETI/MDI Configure screen, and set the "MODE" parameter as DRM_IQ. Then IQ file playing is started automatically. Select desired IQ content file using the "CONTENTS" parameter.

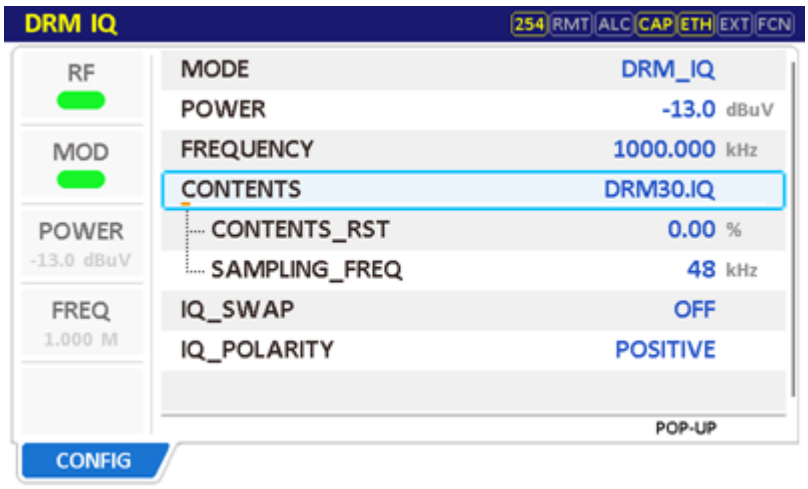


Fig. DRM IQ Setup Screen

5.3.2 Parameters

POWER

RF output power for ETI Player. Users can use the UNIT key to select power units in dBm or dBuV.

FREQUENCY

RF output frequency for IQ Player. Users can use the UNIT key to select power units in MHz, kHz or Hz.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

SAMPLING_FREQ

This parameter indicates the sampling frequency of the IQ file.

IQ_SWAP

This parameter determines whether the I and Q are swapped.

IQ_POLARITY

This parameter determines whether the polarity of I and Q data.

6 Analog Transmitter Operation

This section describes the test method for FM, AM and RDS. Understanding the basic concepts of your RWC2010C helps you use it effectively.

6.1 Analog Transmitter Menu Structure
6.2 FM Tests
6.2 AM Tests

6.1 Analog Transmitter Menu Structure

RWC2010C provides Analog mode for FM/AM test purposes. Analog FM mode supports MONO FM test function, Stereo FM test function, Sweep FM test function and wave file player function. RWC2010C supports up to 3 multi-channel FM test functions. Each FM analog signal could have an independent RDS(Radio Data System) data channel.

6.1.1 Multi-channel FM RDS Tests

Using the RWC2010C, up to 3 FM channels could be transmitted simultaneously. The Frequency of each FM channel could be set independently, but the output power of each FM channel can not be set independently. All FM channels could have the same output power. From Channel 1 to Channel 3 frequencies could be set between CH0_FREQ – 3MHz and CH0_FREQ + 3MHz. Each FM_RDS channel parameter screen can be selected by the Submenu key. To configure FM_RDS_0 channel parameters, please go to FM_RDS_0 screen as follows.

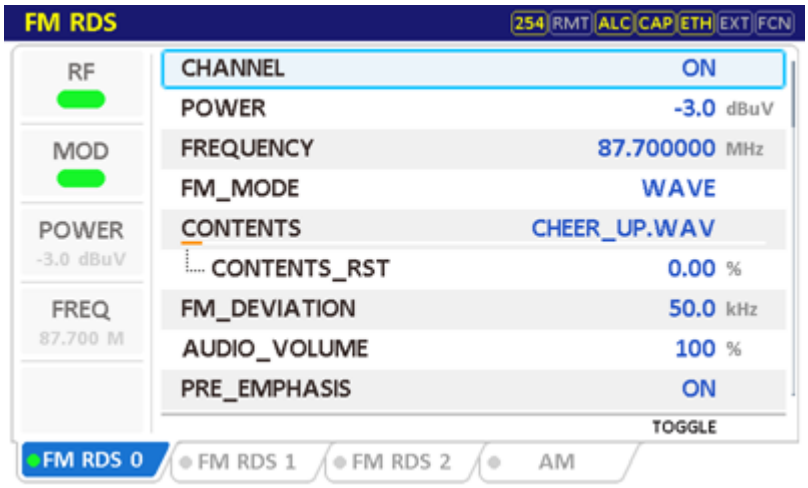


Fig. Multi channel FM test screen

To configure FM_RDS_1 channel parameters, please go to FM_RDS_1 screen as follows.

Each FM_RDS screen, there is CHANNEL parameter to turn-on or turn-off the channel independently and FREQUENCY parameter to configure the frequency independently.

6.1.2 FM Parameters

CHANNEL

RWC2010C can transmit up to 3 FM channels simultaneously. This parameter is for turning each FM signal on and off independently.

POWER

RF output power for FM RDS signal. Users can use the UNIT key to select power units in dBm or dBuV.

FREQUENCY

RF output frequency for FM RDS signal.

FM_MODE

RWC2010C supports various FM sound sources such as MONO, STEREO, WAVE, SWEEP, and EXT_IN.

AUDIO_FREQ

Audio frequency for mono FM modulation.

STEREO_MODE

FM stereo modulation can transmit left audio and right audio separately. This parameter determines left audio only, right audio only, or both for FM stereo modulation.

AUDIO_FREQ_R

Right Audio frequency for stereo FM modulation.

AUDIO_FREQ_L

Left Audio frequency for stereo FM modulation.

SWEEP_START

Start frequency for audio sweep.

SWEEP_STOP

Stop frequency for audio sweep.

SWEEP_TIME

Sweep time for audio sweep.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

WAVE_FS

Shows the sampling frequency information of the wave file being transmitted.

WAVE_CH

Shows the number channel information of the wave file being transmitted.

WAVE_BITS

Shows the number of bits of information per sample in the wave file being transmitted.

AUDIO_IN_GAIN

When FM mode is set to EXT IN mode, audio signals input to the audio input port are transmitted in real time through FM modulation. Users can use this parameter to adjust the input audio signal to an appropriate level.

AUDIO_IN_LEVEL

This parameter displays the level of the audio signal being input in real time in EXT IN mode. Adjust AUDIO_IN_GAIN so that this parameter value is at a medium , or adjust the level of the input audio signal itself.

FM_DEVIATION

This parameter sets the deviation for the FM modulation.(Unit: kHz)

PRE_EMPHASIS

This parameter determines whether the signal-to-noise improvement of the high-frequency portion of the baseband.

TIME_CONSTANT

This parameter determines the time constant for pre-emphasis.(Unit: us)

PILOT_LEVEL

Adjusts the output level of the 19kHz pilot tone, which is used for stereo signal synchronization. Proper adjustment ensures stable RDS signal detection.(Unit: % or kHz)

RDS_LEVEL

Controls the output level of the 57kHz RDS signal. Setting this appropriately prevents interference with the main audio while maintaining reliable RDS reception.(Unit: % or kHz)

RDS_PHASE

Adjusts the phase of the 57kHz RDS signal relative to the 19kHz pilot tone. Correct phase alignment ensures proper RDS data decoding.(Unit: degree)

RDS MODE

RWC2010C can transmit analog FM stereo signal with or without RDS by setting this parameter ON/OFF. RWC2010C also supports the playback of pre-recorded RDS files.

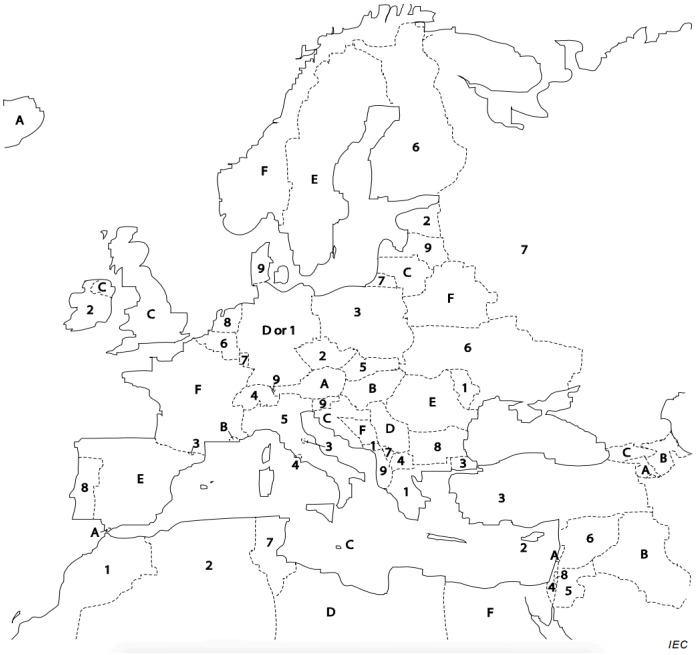
PID

This parameter is the Physical ID of Program. The Program is recognized by this value in DUTs. PID contains Country and Area code values as follows.

b15 b12	b11 b8	b7 b0
Country code	Area code	Programme reference number

COUNTRY

The following figure shows an example of the correspondence between the geographic locations and symbols used for various countries within the European Broadcasting Area, and the PI country codes used within the European Broadcasting Area.



AREA_CODE

This parameter represents the terms of area coverage. The area coverage codes and definitions are as follows:

Area coverage code	L	I	N	S	R1	R2	R3	R4	$5	R6	R7	R8	R9	R10	R11	R12
HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

I: (International)	The same programme is also transmitted in other countries.
N: (National)	The same programme is transmitted throughout the country.
S: (Supra-regional)	The same programme is transmitted throughout a large part of the

	country.
R1 . . . R12: (Regional)	The programme is available only in one location or region over one or more frequencies, and there exists no definition of its frontiers.
L: (Local)	Local programme transmitted via a single transmitter only during the whole transmitting time.

ECC

Extended Country Code defined in TS 101 756.

PS_NAME

This parameter stands for the name of Program. The maximum length of the string is 8.

MUSIC_SPEECH

This parameter sets the type of program as Music or Speech.

TMC

This parameter sets the On/Off of the Traffic Message Channel. TMC is intended to be used for the coded transmission of traffic information.

TMC_LTN (Location Table Number)

This specifies which location table is being used for a particular TPEG service. Location tables contain pre-defined geographical points, lines, or areas, allowing for efficient coding of locations rather than transmitting precise coordinates every time.

TMC_MGS_AFI (Message Group Structure - Application Family Identifier)

TPEG messages are organized into "Application Families" (e.g., TPEG-PTI for Public Transport Information, TPEG-TEC for Traffic Event Compact). The AFI identifies which specific application family the message belongs to.

TMC_MGS_MODE (Message Group Structure - Mode)

This indicates the mode or type of data being transmitted within a TPEG message. For example, it might specify if it's a "live" update, a "prediction," or an "historical" record.

TMC_MGS_I (Message Group Structure - Item)

Refers to a specific item or element within a TPEG message group. This helps in pinpointing a particular piece of information within a structured message.

TMC_MGS_N (Message Group Structure - Nature)

Describes the nature or category of an event or message. For instance, in traffic, it could categorize an event as an "accident," "roadworks," or "congestion."

TMC_MGS_R (Message Group Structure - Reliability)

Indicates the reliability or confidence level of the information being provided. This helps users assess how accurate or current the data is.

TMC_MGS_U (Message Group Structure - Urgency)

Specifies the urgency or severity of the information. For traffic, it might indicate if an event requires immediate attention (e.g., major blockage) versus a minor disruption.

TMC_GROUP

In TPEG, GROUP often refers to a collection of related events or locations. This allows for more efficient transmission by grouping similar information together.

TMC_DIVERSION

This is a common TPEG event type, indicating a recommended alternative route due to an incident or road closure.

TMC_DIRECTION

Specifies the direction of travel to which an event or information applies (e.g., northbound, southbound, or specific cardinal directions). This is crucial for precise traffic reporting.

TMC_LOCATION

This refers to the geographical point, line, or area where an event is occurring or to which information pertains. TPEG uses various methods for location coding, often referencing location tables.

TMC_EVENT

This describes the type of incident or circumstance affecting travel. Common TPEG event types include accidents, roadworks, congestion, bad weather, or vehicle breakdowns.

TMC_EXTENT

Defines the length or spatial coverage of an event. For example, it might indicate that congestion extends for "2 kilometers" or that roadworks cover a specific "section of road."

TP

This is a flag to indicate that the tuned program carries traffic announcements. The TP flag must only be set on programs which dynamically switch on the TA identification during traffic announcements. The signal shall be taken into account during automatic search tuning.

TA

This is an on/off switching signal to indicate when a traffic announcement is on air.

EON

EON stands for Enhanced Other Networks information. This parameter sets On/Off of EON.

EON_CH

RWC2010C can broadcast up to 3 independent FM RDS channels. Using this parameter, other channels are selected to transmit the information of those channels.

EON_PID

Displays the PID values of other FM channels selected with the EON_CH parameter.

EON_PS_NAME

Displays the PS NAME of other FM channels selected with the EON_CH parameter.

EON_AF

Displays the frequency of other FM channels selected with the EON_CH parameter.

EON_TP

Displays the TP values of other FM channels selected with the EON_CH parameter.

EON_TA

Displays the TA values of other FM channels selected with the EON_CH parameter.

EON_SWITCH

This parameter is for transmitting a switching signal from the turned channel to other informed channel by setting it as ON. If this parameter is set as OFF, RWC2010C transmits a stop switching signal to return to the turned channel.

EON_PTY

This parameter indicates the Programme Type of the EON channel, and there are four types defined: Default, News, Weather, and Alarm.

RADIO_TEXT

RADIO_TEXT stands for text string Service. The maximum length of the TEXT string is 64. The editing method is the same as the LABEL editing method.

HEADLINE_MODE

This parameter indicates whether the Headline is added to the Radio Text.

HEADLINE

It can be set as the Headline part of the beginning of a Radio Text sentence. This parameter stands for Headline sentence.

RADIO_TEXT_MODE

RADIO TEXT could be turned off or turned on the RADIO TEXT as NORMA, RT+, eRT(Enhanced Radio Text), and eRT+ mode by this parameter.

ENCODING_FLAG

This parameter sets the character encoding method.

TEXT_DIRECTION

This parameter indicates the text direction (LTR or RTL) of Enhanced Radio Text.

RADIO_TEXT_CH

RADIO TEXT could be broadcasted through one of 2A or 2B channels. Using this parameter, users can select a radio text channel.

TAG_TYPE, TAG_START, TAG_LENGTH

When the "RADIO_TEXT_MODE" is set as RT+, these parameters are displayed on the screen. Tag information could specify some sentences for special purposes like music titles. Please refer to the specification for more detailed information.

PRG_TYPE_MODE

RDS and RBDS have different tables of program type. For Europe broadcasting, please set this parameter as RDS. For American broadcasting, please set this parameter as RBDS.

PRG_TYPE

This is an identification number to be transmitted with each program item and which is intended to specify the current Program Type within 31 possibilities. This code could be used for search tuning. The code will, moreover, enable suitable receivers and recorders to be pre-set to respond only to program items of the desired type.

PRG_TYPE_NAME

The PRG TYPE NAME (PTYN) feature is used to further describe current PTY. PRG TYPE NAME permits the display of a more specific PTY description that the broadcaster can freely decide (e.g. PTY = 4: Sport and PRG TYPE NAME: Football).

AF_MODE

A parameter that determines whether to send AF (Alternative Frequency) information or not.

AF_METHOD

Two methods of transmitting AFs are possible in specification. AF method A is used for lists up to 10 in number and AF method B is used where it is required to indicate frequencies of genetically related services.

AF_NUM, AF_NUM_SAME, AF_NUM_VARIANT, AF_01 ~ AF_24, AF_SAME_01 ~ AF_SAME_24, AF_VARIANT_01 ~ AF_VARIANT_12

Alternative Frequency information informs the list of frequencies which are broadcasting the same program in the same or adjacent reception areas, and enables receivers equipped with a memory to store the list(s), to reduce the time for switching to another transmitter. This facility is particularly useful in the case of car and portable radios. Set the "AF_NUM" and "AF_NUM_VARIANT" parameters as how many alternative frequencies you want to test.

PIN_DAY, PIN_HOUR, PIN_MINUTE

The PIN (Program Item Number) code should enable receivers and recorders designed to make use of this feature to respond to the particular program item(s) that the user has

preselected. Use is made of the scheduled program time, to which is added the day of the month in order to avoid ambiguity.

TIME

This parameter sets On/Off of the TIME information. The current time can be set using the following parameters: "YEAR", "MONTH", "DAY", "HOUR", "MINUTE", and "LTO". As time goes on, internal time related parameters are updated automatically but not refreshed on the screen. To refresh these parameters, go to another screen and return to this screen again.

LANGUAGE

To enable a broadcaster to indicate the spoken language he is currently transmitting, the 8 bit language identification codes shall be transmitted. The code 0x09 stands for English.

DI

The DI(Decoder Identification) indicates which possible operating modes are appropriate for use with the broadcast audio and to indicate if PTY codes are switched dynamically.

Settings	Meaning
Bit d0, set to 0:	Mono
Bit d0, set to 1:	Stereo
Bit d1, set to 0:	Not artificial head
Bit d1, set to 1:	Artificial head
Bit d2, set to 0:	Not compressed
Bit d2, set to 1:	Compressed
Bit d3, set to 0:	Static PTY
Bit d3, set to 1:	Indicates that the PTY code on the tuned service, or referenced in EON variant 13, is dynamically switched

6.1.3 AM Parameters

AM_INDEX

This parameter sets the index for the AM modulation.(Unit: %).

MODE

RWC2010C supports various FM sound sources such as MONO, WAVE, SWEEP, and EXT_IN.

AUDIO_FREQ

Audio frequency for mono AM modulation.

CONTENTS

Users can download many content files to internal memory. This parameter determines which content file to play.

CONTENTS_RST

Users can use this parameter to jump to the beginning of the content.

WAVE_FS

Shows the sampling frequency information of the wave file being transmitted.

WAVE_CH

Shows the number channel information of the wave file being transmitted.

WAVE_BITS

Shows the number of bits of information per sample in the wave file being transmitted.

SWEEP_START

Start frequency for audio sweep.

SWEEP_STOP

Stop frequency for audio sweep.

SWEEP_TIME

Sweep time for audio sweep.

AUDIO_IN_GAIN

When AM mode is set to EXT IN mode, audio signals input to the audio input port are transmitted in real time through AM modulation. Users can use this parameter to adjust the input audio signal to an appropriate level.

AUDIO_IN_LEVEL

This parameter displays the level of the audio signal being input in real time in EXT IN mode. Adjust AUDIO_IN_GAIN so that this parameter value is at a medium , or adjust the level of the input audio signal itself.

6.2 FM Tests

6.2.1 FM Mono Test

Set the MODE parameter as ‘MONO’ for FM Mono Mode test. In FM_MONO mode, one audio signal is FM modulated. To test it, go to the ‘FM_RDS_0’ screen and set the "MODE” parameter as MONO.

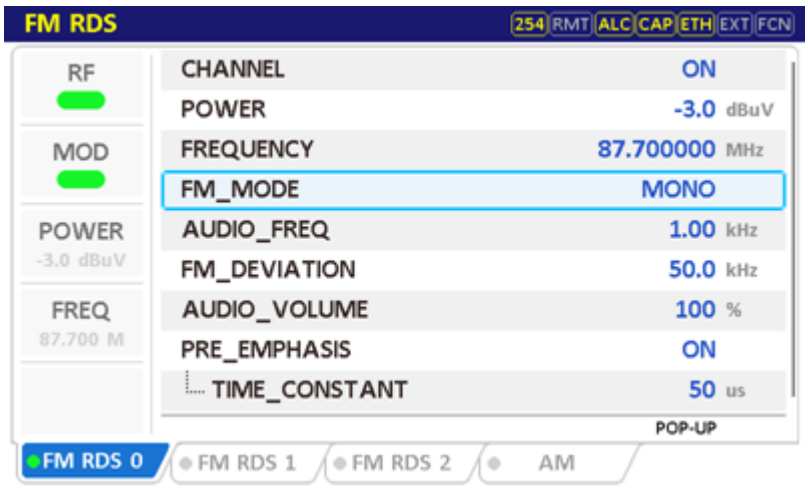


Fig. Mono FM test screen

6.2.2 FM Stereo Test

Set the MODE parameter as ‘STEREO’ for FM Stereo Mode test. In FM_STEREOmode, two audio signals(LEFT/RIGHT) are FM modulated. For the stereo FM test, RWC2010C provides left audio parameters and right audio parameters separately.

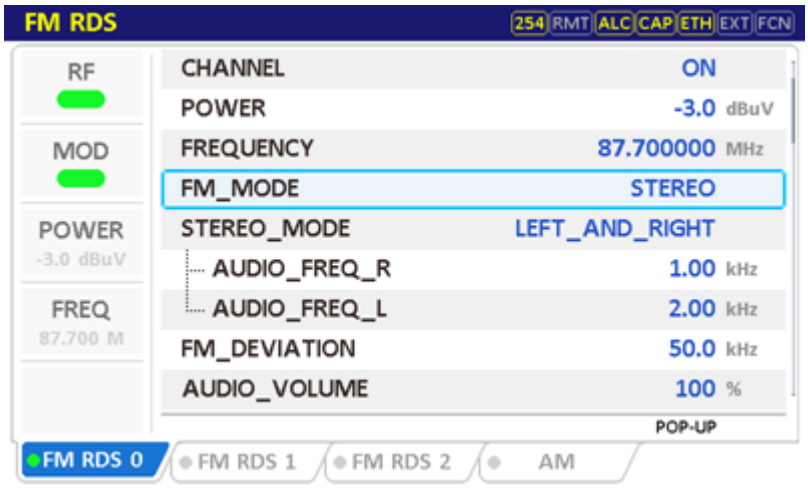


Fig. Stereo FM test screen

6.2.3 FM Wave Test

Set the MODE parameter as ‘WAVE’ for FM Wave Mode test. Downloaded wave file can be played with FM modulation. To test it, go to the ‘FM_RDS_0’ screen and set the "MODE” parameter as WAVE. Select the wave file using "CONTENTS” parameter. The orange color bar below the CONTENTS parameter shows the status of file transmitting

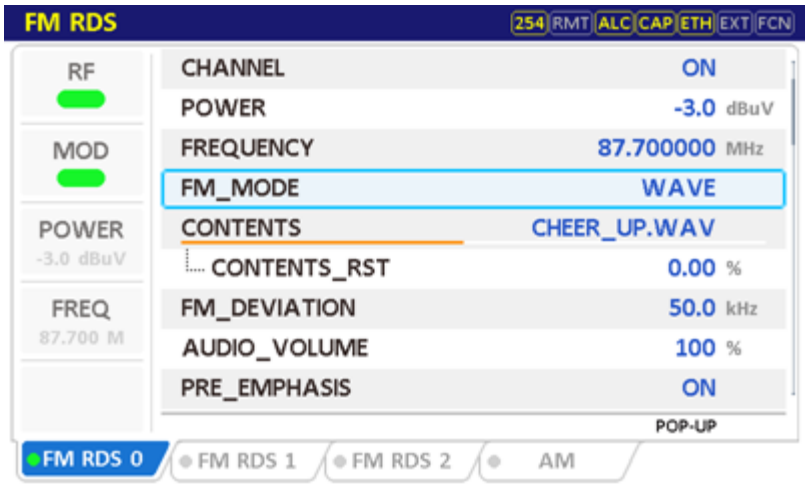


Fig. FM Wave mode test screen

6.2.4 FM Sweep Test

Set the MODE parameter as ‘SWEEP’ for FM SWEEP Mode test. In FM_SWEEP mode, RWC2010C sweeps FM audio tone frequency from the SWEEP_START to the SWEEP_STOP during SWEEP_TIME.

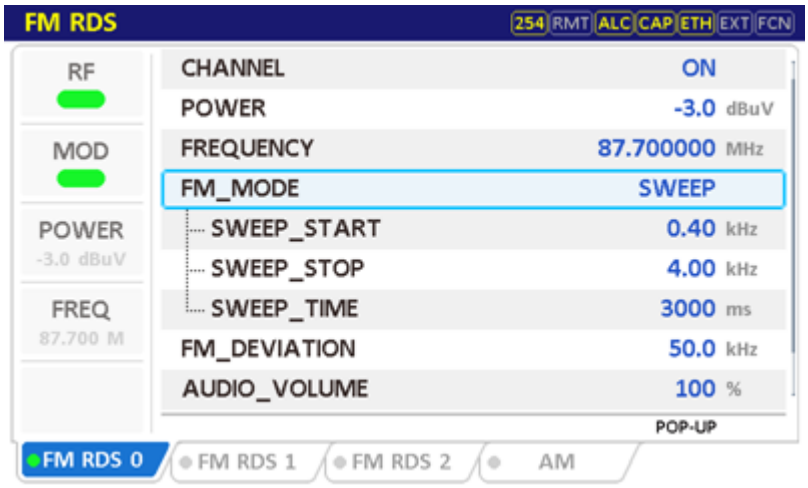


Fig. FM Sweep mode test screen

6.2.5 Traffic Program (TP) and Traffic Announcement (TA) Test

The setting of these two parameters stands for the following condition of the program.

TP	TA	Application
OFF	OFF	This program does not carry traffic announcements nor does it refer, via EON, to a program that does
OFF	ON	This program carries EON information about another program which gives traffic information
ON	OFF	This program carries traffic announcements but none are being broadcast at present and may also carry EON information about other traffic announcements
ON	ON	A traffic announcement is being broadcast on this program at present

6.2.6 EON (Enhanced Other Networks information) Test

The enhanced information about other networks consists of a collection of optional RDS features relating to other program services, cross-referenced by means of their PI codes. Features which may be transmitted using EON for other program services are: PID, AF, PS_NAME, TA and TP. RWC2010C supports multi channel FM RDS signals then EON test could be done using just one unit. To set these EON parameters, please set the EON parameter as ON.

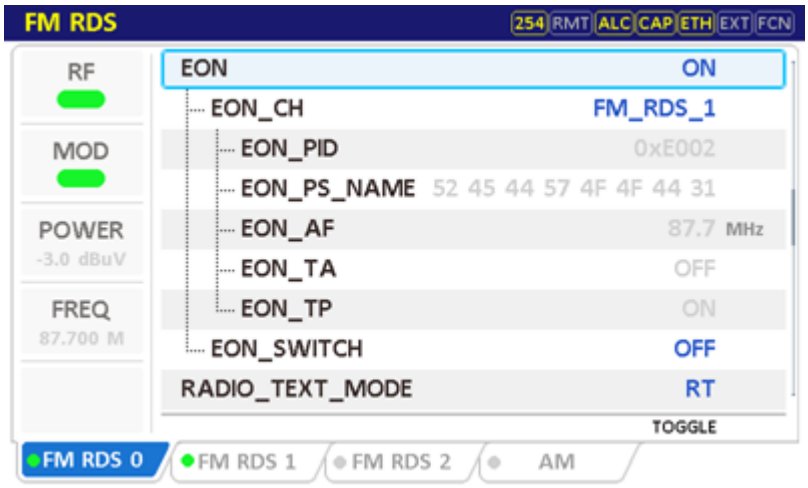


Fig. EON_SWITCH ON/OFF screen

Set the EON_CH parameter. The other channel which EON_CH assigned should be turned on before start testing. In this example, the EON_CH parameter is FM_RDS_1. Then FM_RDS_1 channel should be turned on as follows. Other EON parameters will be set automatically.

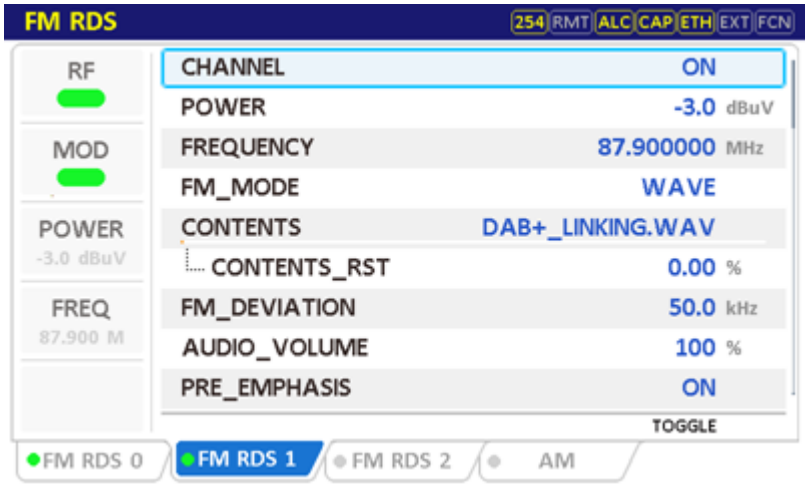


Fig. Set up the Assigned EON Channel

The type 14B group is used to cause the receiver to switch to a programme service which carries a traffic announcement. To transmit the type 14B group, please set the EON_SWITCH as ON as follows.

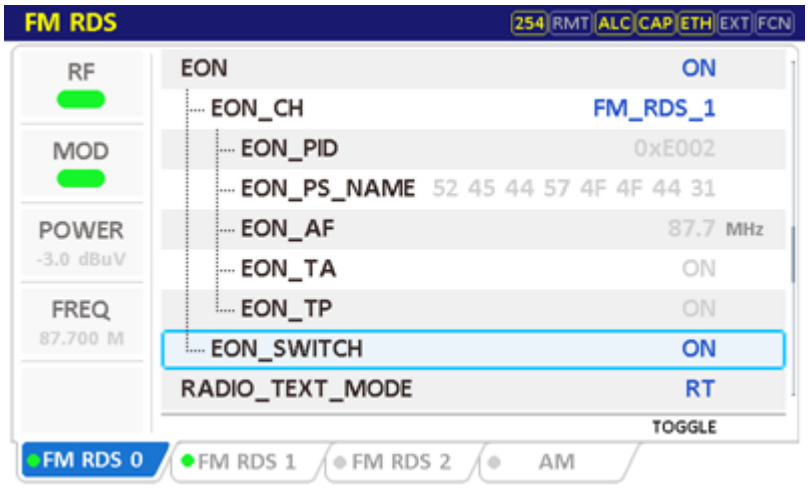


Fig. Set up the EON_SWITCH as ON

6.2.7 TMC (Traffic Message Channel)

RDS will enable traffic messages to be carried digitally and silently by a Traffic Message Channel (TMC), without necessarily interrupting the audio programme. To transmit a TMC message, please set the TRAFFIC_MESSAGE_CH parameter as ON.

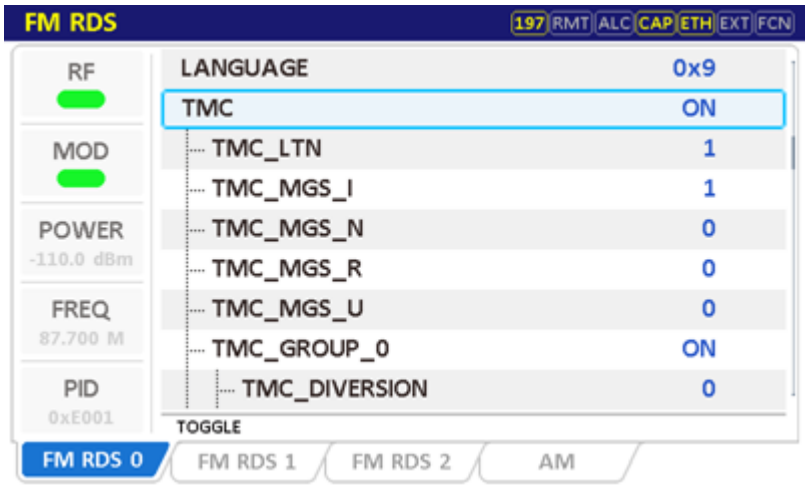


Fig. Screen for set up TMC parameters

Users could modify TMC messages using TMC related parameters. For more detailed information about these parameters, please refer to DD ENV 12313-1 document.

6.2.8 AF (Alternative Frequency)

To facilitate the automatic tuning process in a receiver, a number of AFs shall be transmitted. The AF list shall only comprise frequencies of neighboring transmitters or repeaters. RWC2010C supports two methods of transmitting AFs by setting the AF_METHOD parameter.

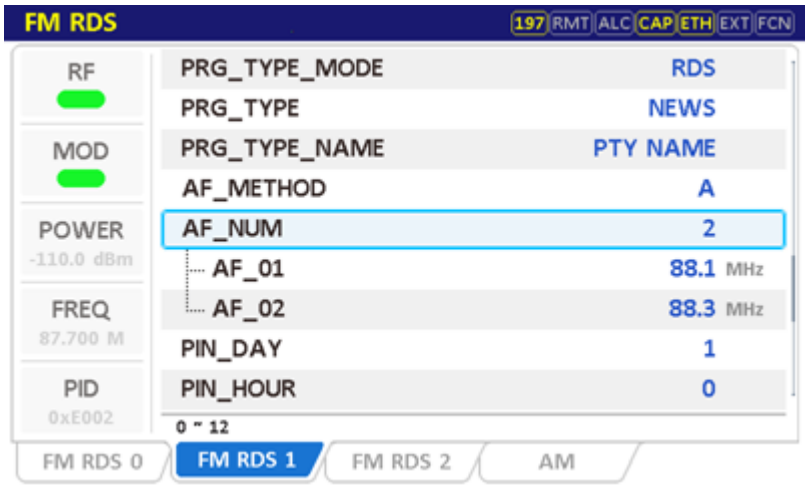


Fig. Screen for set up AF

6.3 AM Tests

RWC2010C provides Analog mode for FM/AM test purposes. Analog AM mode supports MONO AM test function and wave file player function.

6.3.1 AM Mono Test

In AM_MONO mode, one audio signal is AM modulated. To test it, go to the ‘ANALOG/AM’ screen and set the "MODE” parameter as MONO. The "AM_INDEX” in this screen controls audio volume.

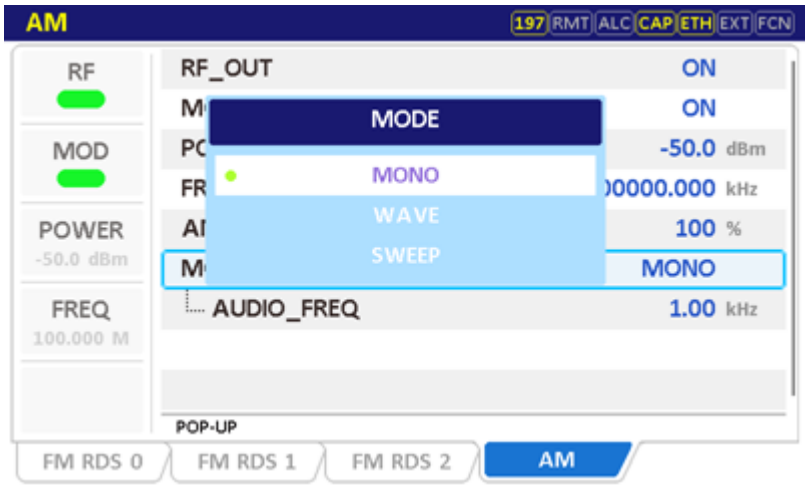


Fig. Mono AM test screen

6.3.2 AM Wave Test

Downloaded wav files can be played with AM modulation. To test it, go to the ‘ANALOG/AM’ screen and set the "MODE” parameter as WAVE. Select the wave file using "CONTENTS” parameter. The orange color bar below the CONTENTS parameter shows the status of file transmitting

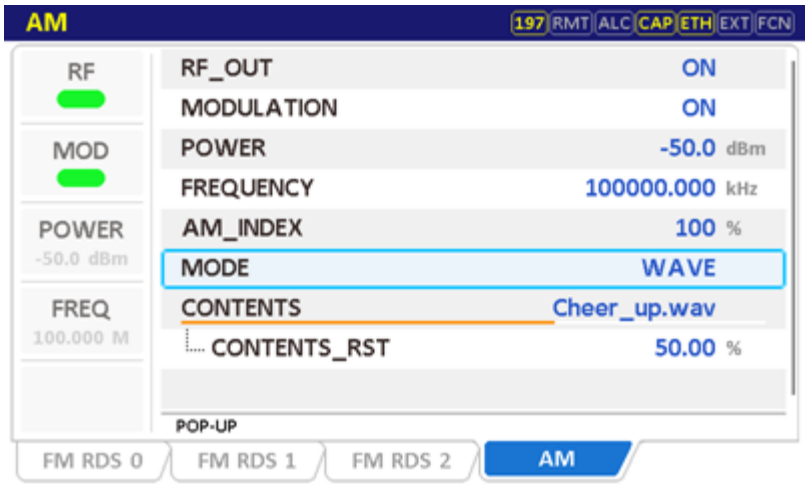


Fig. AM File mode test screen

6.3.3 AM Sweep Test

Set the MODE parameter as ‘SWEEP’ for the AM SWEEP Mode test. In AM_SWEEP mode, RWC2010C sweeps AM audio tone frequency from the SWEEP_START to the SWEEP_STOP during SWEEP_TIME.

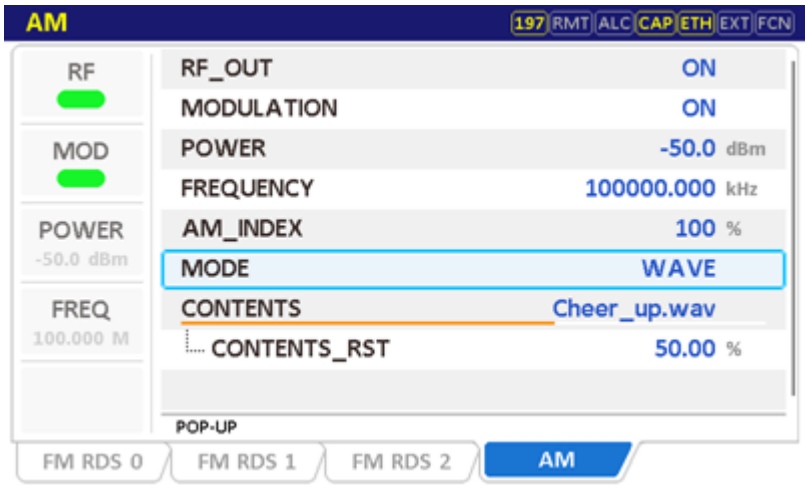


Fig. AM Sweep mode test screen

7 Analog Analyzer Operation

This section describes the test method for Audio Analyzer. Understanding the basic concepts of your RWC2010C helps you use it effectively.

7.1 Audio Scope
7.2 Audio Spectrum

The audio analyzer operates independently of DAB, DRM and FM/AM transmission functions and is designed to operate continuously. Therefore, users can read measured values using remote commands from the audio analyzer in DAB, DRM or FM/AM mode. Conversely, switching from DAB, DRM and FM/AM mode to the Audio Analyzer screen does not interrupt DAB, DRM and FM/AM transmission.

7.1 Audio Scope

7.1.1 Audio Scope analyzer

The RWC2010C provides a feature to analyze the waveform of audio using an Audio Scope. It displays the waveforms of both the Left and Right audio inputs simultaneously. Additionally, it measures and displays the frequencies of each input. It also measures the input level in three different units: Peak-to-Peak (Pk-Pk), Root Mean Square (RMS), and Quasi-Peak (Q-Pk).

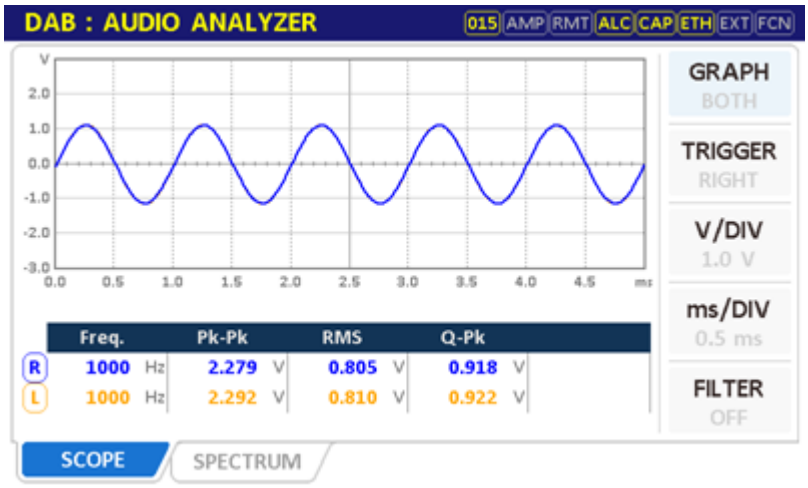


Fig. Audio Scope screen

7.1.2 Audio Scope Parameters

GRAPH

Using these parameters, you can configure the RWC2010C audio scope to display either the Left and Right audio input signals simultaneously or only one of them.

TRIGGER

In order to minimize the left and right shaking of the graph, the trigger function finds the starting point of the waveform where the zero crossing occurs and then draws from that point. Left and Right audio signals can be selected or set to OFF.

V/DIV

This feature allows you to adjust the vertical axis (Y-axis) units of the graph. You can set it to a range from 0.1V to 10V.

ms/DIV

This feature allows you to adjust the horizontal axis (X-axis) units of the graph. You can set it to a range from 0.1ms to 4ms.

FILTER

In the RWC2010C, users can choose from various audio weight filters, including:

- W_WEIGHT (Weighting Filter): This filter is primarily used for measuring sound pressure levels. It applies different weighting to audio signals based on their frequency composition to correct sound pressure levels. It is commonly used for measuring noise levels and displaying sound pressure levels.
- C_WEIGHT (Characteristic Filter): The C_WEIGHT filter is associated with specific noise measurements. It applies weighting to audio signals based on frequency to reduce or emphasize certain types of noise.
- CCIR Filter (International Radio Consultative Committee Filter): The CCIR filter is a standard filter defined by the International Radio Consultative Committee. It is typically used for sound pressure level and noise level measurements. This filter is widely used for sound pressure level and audio quality testing.

By selecting these different weight filters, you can tailor your audio measurements and analyses to your specific purposes and standards. Each filter adjusts the characteristics of the audio signal based on its frequency, allowing you to obtain accurate measurement results according to your requirements.

AVG_NUM

When measuring parameters such as frequency, audio level, SINAD, SNR, THD, and THDN, you have the option to set the Running Average Number. Adjusting this value can impact the accuracy of the measured values and the measurement time.

7.2 Audio Spectrum

7.2.1 Audio Spectrum analyzer

The RWC2010C provides an Audio Spectrum function that allows you to analyze the frequency components of audio. It displays the frequency components of both the Left and Right audio

inputs simultaneously. Additionally, it measures and displays various parameters for each input, including:

- Frequency: This represents the frequency of each component in the audio signal.
- SINAD (Signal-to-Noise and Distortion Ratio): SINAD is a measure of the ratio of the signal power to the sum of noise and distortion components in the signal. It indicates the overall quality of the signal.
- SNR (Signal-to-Noise Ratio): SNR measures the ratio of the signal power to the noise power, indicating how much the signal stands out from the background noise.
- THD (Total Harmonic Distortion): THD quantifies the level of distortion in the signal caused by harmonic components. It measures how much the signal deviates from its ideal, pure form.
- THDN (Total Harmonic Distortion plus Noise): THDN is similar to THD but includes both harmonic distortion and additional noise in the measurement.

This functionality allows you to gain a detailed understanding of the frequency characteristics and quality of your audio signals, both for the Left and Right channels.

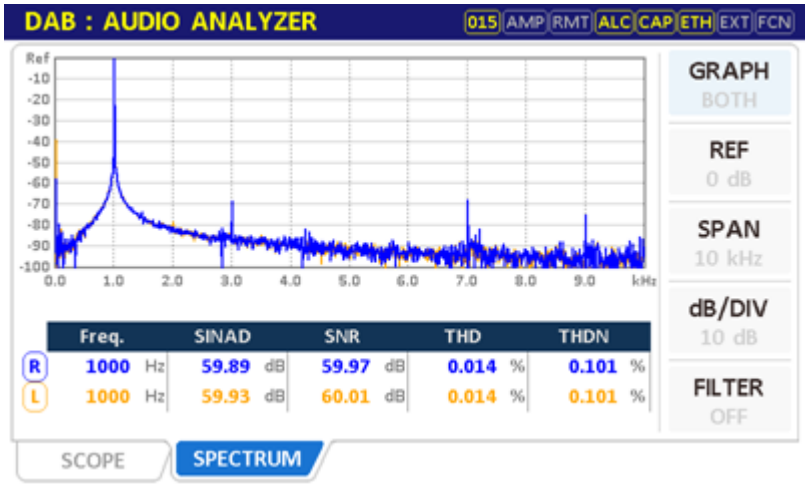


Fig. Spectrum screen of Audio Anayzer

7.2.2 Audio Spectrum Parameters

GRAPH

Using these parameters, you can configure the RWC2010C audio spectrum to display either the Left and Right audio input signals simultaneously or only one of them.

REF

Ref level is a variable used in frequency spectrum analysis to adjust the topmost level of the spectrum graph. It primarily relates to setting the vertical axis level of the spectrum..

SPAN

You can set the horizontal axis range of the graph, and it can be adjusted from 1 kHz to 20 kHz.

dB/DIV

You can adjust the vertical axis units of the graph, and it can be adjusted from 1 dB to 30 dB.

FILTER

In the RWC2010C, users can choose from various audio weight filters, including:

- W_WEIGHT (Weighting Filter): This filter is primarily used for measuring sound pressure levels. It applies different weighting to audio signals based on their frequency composition to correct sound pressure levels. It is commonly used for measuring noise levels and displaying sound pressure levels.
- C_WEIGHT (Characteristic Filter): The C_WEIGHT filter is associated with specific noise measurements. It applies weighting to audio signals based on frequency to reduce or emphasize certain types of noise.
- CCIR Filter (International Radio Consultative Committee Filter): The CCIR filter is a standard filter defined by the International Radio Consultative Committee. It is typically used for sound pressure level and noise level measurements. This filter is widely used for sound pressure level and audio quality testing.

By selecting these different weight filters, you can tailor your audio measurements and analyses to your specific purposes and standards. Each filter adjusts the characteristics of the audio signal based on its frequency, allowing you to obtain accurate measurement results according to your requirements.

AVG_NUM

When measuring parameters such as frequency, audio level, SINAD, SNR, THD, and THDN, you have the option to set the Running Average Number. Adjusting this value can impact the accuracy of the measured values and the measurement time.

REF_MODE

When measuring parameters like SINAD, SNR, THD, and THDN, having a reference signal is crucial. The parameter determines whether the reference signal's frequency should be automatically measured and used or manually set by the users.

REF_FREQ_L, REF_FREQ_R

When REF_MODE is set to MANUAL, these parameters set the frequency of the reference signal required for measuring SINAD, SNR, THD, and THDN.

8 Linking Test

This section describes the test method for Service (Seamless) Linking test and SFN (Single Frequency Network) test using two RWC2010Cs. Understanding the basic concepts of your RWC2010C helps you use it effectively.

8.1 Service (Seamless) Linking Test
8.2 SFN (Single Frequency Network) Test

8.1 Service (Seamless) Linking Test

In a vehicle, DAB receiver's experience a constantly varying coverage area. When the reception quality becomes weak in one transmitter, the receiver must be able to identify and intelligently switch to another transmitter and continue to play the same station with good reception quality. In general, even though the two transmitters are identical, they might have different transmission parameters (like signal delay etc…) or they might use different broadcast systems. In many cases, some of the DAB services are the simulcast of existing FM services with RDS. Sometimes, the same DAB service can be simulcast over two or three DAB ensembles emanating from different regions. So, in effect, a moving car can experience any of the below situations:

- DAB Broadcast Area 1 with DAB-1 ensemble containing service ABC, FM with RDS Broadcast Area with ABC
- DAB Broadcast Area 1 with DAB-1 ensemble containing service ABC, DAB Broadcast Area 2 with DAB-2 ensemble containing service ABC, DAB Broadcast Area 3 with DAB-3 ensemble containing service ABC

In these above situations, ordinary digital receivers that are able to do the switching usually make transient echoes like noise or "clicks". But latest receivers can switch without transient echo using Seamless Linking algorithm.

To test the Seamless Linking algorithm in the Lab, two broadcasting emulators are required. And two broadcasting emulators should be synchronized with adjustable sync delay. Using two RWC2010Cs, many combinations of Seamless Linking tests (DAB to DAB, DAB to DRM, DAB to FM, DRM to DRM, DRM to FM) can be performed in the Lab very easily. In this manual, it explains DAB to FM seamless linking test method. Other combination test methods are very similar to it.

For detailed usage, please refer to the application manual of the RwcServiceLinkingTestTool.exe.

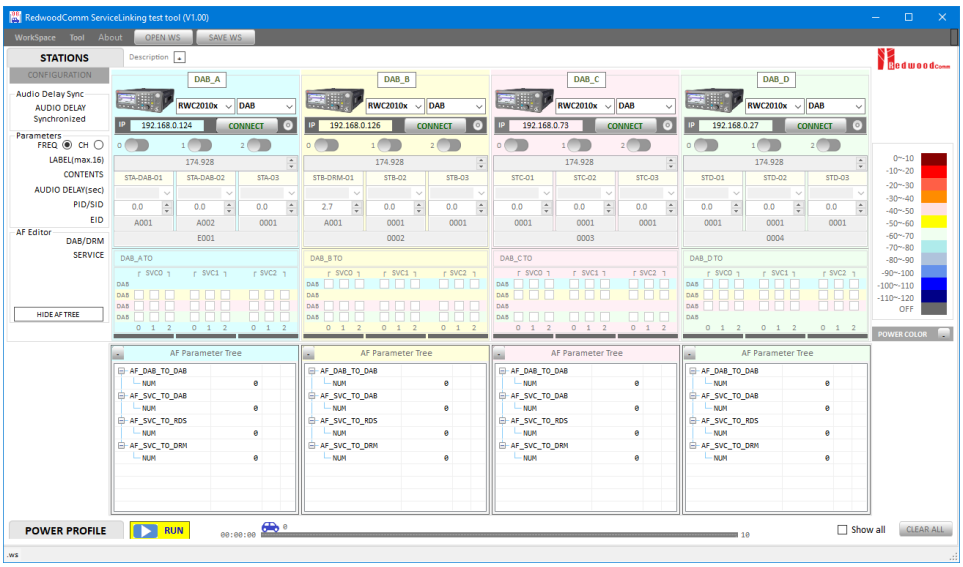


Fig. RwcServiceLinkingTestTool.exe

8.2 SFN (Single Frequency Network) Test

As a digital, OFDM radio system (DAB/DRM) is capable of transmitting in a single frequency network (SFN). Here several transmitters can work on the same frequency, due to a guard interval added after every symbol, differences in time of arrival from the different transmitters do not decrease the performance. This offers the possibility of covering a big area with several transmitters on only one frequency which saves bandwidth and simplifies frequency planning significantly. It also enhances the reception quality in areas with obstacles such as buildings, hills or mountains.

To test SFN in the Lab, two or more broadcasting emulators are required. Only two RWC2010C could be connected and synchronized, so in this manual will explain the test method of SFN using two RWC2010C.

Two RWC2010C units should be connected to the same External 10MHz Reference input and "REF_CLK" parameter in 'SYSTEM/SETUP' screen should be set as EXT as the following Figure.

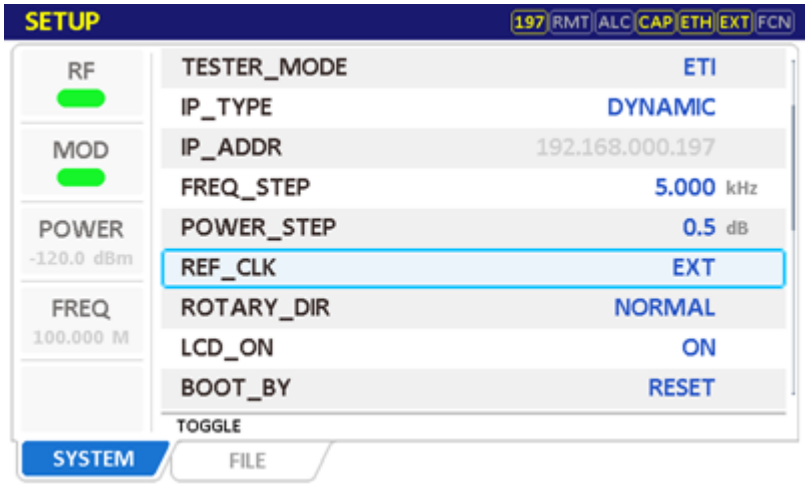


Fig. External Reference Input Setup Screen

Two RWC2010C testers should be connected by Sync cable (Cross LAN cable) which are provided from RedwoodComm. Sync cable (Cross LAN cable) should be connected to the DATA_I/O port of two RWC2010C testers. For the location of the DATA_I_O port, see Section 2.2 Rear Panel View.



Fig. SFN Test block diagram

User could assign one RWC2010C for Master and the other RWC2010C for Slave. Master and Slave units should be configured for ETI mode with the same content file for DAB SFN test. For DRM SFN test, both units should be configured for MDI mode with the same content file.

After setting the two units as ETI mode with the same contents file, please go to the 'ETI/SFN' screen and set the "SFN_MODE" parameter as MASTER in Master RWC2010C to start the SFN test. Using the "SFN_DELAY" parameter, Audio Sync delay between two transmitters are adjustable in 0.1us units.

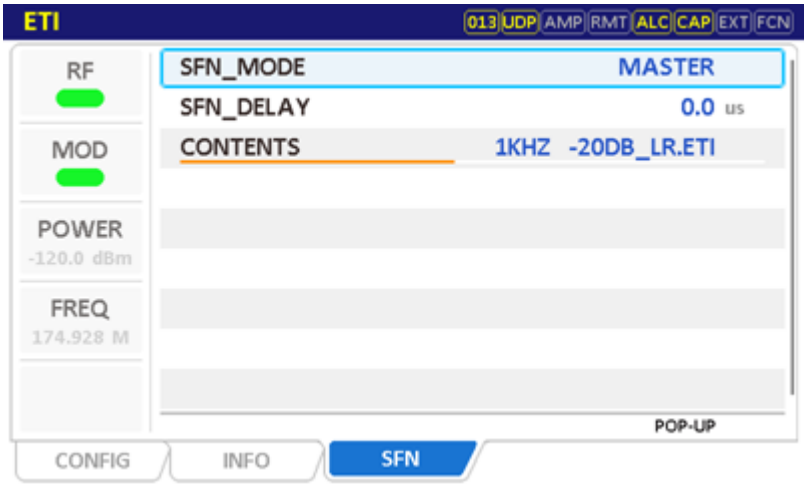


Fig. SFN screen as master

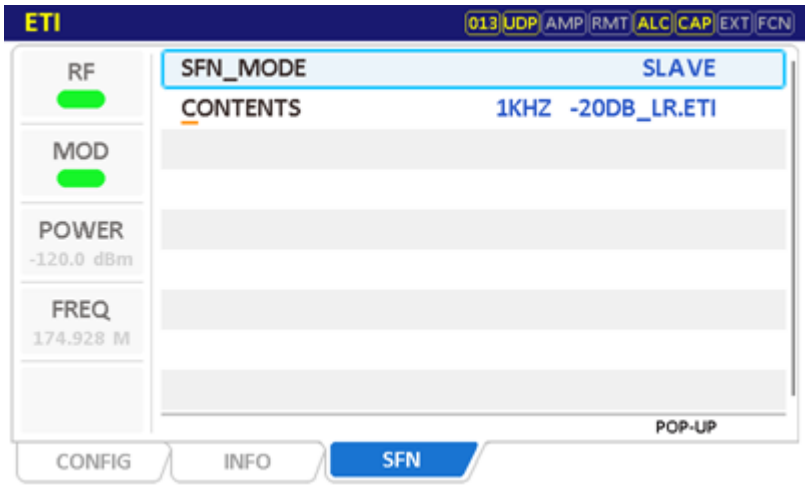


Fig. SFN screen as slave

9 Remote Control Programming

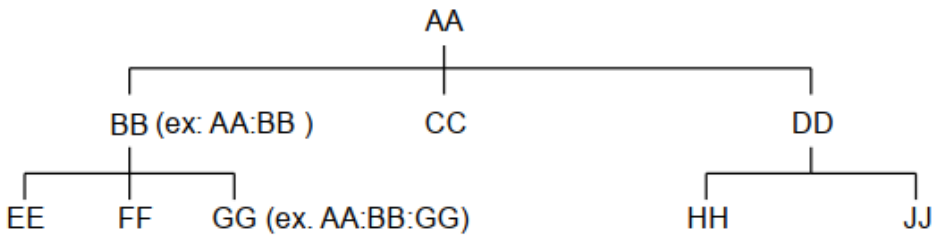
PC may control the RWC2010C remotely through Ethernet or RS232C interface using a comprehensive set of commands. This section provides the necessary information to operate the RWC2010C under Ethernet and RS232C control

9.1 Introduction
9.2 RS-232C Interface
9.3 Ethernet Interface
9.4 Command Tables

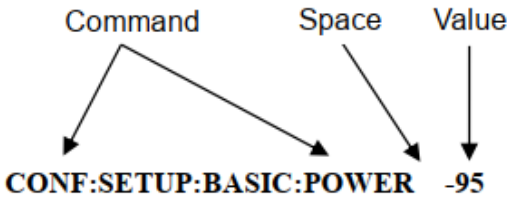
9.1 Introduction

The RWC2010C supports RS232C and Ethernet Interface, located at the rear panel for remote operation under PC control. Ethernet is used for high speed and flexible interfaces. To use Ethernet, socket programming is required. RS232C is a slow serial interface, but it does not need any special devices, and is easy to use

9.1.1 Command Structure



- Users must follow a particular path to reach lower level subcommands. For example, if you wish to access the GG command, you must follow the path AA to BB to GG (AA:BB:GG)
- Commands consist of *set commands* and *query commands* (usually simply called commands and queries). Set commands change instrument settings or perform a specific action. Queries cause the RWC2010C to return data and information about its status. Most commands have both a set form and query form. The query form of the command is started with "READ" and the set form of the command is started with "CONF". For example, one of the set commands is **CONF:SETUP:BASIC:POWER -95** and one of the query commands is **READ:SETUP:BASIC:POWER?**
- When a *colon* is placed between two command mnemonics, it moves the current path down one level in the command tree
- A *space* is used to separate parameters from commands. AA:BB:FF 20
- Some commands require two parameters. Refer to the Command list.



▣ **Note**: All command s should be finished by LF (Line Feed, Char(10)) or semicolon(;).

9.1.2 Command Parameter Types

- Integer Parameter : CONF:SETUP:BASIC:POWER <param> <LF>
- Double Integer parameter : CONF:SETUP:BASIC:POWER <param1> <param2> <LF>
- Discrete Parameter : CONF:SETUP:BASIC:RF {ON | OFF} <LF>

9.1.3 Response to Query

- Integer: Return an integer value, e.g. 0, 100, 256, -230.
- Discrete: Return a selection.

Command & Query	Response
READ:SETUP:BASIC:POWER?	-10
READ:SETUP:BASIC:RF?	ON

▣ **Note**: All responses are finished by LF (Line Feed, Char(10))

9.2 RS-232C Interface

9.2.1 Setup

9.2.1.1 RS232 Connection

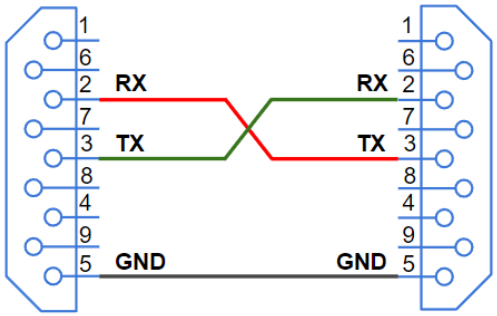


Fig. RS232 Connection Diagram

9.2.1.2 Setup RWC2010C

To use RS232, the parameters of the RWC2010C should be set up according to the following sequence.

	Parameter	Range	Description
	DATA BITS	8-bit	Length of Data bit
	PARITY	Off	Error check bit
	STOP BIT	1-bit	Stop bit
	BPS	115200	Baud Rate

9.2.2 Remote Programming Guide

- Set Serial Port
- Set up Baud Rate, Parity Bit (None), Data Bit (8 bit), Stop Bit (1 bit).
- Open port.
- Send RS232C command through serial port.
- Check command execution results on the RWC2010C screen.
- Send the next command after successful execution of the previous command.

If it is difficult to check the execution of the previous command, the next command should be sent after a few milliseconds.

Tip for programming

- A colon is used between commands.
- A space is only used between parameter values and commands.
- All commands should be finished by LF (Line Feed, char(10)).

9.3 Ethernet Interface

9.3.1 Setup

- Connect LAN port of PC and RWC2010C Ethernet port by RJ45 cable. If the PC and RWC2010C are connected directly, crossover cable must be used.
- Set up the IP address as follows to use crossover cable.

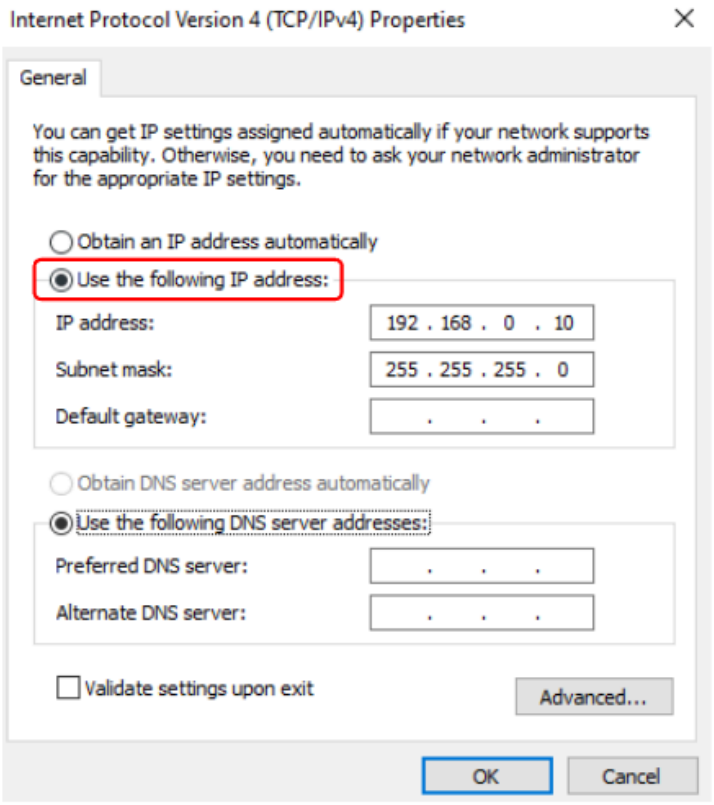


Fig. How to set up the static IP address of PC with Window OS

- Turn RWC2010C power ON, go to the 'SETUP/SYSTEM' screen and check the "IP_ADDR" value. Please be sure that the "IP_ADDR" value should be different from the PC's IP Address.

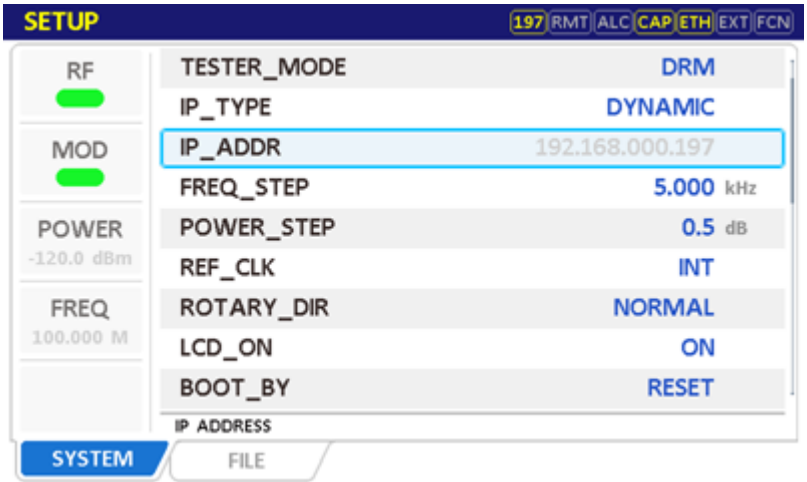


Fig. Screen for setup Remote Port and IP address

9.4 Command Tables

9.4.1 Common Commands

COMMAND	<param1> RANGE	<param2> RANGE	DESCRIPTION
*IDN?			Query Identification
*RST			Full preset command
*SAVE	SAVE_00 - SAVE_09		Save current parameters setting to memory. The SAVE NAME can be modified using the CONF:SETUP:SAVE_NAME command
*RECALL	SAVE_00 - SAVE_09		Recall saved parameters setting from memory
EXEC:REBOOT			Reboot Tester
EXEC:MOVE_SCREEN:REMOTE			Move to the SETUP/REMOTE screen
READ:SETUP:RF?			
CONF:SETUP:RF <param1>	OFF, ON		RF On/Off
READ:SETUP:MODULATION?			
CONF:SETUP:MODULATION <param1>	OFF, ON		Modulation On/Off
READ:SETUP:FREQUENCY?			
CONF:SETUP:FREQUENCY <param1>	0.15 ~ 30 MHz 47 ~ 68 MHz 87 ~ 108 MHz 174 ~ 250 MHz		LF/MF/HF Band Band I Band II Band III
READ:SETUP:POWER?			Read Power(dBm)
CONF:SETUP:POWER <param1>	[CONF:SETUP:TESTER_MODE] For AM, -110.0 ~ -10.0; For FM, -110.0 ~ 0.0;		Set Power(dBm)

COMMAND	<param1> RANGE	<param2> RANGE	DESCRIPTION
	For DAB, -120.0 ~ -10.0; For DRM, -120.0 ~ -20.0		
READ:SETUP:POWER:DBUV?			Read Power(dBuV)
CONF:SETUP:POWER:DBUV <param1>	[CONF:SETUP:TESTER_MODE] For AM, -3.0 ~ 97.0; For FM, -3.0 ~ 107.0; For DAB, -13.0 ~ 97.0; For DRM, -13.0 ~ 87.0		Set Power(dBuV)
READ:SETUP:PATH_LOSS?			dB
CONF:SETUP:PATH_LOSS <param1>	-60.0 ~ 60.0		dB
READ:SETUP:TESTER_MODE?			
CONF:SETUP:TESTER_MODE <param1>	FM, AM, DAB, DRM, ETI, MDI, DRM_IQ		
READ:SETUP:SAVE_NAME? <param1>	0 - 9		
CONF:SETUP:SAVE_NAME <param1> <param2>	0 - 9	NAME	Edit the SAVE name, with a max 16 characters

9.4.2 DAB ENSEMBLE Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:ENSEMBLE:CH_TYPE?				3.1.1.1 CH_TYPE
CONF:DAB:ENSEMBLE:CH_TYPE <param1>	EUROPE, KOREA			
READ:DAB:ENSEMBLE:CHANNEL?				3.1.1.1 CHANNEL
CONF:DAB:ENSEMBLE:CHANNEL <param1>	[CONF:DAB:ENSEMBLE:CH_TYPE] For EUROPE, EU_5A, EU_5B, EU_5C, EU_5D, EU_6A, EU_6B, EU_6C, EU_6D, EU_7A, EU_7B, EU_7C, EU_7D, EU_8A, EU_8B, EU_8C, EU_8D, EU_9A, EU_9B, EU_9C, EU_9D, EU_10A, EU_10N, EU_10B, EU_10C, EU_10D, EU_11A, EU_11N, EU_11B, EU_11C, EU_11D, EU_12A,			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
	EU_12N, EU_12B, EU_12C, EU_12D, EU_13A, EU_13B, EU_13C, EU_13D, EU_13E, EU_13F; For KOREA, KOR_7A, KOR_7B, KOR_7C, KOR_8A, KOR_8B, KOR_8C, KOR_9A, KOR_9B, KOR_9C, KOR_10A, KOR_10B, KOR_10C, KOR_11A, KOR_11B, KOR_11C, KOR_12A, KOR_12B, KOR_12C, KOR_13A, KOR_13B, KOR_13C			
READ:DAB:ENSEMBLE:ENSEMBLE_ID?				3.1.1.1 ENSEMBLE_ID
CONF:DAB:ENSEMBLE:ENSEMBLE_ID <param1>	0x0000 ~ 0xFFFF			
READ:DAB:ENSEMBLE:ECC?				3.1.1.1 ECC
CONF:DAB:ENSEMBLE:ECC <param1>	0 ~ 255			
READ:DAB:ENSEMBLE:NORMAL_LABEL?				3.1.1.1 NORMAL_LABEL
CONF:DAB:ENSEMBLE:NORMAL_LABEL <param1>	OFF, ON			
READ:DAB:ENSEMBLE:LABEL?				3.1.1.1 LABEL
CONF:DAB:ENSEMBLE:LABEL <param1>	Max 16-byte Characters			
READ:DAB:ENSEMBLE:LABEL_HEX?				
CONF:DAB:ENSEMBLE:LABEL_HEX <param1>	Max 16-byte Hexadecimal Values			
READ:DAB:ENSEMBLE:CHAR_SET?				3.1.1.1 CHAR_SET
CONF:DAB:ENSEMBLE:CHAR_SET <param1>	EBU_LATIN, UTF_16, UTF_8			
READ:DAB:ENSEMBLE:CHAR_FLAG?				3.1.1.1 CHAR_FLAG
CONF:DAB:ENSEMBLE:CHAR_FLAG <param1>	0x0000 ~ 0xFF00			
READ:DAB:ENSEMBLE:EXTEND_LABEL?				3.1.1.1 EXTEND_LABEL
CONF:DAB:ENSEMBLE:EXTEND_LABEL <param1>	OFF, ON			
READ:DAB:ENSEMBLE:E_LABEL?				3.1.1.1 E_LABEL
CONF:DAB:ENSEMBLE:E_LABEL <param1>	Max 32-byte Characters			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:ENSEMBLE:E_LABEL_HEX?				
CONF:DAB:ENSEMBLE:E_LABEL_HEX <param1>	Max 32-byte Hexadecimal Values			
READ:DAB:ENSEMBLE:ENCODING_FLAG?				3.1.1.1 ENCODING_FLAG
CONF:DAB:ENSEMBLE:ENCODING_FLAG <param1>	UTF_8, UTF_16			
READ:DAB:ENSEMBLE:TEXT_CONTROL?				3.1.1.1 TEXT_CONTROL
READ:DAB:ENSEMBLE:BIDI_FLAG?				
CONF:DAB:ENSEMBLE:BIDI_FLAG <param1>	0, 1			
READ:DAB:ENSEMBLE:BASE_DIRECTION?				
CONF:DAB:ENSEMBLE:BASE_DIRECTION <param1>	LTR, RTL			
READ:DAB:ENSEMBLE:CONTEXTUAL_FLAG?				
CONF:DAB:ENSEMBLE:CONTEXTUAL_FLAG <param1>	0, 1			
READ:DAB:ENSEMBLE:COMBINING_FLAG?				
CONF:DAB:ENSEMBLE:COMBINING_FLAG <param1>	0, 1			
READ:DAB:ENSEMBLE:PROTOCOL_VER?				3.1.1.1 PROTOCOL_VER
CONF:DAB:ENSEMBLE:PROTOCOL_VER <param1>	V1x, V2x			
READ:DAB:ENSEMBLE:SERVICE? <param1>	[service number] 0 ~ 63			3.1.1.1 SERVICE_00 - SERVICE_63
CONF:DAB:ENSEMBLE:SERVICE <param1> <param2>	[service number] 0 ~ 63	OFF, ON		
READ:DAB:ENSEMBLE:OFDM_WINDOWING?				3.1.1.1 OFDM_WINDOWING
CONF:DAB:ENSEMBLE:OFDM_WINDOWING <param1>	1/4, 1/8 , 1/16, 1/32, 1/64, OFF			

9.4.3 DAB SERVICE Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:SERVICE:SID? <param1>	[service number] 0 ~ 63			3.1.2.1 SID
CONF:DAB:SERVICE:SID <param1> <param2>	[service number] 0 ~ 63	0x0000 ~ 0xFFFF		
READ:DAB:SERVICE:PROGRAM? <param1>	[service number] 0 ~ 63			3.1.2.1 PROGRAM
CONF:DAB:SERVICE:PROGRAM <param1> <param2>	[service number] 0 ~ 63	NONE, NEWS, AFFAIRS, INFO, SPORTS, EDUCATE, DRAMA, CULTURE, SCIENCE, VARIED, POP_M, ROCK_M, EASY_M, LIGHT_M, CLASSICS, OTHER_M, WEATHER, FINANCE, CHILDREN, SOCIAL, RELIGION, PHONE_IN, TRAVEL, LEISURE, JAZZ, COUNTRY, NATION_M, OLDIES, FOLK_M, DOCUMENT		
READ:DAB:SERVICE:PROGRAM_S/D? <param1>	[service number] 0 ~ 63			3.1.2.1 PROGRAM_S/D
CONF:DAB:SERVICE:PROGRAM_S/D <param1> <param2>	[service number] 0 ~ 63	STATIC, DYNAMIC		
READ:DAB:SERVICE:NORMAL_LABEL? <param1>	[service number] 0 ~ 63			3.1.2.1 NORMAL_LABEL
CONF:DAB:SERVICE:NORMAL_LABEL <param1> <param2>	[service number] 0 ~ 63	OFF, ON		
READ:DAB:SERVICE:LABEL? <param1>	[service number] 0 ~ 63			3.1.2.1 LABEL
CONF:DAB:SERVICE:LABEL <param1> <param2>	[service number] 0 ~ 63	Max 16-byte Characters		
READ:DAB:SERVICE:LABEL_HEX? <param1>	[service number] 0 ~ 63			
CONF:DAB:SERVICE:LABEL_HEX <param1> <param2>	[service number] 0 ~ 63	Max 16-byte Hexadecimal Values		
READ:DAB:SERVICE:CHAR_SET? <param1>	[service number] 0 ~ 63			3.1.2.1 CHAR_SET
CONF:DAB:SERVICE:CHAR_SET <param1> <param2>	[service number] 0 ~ 63	EBU_LATIN, UTF_16, UTF_8		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:SERVICE:CHAR_FLAG? <param1>	[service number] 0 ~ 63			3.1.2.1 CHAR_FLAG
CONF:DAB:SERVICE:CHAR_FLAG <param1>> <param2>	[service number] 0 ~ 63	0x0000 ~ 0xFF00		
READ:DAB:SERVICE:EXTEND_LABEL? <param1>	[service number] 0 ~ 63			3.1.2.1 EXTEND_LABEL
CONF:DAB:SERVICE:EXTEND_LABEL <param1> <param2>	[service number] 0 ~ 63	OFF, ON		
READ:DAB:SERVICE:E_LABEL? <param1>	[service number] 0 ~ 63			3.1.2.1 E_LABEL
CONF:DAB:SERVICE:E_LABEL <param1> <param2>	[service number] 0 ~ 63	Max 32-byte Characters		
READ:DAB:SERVICE:E_LABEL_HEX? <param1>	[service number] 0 ~ 63			
CONF:DAB:SERVICE:E_LABEL_HEX <param1> <param2>	[service number] 0 ~ 63	Max 32-byte Hexadecimal Values		
READ:DAB:SERVICE:ENCODING_FLAG? <param1>	[service number] 0 ~ 63			3.1.2.1 ENCODING_FLAG
CONF:DAB:SERVICE:ENCODING_FLAG <param1> <param2>	[service number] 0 ~ 63	UTF_8, UTF_16		
READ:DAB:SERVICE:TEXT_CONTROL? <param1>	[service number] 0 ~ 63			3.1.2.1 TEXT_CONTROL
READ:DAB:SERVICE:BIDI_FLAG? <param1>	[service number] 0 ~ 63			3.1.2.1 BIDI_FLAG
CONF:DAB:SERVICE:BIDI_FLAG <param1> <param2>	[service number] 0 ~ 63	0, 1		
READ:DAB:SERVICE:BASE_DIRECTION? <param1>	[service number] 0 ~ 63			3.1.2.1 BASE_DIRECTION
CONF:DAB:SERVICE:BASE_DIRECTION <param1> <param2>	[service number] 0 ~ 63	LTR, RTL		
READ:DAB:SERVICE:CONTEXTUAL_FLAG? <param1>	[service number] 0 ~ 63			3.1.2.1 CONTEXTUAL_FLAG
CONF:DAB:SERVICE:CONTEXTUAL_FLAG <param1> <param2>	[service number] 0 ~ 63	0, 1		
READ:DAB:SERVICE:COMBINING_FLAG? <param1>	[service number] 0 ~ 63			3.1.2.1 COMBINING_FLAG

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:SERVICE:COMBINING_FLAG <param1> <param2>	[service number] 0 ~ 63	0, 1		
READ:DAB:SERVICE:PRIMARY? <param1>	[service number] 0 ~ 63			3.1.2.1 PRIMARY
CONF:DAB:SERVICE:PRIMARY <param1> <param2>	[service number] 0 ~ 63	OFF, COMPONENT_00 ~ COMPONENT_63		
READ:DAB:SERVICE:SECONDARY? <param1> <param2>	[service number] 0 ~ 63	[secondary number] 1 ~ 11		3.1.2.1 SECONDARY_1 - 11
CONF:DAB:SERVICE:SECONDARY <param1> <param2> <param3>	[service number] 0 ~ 63	[secondary number] 1 ~ 11	OFF, COMPONENT_00 ~ COMPONENT_63	

9.4.4 DAB COMPONENT Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:COMPONENT:MODE? <param1>	[component number] 0 ~ 63			3.1.3.1 MODE
CONF:DAB:COMPONENT:MODE <param1> <param2>	[component number] 0 ~ 63	DAB, DMB, DAB+, SPI, SLS, PKT_BER		
READ:DAB:COMPONENT:CONTENTS? <param1>	[component number] 0 ~ 63			3.1.3.1 CONTENTS
CONF:DAB:COMPONENT:CONTENTS <param1> <param2>	[component number] 0 ~ 63	File name		
EXEC:DAB:COMPONENT:CONTENTS_RST <param1>	[component number] 0 ~ 63	0.0 ~ 99.9		3.1.3.1 CONTENTS_RST
READ:DAB:COMPONENT:MP2_MODE? <param1>	[component number] 0 ~ 63			3.1.3.2 MP2_MODE
READ:DAB:COMPONENT:MP2_FS? <param1>	[component number] 0 ~ 63			3.1.3.2 MP2_FS
READ:DAB:COMPONENT:PRT_TYPE? <param1>	[component number] 0 ~ 63			3.1.3.1 PRT_TYPE
CONF:DAB:COMPONENT:PRT_TYPE <param1> <param2>	[component number] 0 ~ 63	UEP, EEP		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:COMPONENT:UEP_BPS? <param1>	[component number] 0 ~ 63			3.1.3.1 UEP_BPS
CONF:DAB:COMPONENT:UEP_BPS <param1> <param2>	[component number] 0 ~ 63	8 ~ 384		
READ:DAB:COMPONENT:UEP_LEVEL? <param1>	[component number] 0 ~ 63			3.1.3.1 UEP_LEVEL
CONF:DAB:COMPONENT:UEP_LEVEL <param1> <param2>	[component number] 0 ~ 63	1 ~ 5		
READ:DAB:COMPONENT:EEP_BPS? <param1>	[component number] 0 ~ 63			3.1.3.1 EEP_BPS
CONF:DAB:COMPONENT:EEP_BPS <param1> <param2>	[component number] 0 ~ 63	8 ~ 1072		
READ:DAB:COMPONENT:EEP_LEVEL? <param1>	[component number] 0 ~ 63			3.1.3.1 EEP_LEVEL
CONF:DAB:COMPONENT:EEP_LEVEL <param1> <param2>	[component number] 0 ~ 63	1 ~ 4		
READ:DAB:COMPONENT:EEP_OPTION? <param1>	[component number] 0 ~ 63			3.1.3.1 EEP_OPTION
CONF:DAB:COMPONENT:EEP_OPTION <param1> <param2>	[component number] 0 ~ 63	A, B		
READ:DAB:COMPONENT:NORMAL_LABEL? <param1>	[component number] 0 ~ 63			3.1.3.1 NORMAL_LABEL
CONF:DAB:COMPONENT:NORMAL_LABEL <param1> <param2>	[component number] 0 ~ 63	OFF, ON		
READ:DAB:COMPONENT:LABEL? <param1>	[component number] 0 ~ 63			3.1.3.1 LABEL
CONF:DAB:COMPONENT:LABEL <param1> <param2>	[component number] 0 ~ 63	Max 16-byte Characters		
READ:DAB:COMPONENT:LABEL_HEX? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:LABEL_HEX <param1> <param2>	[component number] 0 ~ 63	Max 16-byte Hexadecimal Values		
READ:DAB:COMPONENT:CHAR_SET? <param1>	[component number] 0 ~ 63			3.1.3.1 CHAR_SET
CONF:DAB:COMPONENT:CHAR_SET <param1> <param2>	[component number] 0 ~ 63	EBU_LATIN, UTF_16, UTF_8		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:COMPONENT:CHAR_FLAG? <param1>	[component number] 0 ~ 63			3.1.3.1 CHAR_FLAG
CONF:DAB:COMPONENT:CHAR_FLAG <param1> <param2>	[component number] 0 ~ 63	0x0000 ~ 0xFF00		
READ:DAB:COMPONENT:EXTEND_LABEL? <param1>	[component number] 0 ~ 63			3.1.3.1 EXTEND_LABEL
CONF:DAB:COMPONENT:EXTEND_LABEL <param1> <param2>	[component number] 0 ~ 63	OFF, ON		
READ:DAB:COMPONENT:E_LABEL? <param1>	[component number] 0 ~ 63			3.1.3.1 E_LABEL
CONF:DAB:COMPONENT:E_LABEL <param1> <param2>	[component number] 0 ~ 63	Max 32-byte Characters		
READ:DAB:COMPONENT:E_LABEL_HEX? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:E_LABEL_HEX <param1> <param2>	[component number] 0 ~ 63	Max 32-byte Hexadecimal Values		
READ:DAB:COMPONENT:ENCODING_FLAG? <param1>	[component number] 0 ~ 63			3.1.3.1 ENCODING_FLAG
CONF:DAB:COMPONENT:ENCODING_FLAG <param1> <param2>	[component number] 0 ~ 63	UTF_8, UTF_16		
READ:DAB:COMPONENT:TEXT_CONTROL? <param1>	[component number] 0 ~ 63			3.1.3.1 TEXT_CONTROL
READ:DAB:COMPONENT:BIDI_FLAG? <param1>	[component number] 0 ~ 63			3.1.3.1 BIDI_FLAG
CONF:DAB:COMPONENT:BIDI_FLAG <param1> <param2>	[component number] 0 ~ 63	0, 1		
READ:DAB:COMPONENT:BASE_DIRECTION? <param1>	[component number] 0 ~ 63			3.1.3.1 BASE_DIRECTION
CONF:DAB:COMPONENT:BASE_DIRECTION <param1> <param2>	[component number] 0 ~ 63	LTR, RTL		
READ:DAB:COMPONENT:CONTEXTUAL_FLAG? <param1>	[component number] 0 ~ 63			3.1.3.1 CONTEXTUAL_FLAG
CONF:DAB:COMPONENT:CONTEXTUAL_FLAG <param1> <param2>	[component number] 0 ~ 63	0, 1		
READ:DAB:COMPONENT:COMBINING_FLAG? <param1>	[component number] 0 ~ 63			3.1.3.1 COMBINING_FLAG

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:COMPONENT:COMBINING_FLAG <param1> <param2>	[component number] 0 ~ 63	0, 1		
READ:DAB:COMPONENT:LANGUAGE? <param1>	[component number] 0 ~ 63			3.1.3.1 LANGUAGE
CONF:DAB:COMPONENT:LANGUAGE <param1> <param2>	[component number] 0 ~ 63	0 ~ 255		
READ:DAB:COMPONENT:SUBCH_ID? <param1>	[component number] 0 ~ 63			3.1.3.1 SUBCH_ID
CONF:DAB:COMPONENT:SUBCH_ID <param1> <param2>	[component number] 0 ~ 63	0 ~ 63		
READ:DAB:COMPONENT:ASCTY? <param1>	[component number] 0 ~ 63			3.1.3.2, 3.1.3.4 ASCTY
CONF:DAB:COMPONENT:ASCTY <param1> <param2>	[component number] 0 ~ 63	0 ~ 63		
READ:DAB:COMPONENT:DSCTY? <param1>	[component number] 0 ~ 63			3.1.3.3, 3.1.3.5, 3.1.3.6 DSCTY
CONF:DAB:COMPONENT:DSCTY <param1> <param2>	[component number] 0 ~ 63	0 ~ 63		
READ:DAB:COMPONENT:UATY? <param1>	[component number] 0 ~ 63			3.1.3.3, 3.1.3.5, 3.1.3.6 UATY
CONF:DAB:COMPONENT:UATY <param1> <param2>	[component number] 0 ~ 63	0 ~ 255		
READ:DAB:COMPONENT:BER_DATA? <param1>	[component number] 0 ~ 63			3.1.3.1 BER_DATA
CONF:DAB:COMPONENT:BER_DATA <param1> <param2>	[component number] 0 ~ 63	ALL_ZERO, ALL_ONE		
READ:DAB:COMPONENT:PKT_ADR? <param1>	[component number] 0 ~ 63			3.1.3.1 PKT_ADR
CONF:DAB:COMPONENT:PKT_ADR <param1> <param2>	[component number] 0 ~ 63	0x000 ~ 0x3FF		
READ:DAB:COMPONENT:PAD_TYPE? <param1>	[component number] 0 ~ 63			3.1.3.2 PAD_TYPE
CONF:DAB:COMPONENT:PAD_TYPE <param1> <param2>	[component number] 0 ~ 63	OFF, DLS, DL+, SLS, SPI		
READ:DAB:COMPONENT:HEADLINE_MODE? <param1>	[component number] 0 ~ 63			3.1.3.2 HEADLINE_MODE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:COMPONENT:HEADLINE_MODE <param1> <param2>	[component number] 0 ~ 63	OFF, ON		
READ:DAB:COMPONENT:DLS_HEADLINE? <param1>	[component number] 0 ~ 63			3.1.3.2 HEADLINE
CONF:DAB:COMPONENT:DLS_HEADLINE <param1> <param2>	[component number] 0 ~ 63	Max 32-byte Characters		
READ:DAB:COMPONENT:DLS_HEADLINE_HEX? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:DLS_HEADLINE_HEX <param1> <param2>	[component number] 0 ~ 63	Max 32-byte Hexadecimal Values		
READ:DAB:COMPONENT:DLS? <param1>	[component number] 0 ~ 63			3.1.3.2 DLS
CONF:DAB:COMPONENT:DLS <param1> <param2>	[component number] 0 ~ 63	Max 128-byte Characters		
READ:DAB:COMPONENT:DLS_HEX? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:DLS_HEX <param1> <param2>	[component number] 0 ~ 63	Max 128-byte Hexadecimal Values		
READ:DAB:COMPONENT:DLS_SET? <param1>	[component number] 0 ~ 63			3.1.3.2 DLS_SET
CONF:DAB:COMPONENT:DLS_SET <param1> <param2>	[component number] 0 ~ 63	EBU_LATIN, UTF_16, UTF_8		
READ:DAB:COMPONENT:DLS_CLEAR_CMD? <param1>	[component number] 0 ~ 63			3.1.3.2 DLS_CLEAR_CMD
CONF:DAB:COMPONENT:DLS_CLEAR_CMD <param1> <param2>	[component number] 0 ~ 63	OFF, ON		
READ:DAB:COMPONENT:DLS_TOGGLE_BIT? <param1>	[component number] 0 ~ 63			3.1.3.2 DLS_TOGGLE_BIT
CONF:DAB:COMPONENT:DLS_TOGGLE_BIT <param1> <param2>	[component number] 0 ~ 63	0,1		
READ:DAB:COMPONENT:CMD_TOGGLE_BIT? <param1>	[component number] 0 ~ 63			3.1.3.2 CMD_TOGGLE_BIT
CONF:DAB:COMPONENT:CMD_TOGGLE_BIT <param1> <param2>	[component number] 0 ~ 63	0,1		
READ:DAB:COMPONENT:DRC? <param1>	[component number] 0 ~ 63			3.1.3.2 DRC

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:COMPONENT:DRC <param1> <param2>	[component number] 0 ~ 63	OFF, ON		
READ:DAB:COMPONENT:DRC_VALUE? <param1>	[component number] 0 ~ 63			3.1.3.2 DRC_VALUE
CONF:DAB:COMPONENT:DRC_VALUE <param1> <param2>	[component number] 0 ~ 63	0.00 ~ 15.75 [0.25dB STEP]		
READ:DAB:COMPONENT:XPAD_DATA_LEN? <param1>	[component number] 0 ~ 63			3.1.3.2 XPAD_DATA_LEN
CONF:DAB:COMPONENT:XPAD_DATA_LEN <param1> <param2>	[component number] 0 ~ 63	4, 6, 8, 12, 16, 24, 32, 48		
READ:DAB:COMPONENT:TAG? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG
CONF:DAB:COMPONENT:TAG <param1> <param2>	[component number] 0 ~ 63	OFF, ON		
READ:DAB:COMPONENT:TAG0_TYPE? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:TAG0_TYPE <param1> <param2>	[component number] 0 ~ 63	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT,		3.1.3.2 TAG_TYPE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:DAB:COMPONENT:TAG0_START? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_START
CONF:DAB:COMPONENT:TAG0_START <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:TAG0_LENGTH? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_LENGTH
CONF:DAB:COMPONENT:TAG0_LENGTH <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:TAG1_TYPE? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_TYPE
CONF:DAB:COMPONENT:TAG1_TYPE <param1> <param2>	[component number] 0 ~ 63	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:DAB:COMPONENT:TAG1_START? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_START
CONF:DAB:COMPONENT:TAG1_START <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:TAG1_LENGTH? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_LENGTH
CONF:DAB:COMPONENT:TAG1_LENGTH <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:COMPONENT:TAG2_TYPE? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:TAG2_TYPE <param1> <param2>	[component number] 0 ~ 63	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2,		3.1.3.2 TAG_TYPE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:DAB:COMPONENT:TAG2_START? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_START
CONF:DAB:COMPONENT:TAG2_START <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:TAG2_LENGTH? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_LENGTH
CONF:DAB:COMPONENT:TAG2_LENGTH <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:TAG3_TYPE? <param1>	[component number] 0 ~ 63			
CONF:DAB:COMPONENT:TAG3_TYPE <param1> <param2>	[component number] 0 ~ 63	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY,		3.1.3.2 TAG_TYPE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:DAB:COMPONENT:TAG3_START? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_START
CONF:DAB:COMPONENT:TAG3_START <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:TAG3_LENGTH? <param1>	[component number] 0 ~ 63			3.1.3.2 TAG_LENGTH
CONF:DAB:COMPONENT:TAG3_LENGTH <param1> <param2>	[component number] 0 ~ 63	0 ~ 127		
READ:DAB:COMPONENT:PAD_SLS_CONTENTS? <param1>	[component number] 0 ~ 63			3.1.3.2 CONTENTS (for XPAD)
CONF:DAB:COMPONENT:PAD_SLS_CONTENTS <param1> <param2>	[component number] 0 ~ 63	File name		
READ:DAB:COMPONENT:TRANSPORT_ID? <param1>	[component number] 0 ~ 63			3.1.3.2 TRANSPORT_ID
CONF:DAB:COMPONENT:TRANSPORT_ID <param1> <param2>	[component number] 0 ~ 63	0x0000 ~ 0xFFFF		
READ:DAB:COMPONENT:EPG_NUM? <param1>	[component number] 0 ~ 63			3.1.3.2, 3.1.3.5 EPG_NUM
CONF:DAB:COMPONENT:EPG_NUM <param1> <param2>	[component number] 0 ~ 63	1 ~ 3		
READ:DAB:COMPONENT:EPG_ID? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 EPG_ID_00 ~ 02

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:COMPONENT:EPG_ID <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	0x0000 ~ 0xFFFF	
READ:DAB:COMPONENT:EPG_SHORT_NAME? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 SHORT_NAME
CONF:DAB:COMPONENT:EPG_SHORT_NAME <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	Max 8-byte Characters	
READ:DAB:COMPONENT:EPG_MEDIUM_NAME? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 MEDIUM_NAME
CONF:DAB:COMPONENT:EPG_MEDIUM_NAME <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	Max 16-byte Characters	
READ:DAB:COMPONENT:EPG_LONG_NAME? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 LONG_NAME
CONF:DAB:COMPONENT:EPG_LONG_NAME <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	Max 32-byte Characters	
READ:DAB:COMPONENT:EPG_HOUR? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 HOUR
CONF:DAB:COMPONENT:EPG_HOUR <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	0 ~ 23	
READ:DAB:COMPONENT:EPG_MINUTE? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 MINUTE
CONF:DAB:COMPONENT:EPG_MINUTE <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	0 ~ 59	
READ:DAB:COMPONENT:EPG_DURATION? <param1> <param2>	[component number] 0 ~ 63	[EPG index] 0 ~ 2		3.1.3.2, 3.1.3.5 DURATION
CONF:DAB:COMPONENT:EPG_DURATION <param1> <param2> <param3>	[component number] 0 ~ 63	[EPG index] 0 ~ 2	1 ~ 1000	
READ:DAB:COMPONENT:START_CU_MODE?				3.1.3.1 START_CU_MODE
CONF:DAB:COMPONENT:START_CU_MODE <param2>		AUTO, MANUAL		
READ:DAB:COMPONENT:START_CU? <param1>	[component number] 0 ~ 63			3.1.3.1 START_CU
CONF:DAB:COMPONENT:START_CU <param1> <param2>	[component number] 0 ~ 63	0 ~ 863		

9.4.5 DAB FUNCTION Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:FUNCTION:TEST_ITEM?				-
CONF:DAB:FUNCTION:TEST_ITEM <param1>	RECONFIGURATION, ANNOUNCEMENT, ALTERNATIVE_FREQ, SCI, TII, TIME			
READ:DAB:FUNCTION:RC_MODE?				3.1.4.1 MODE
CONF:DAB:FUNCTION:RC_MODE <param1>	OFF, ON			
EXEC:DAB:FUNCTION:RC_EXECUTE				3.1.4.1 EXECUTE
READ:DAB:FUNCTION:AN_MODE?				3.1.4.2 MODE
CONF:DAB:FUNCTION:AN_MODE <param1>	TUNED_ENSEMBLE, OTHER_ENSEMBLE			
READ:DAB:FUNCTION:AN_SUPPORT?				3.1.4.2 SUPPORT
CONF:DAB:FUNCTION:AN_SUPPORT <param1>	OFF, ON			
READ:DAB:FUNCTION:AN_NUM_OF_SVC?				3.1.4.2 NUM_OF_SVC
CONF:DAB:FUNCTION:AN_NUM_OF_SVC <param1>	1 ~ 5			
READ:DAB:FUNCTION:AN_SOURCE_SRV? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 AN_SOURCE_SVC_00 - AN_SOURCE_SVC_63
CONF:DAB:FUNCTION:AN_SOURCE_SRV <param1> <param2>	[Announcement index] 0 ~ 4	SERVICE_00 ~ SERVICE_63		
READ:DAB:FUNCTION:AN_SUPPORT_ALARM? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 ALARM
CONF:DAB:FUNCTION:AN_SUPPORT_ALARM <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_TRAFFIC? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 TRAFFIC
CONF:DAB:FUNCTION:AN_SUPPORT_TRAFFIC <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:FUNCTION:AN_SUPPORT_TRAVEL? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 TRAVEL
CONF:DAB:FUNCTION:AN_SUPPORT_TRAVEL <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_WARNING? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 WARNING
CONF:DAB:FUNCTION:AN_SUPPORT_WARNING <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_NEWS? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 NEWS
CONF:DAB:FUNCTION:AN_SUPPORT_NEWS <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_WEATHER? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 WEATHER
CONF:DAB:FUNCTION:AN_SUPPORT_WEATHER <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_EVENT? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 EVENT
CONF:DAB:FUNCTION:AN_SUPPORT_EVENT <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_SPECIAL? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 SPECIAL
CONF:DAB:FUNCTION:AN_SUPPORT_SPECIAL <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_RAD_INFO? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 RAD_INFO
CONF:DAB:FUNCTION:AN_SUPPORT_RAD_INFO <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_SPORTS? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 SPORTS
CONF:DAB:FUNCTION:AN_SUPPORT_SPORTS <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		
READ:DAB:FUNCTION:AN_SUPPORT_FINANCE? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 FINANCE
CONF:DAB:FUNCTION:AN_SUPPORT_FINANCE <param1> <param2>	[Announcement index] 0 ~ 4	OFF, ON		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:FUNCTION:AN_NUM_OF_SU_CLUSTER? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 NUM_OF_CLUSTER (for Support)
CONF:DAB:FUNCTION:AN_NUM_OF_SU_CLUSTER <param1> <param2>	[Announcement index] 0 ~ 4	1 ~ 5		
READ:DAB:FUNCTION:AN_SU_CLUSTER_ID? <param1> <param2>	[Announcement index] 0 ~ 4	[Cluster index] 0 ~ 4		3.1.4.2 CLUSTER_ID_xx (for Support)
CONF:DAB:FUNCTION:AN_SU_CLUSTER_ID <param1> <param2> <param3>	[Announcement index] 0 ~ 4	[Cluster index] 0 ~ 4	0x01 ~ 0xFE	
READ:DAB:FUNCTION:FIG0/0_ALARM_FLAG?				3.1.4.2 FIG0/0_ALARM_FLAG
CONF:DAB:FUNCTION:FIG0/0_ALARM_FLAG <param1>	OFF, ON			
READ:DAB:FUNCTION:AN_NUM_OF_SW_CLUSTER?				3.1.4.2 NUM_OF_CLUSTER (for Switching)
CONF:DAB:FUNCTION:AN_NUM_OF_SW_CLUSTER <param1>	1 ~ 5			
READ:DAB:FUNCTION:AN_SW_CLUSTER_ID? <param1>	[Cluster index] 0 ~ 4			3.1.4.2 CLUSTER_ID_xx (for Switching)
CONF:DAB:FUNCTION:AN_SW_CLUSTER_ID <param1> <param2>	[Cluster index] 0 ~ 4	0x01 ~ 0xFF		
READ:DAB:FUNCTION:AN_SWITCH_TYPE? <param1>	[Cluster index] 0 ~ 4			3.1.4.2 AN_SWITCH_TYPE
CONF:DAB:FUNCTION:AN_SWITCH_TYPE <param1> <param2>	[Cluster index] 0 ~ 4	ALARM, TRAFFIC, TRAVEL, WARNING, NEWS, WEATHER, EVENT, SPECIAL, RAD_INFO, SPORTS, FINANCE, ABNORMAL		
READ:DAB:FUNCTION:AN_TARGET_CH? <param1>	[Cluster index] 0 ~ 4			3.1.4.2 TARGET_CH
CONF:DAB:FUNCTION:AN_TARGET_CH <param1> <param2>	[Cluster index] 0 ~ 4	COMPONENT00 ~ COMPONENT63		
READ:DAB:FUNCTION:AN_OE_EID? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 OE_EID
CONF:DAB:FUNCTION:AN_OE_EID <param1> <param2>	[Announcement index] 0 ~ 4	0x0000 ~ 0xFFFF		
READ:DAB:FUNCTION:AN_OE_SID? <param1>	[Announcement index] 0 ~ 4			3.1.4.2 OE_SID

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:FUNCTION:AN_OE_SID <param1> <param2>	[Announcement index] 0 ~ 4	0x0000 ~ 0xFFFF		
READ:DAB:FUNCTION:AN_SWITCHING?				3.1.4.2 AN_SWITCHING
CONF:DAB:FUNCTION:AN_SWITCHING <param1>	OFF, ON			
READ:DAB:FUNCTION:AF_SVC_TO_DAB:NUM?				3.1.4.3 NUM
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:NUM <param1>	0 ~ 10			
READ:DAB:FUNCTION:AF_SVC_TO_DAB:TUNED_SVC? <param1>	[AF index] 0 ~ 9			3.1.4.3 TUNED_SVC
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_00 ~ SERVICE_63		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_SID? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_SID
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_SID <param1> <param2>	[AF index] 0 ~ 9	0x00000000 ~ 0xFFFFFFFF		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:ILS? <param1>	[AF index] 0 ~ 9			3.1.4.3 ILS
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:ILS <param1> <param2>	[AF index] 0 ~ 9	NATIONAL, INTERNATIONAL		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_EID? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_EID
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_EID <param1> <param2>	[AF index] 0 ~ 9	0x0000 ~ 0xFFFF		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_FREQ
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	0.016 ~ 8388.529		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:CONTINUITY? <param1>	[AF index] 0 ~ 9			3.1.4.3 CONTINUITY
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:CONTINUITY <param1> <param2>	[AF index] 0 ~ 9	OFF, ON		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_ECC? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_ECC
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:OTHER_ECC <param1> <param2>	[AF index] 0 ~ 9	0 ~ 255		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:FUNCTION:AF_SVC_TO_DAB:CEI? <param1>	[AF index] 0 ~ 9			3.1.4.3 CEI
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:CEI <param1> <param2>	[AF index] 0 ~ 9	LONG_TERM, SHORT_TERM		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:LSN? <param1>	[AF index] 0 ~ 9			3.1.4.3 LSN
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:LSN <param1> <param2>	[AF index] 0 ~ 9	1 ~ 4095		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:LA? <param1>	[AF index] 0 ~ 9			3.1.4.3 LA
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:LA <param1> <param2>	[AF index] 0 ~ 9	ACTIVE_LINK, FUTURE_LINK		
READ:DAB:FUNCTION:AF_SVC_TO_DAB:S_H? <param1>	[AF index] 0 ~ 9			3.1.4.3 S/H
CONF:DAB:FUNCTION:AF_SVC_TO_DAB:S_H <param1> <param2>	[AF index] 0 ~ 9	HARD_LINK, SOFT_LINK		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:NUM?				3.1.4.3 NUM
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:NUM <param1>	0 ~ 9			
READ:DAB:FUNCTION:AF_SVC_TO_RDS:TUNED_SVC? <param1>	[AF index] 0 ~ 9			3.1.4.3 TUNED_SVC
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_00 ~ SERVICE_63		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:OTHER_PID? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_PID
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:OTHER_PID <param1> <param2>	[AF index] 0 ~ 9	0x0001 ~ 0xFFFF		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:ILS? <param1>	[AF index] 0 ~ 9			3.1.4.3 ILS
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:ILS <param1> <param2>	[AF index] 0 ~ 9	NATIONAL, INTERNATIONAL		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_FREQ
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	87.6 ~ 107.9		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:CONTINUITY? <param1>	[AF index] 0 ~ 9			3.1.4.3 CONTINUITY

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:CONTINUITY <param1> <param2>	[AF index] 0 ~ 9	OFF, ON		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:OTHER_ECC? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_ECC
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:OTHER_ECC <param1> <param2>	[AF index] 0 ~ 9	0 ~ 255		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:CEI? <param1>	[AF index] 0 ~ 9			3.1.4.3 CEI
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:CEI <param1> <param2>	[AF index] 0 ~ 9	LONG_TERM, SHORT_TERM		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:LSN? <param1>	[AF index] 0 ~ 9			3.1.4.3 LSN
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:LSN <param1> <param2>	[AF index] 0 ~ 9	1 ~ 4095		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:LA? <param1>	[AF index] 0 ~ 9			3.1.4.3 LA
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:LA <param1> <param2>	[AF index] 0 ~ 9	ACTIVE_LINK, FUTURE_LINK		
READ:DAB:FUNCTION:AF_SVC_TO_RDS:S_H? <param1>	[AF index] 0 ~ 9			3.1.4.3 S/H
CONF:DAB:FUNCTION:AF_SVC_TO_RDS:S_H <param1> <param2>	[AF index] 0 ~ 9	HARD_LINK, SOFT_LINK		
READ:DAB:FUNCTION:AF_SVC_TO_AM:NUM?				3.1.4.3 NUM
CONF:DAB:FUNCTION:AF_SVC_TO_AM:NUM <param1>	0 ~ 10			
READ:DAB:FUNCTION:AF_SVC_TO_AM:TUNED_SVC? <param1>	[AF index] 0 ~ 9			3.1.4.3 TUNED_SVC
CONF:DAB:FUNCTION:AF_SVC_TO_AM:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_00 ~ SERVICE_63		
READ:DAB:FUNCTION:AF_SVC_TO_AM:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_FREQ
CONF:DAB:FUNCTION:AF_SVC_TO_AM:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	0.005 ~ 327.675		
READ:DAB:FUNCTION:AF_SVC_TO_AM:CONTINUITY? <param1>	[AF index] 0 ~ 9			3.1.4.3 CONTINUITY
CONF:DAB:FUNCTION:AF_SVC_TO_AM:CONTINUITY <param1> <param2>	[AF index] 0 ~ 9	OFF, ON		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:FUNCTION:AF_SVC_TO_AM:CEI? <param1>	[AF index] 0 ~ 9			3.1.4.3 CEI
CONF:DAB:FUNCTION:AF_SVC_TO_AM:CEI <param1> <param2>	[AF index] 0 ~ 9	LONG_TERM, SHORT_TERM		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:NUM?				3.1.4.3 NUM
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:NUM <param1>	0 ~ 10			
READ:DAB:FUNCTION:AF_SVC_TO_DRM:TUNED_SVC? <param1>	[AF index] 0 ~ 9			3.1.4.3 TUNED_SVC
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_00 ~ SERVICE_63		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:OTHER_SID? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_SID
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:OTHER_SID <param1> <param2>	[AF index] 0 ~ 9	0x000000 ~ 0xFFFFFF		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:ILS? <param1>	[AF index] 0 ~ 9			3.1.4.3 ILS
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:ILS <param1> <param2>	[AF index] 0 ~ 9	NATIONAL, INTERNATIONAL		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_FREQ
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	0.001 ~ 32.767		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:CONTINUITY? <param1>	[AF index] 0 ~ 9			3.1.4.3 CONTINUITY
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:CONTINUITY <param1> <param2>	[AF index] 0 ~ 9	OFF, ON		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:OTHER_ECC? <param1>	[AF index] 0 ~ 9			3.1.4.3 OTHER_ECC
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:OTHER_ECC <param1> <param2>	[AF index] 0 ~ 9	0 ~ 255		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:CEI? <param1>	[AF index] 0 ~ 9			3.1.4.3 CEI
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:CEI <param1> <param2>	[AF index] 0 ~ 9	LONG_TERM, SHORT_TERM		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:LSN? <param1>	[AF index] 0 ~ 9			3.1.4.3 LSN

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:LSN <param1> <param2>	[AF index] 0 ~ 9	1 ~ 4095		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:LA? <param1>	[AF index] 0 ~ 9			3.1.4.3 LA
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:LA <param1> <param2>	[AF index] 0 ~ 9	ACTIVE_LINK, FUTURE_LINK		
READ:DAB:FUNCTION:AF_SVC_TO_DRM:S_H? <param1>	[AF index] 0 ~ 9			3.1.4.3 S/H
CONF:DAB:FUNCTION:AF_SVC_TO_DRM:S_H <param1> <param2>	[AF index] 0 ~ 9	HARD_LINK, SOFT_LINK		
READ:DAB:FUNCTION:SCI_MODE?				3.1.4.5 MODE
CONF:DAB:FUNCTION:SCI_MODE <param1>	OFF, ON			
READ:DAB:FUNCTION:SCI_CHANGE_FLAG?				3.1.4.5 CHANGE_FLAG
CONF:DAB:FUNCTION:SCI_CHANGE_FLAG <param1>	REMAIN, ADD, REMOVE, REMOVE_ALL			
READ:DAB:FUNCTION:SCI_SERVICE?				3.1.4.5 SERVICE
CONF:DAB:FUNCTION:SCI_SERVICE <param1>	SERVICE_00 ~ SERVICE_63			
READ:DAB:FUNCTION:SCI_PART_TIME_FLAG?				3.1.4.5 PART_TIME_FLAG
CONF:DAB:FUNCTION:SCI_PART_TIME_FLAG <param1>	24_HOURS, PART_TIME			
READ:DAB:FUNCTION:SCI_SID_FLAG?				3.1.4.5 SID_FLAG
CONF:DAB:FUNCTION:SCI_SID_FLAG <param1>	OFF, ON			
READ:DAB:FUNCTION:SCI_SID?				3.1.4.5 SID
CONF:DAB:FUNCTION:SCI_SID <param1>	0x0000 ~ 0xFFFF			
READ:DAB:FUNCTION:SCI_EID_FLAG?				3.1.4.5 EID_FLAG
CONF:DAB:FUNCTION:SCI_EID_FLAG <param1>	OFF, ON			
READ:DAB:FUNCTION:SCI_EID?				3.1.4.5 EID
CONF:DAB:FUNCTION:SCI_EID <param1>	0x0000 ~ 0xFFFF			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DAB:FUNCTION:SCI_YEAR?				3.1.4.5 YEAR
CONF:DAB:FUNCTION:SCI_YEAR <param1>	1900 ~ 2200			
READ:DAB:FUNCTION:SCI_MONTH?				3.1.4.5 MONTH
CONF:DAB:FUNCTION:SCI_MONTH <param1>	1 ~ 12			
READ:DAB:FUNCTION:SCI_DAY?				3.1.4.5 DAY
CONF:DAB:FUNCTION:SCI_DAY <param1>	1 ~ 31			
READ:DAB:FUNCTION:SCI_HOUR?				3.1.4.5 HOUR
CONF:DAB:FUNCTION:SCI_HOUR <param1>	0 ~ 23			
READ:DAB:FUNCTION:SCI_MINUTE?				3.1.4.5 MINUTE
CONF:DAB:FUNCTION:SCI_MINUTE <param1>	0 ~ 59			
READ:DAB:FUNCTION:SCI_SECOND?				3.1.4.5 SECOND
CONF:DAB:FUNCTION:SCI_SECOND <param1>	0 ~ 59			
READ:DAB:FUNCTION:TII?				3.1.4.6 TII
CONF:DAB:FUNCTION:TII <param1>	OFF, ON			
READ:DAB:FUNCTION:TII_SUB_ID?				3.1.4.6 SUB_ID
CONF:DAB:FUNCTION:TII_SUB_ID <param1>	0 ~ 23			
READ:DAB:FUNCTION:TII_MAIN_ID?				3.1.4.6 MAIN_ID
CONF:DAB:FUNCTION:TII_MAIN_ID <param1>	0 ~ 69			
READ:DAB:FUNCTION:TIME?				3.1.4.7 TIME
CONF:DAB:FUNCTION:TIME <param1>	OFF, ON			
READ:DAB:FUNCTION:YEAR?				3.1.4.7 YEAR
CONF:DAB:FUNCTION:YEAR <param1>	1900 ~ 2200			
READ:DAB:FUNCTION:MONTH?				3.1.4.7

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:FUNCTION:MONTH <param1>	1 ~ 12			MONTH
READ:DAB:FUNCTION:DAY?				3.1.4.7 DAY
CONF:DAB:FUNCTION:DAY <param1>	1 ~ 31			
READ:DAB:FUNCTION:HOUR?				3.1.4.7 HOUR
CONF:DAB:FUNCTION:HOUR <param1>	0 ~ 23			
READ:DAB:FUNCTION:MINUTE?				3.1.4.7 MINUTE
CONF:DAB:FUNCTION:MINUTE <param1>	0 ~ 59			
READ:DAB:FUNCTION:LTO?				3.1.4.7 LTO
CONF:DAB:FUNCTION:LTO <param1>	-31 ~ 31			
READ:DAB:FUNCTION:EWS_ALERT?				3.1.4.4 EWS_ALERT
CONF:DAB:FUNCTION:EWS_ALERT <param1>	OFF HEARTBEAT_ONLY START_&_REPEAT UPDATE_&_REPEAT END			
READ:DAB:FUNCTION:EWS_MODE?				3.1.4.4 EWS_MODE
CONF:DAB:FUNCTION:EWS_MODE <param1>	TUNED_ENSEMBLE OTHER_ENSEMBLE			
READ:DAB:FUNCTION:EWS_SUBCHID?				3.1.4.4 EWS_SUBCHID
CONF:DAB:FUNCTION:EWS_SUBCHID <param1>	0 ~ 63			
READ:DAB:FUNCTION:EWS_SEVERITY?				3.1.4.4 EWS_SEVERITY
CONF:DAB:FUNCTION:EWS_SEVERITY <param1>	LEVEL_1 LEVEL_2			
READ:DAB:FUNCTION:EWS_NUM_OF_LOCATION?				3.1.4.4 EWS_NUM_OF_LOCATION
CONF:DAB:FUNCTION:EWS_NUM_OF_LOCATION <param1>	0 ~ 4			
READ:DAB:FUNCTION:EWS_NUM_OF_LOCATION?				3.1.4.4

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:FUNCTION:EWS_NUM_OF_LOCATION <param1>	0 ~ 4			EWS_NUM_OF_LOCATION
READ:DAB:FUNCTION:EWS_OE_EID?				3.1.4.4 EWS_OE_EID
CONF:DAB:FUNCTION:EWS_OE_EID <param1>	0x0 ~ 0xFFFF			
READ:DAB:FUNCTION:EWS_INCIDENT_ID?				3.1.4.4 EWS_INCIDENT_ID
CONF:DAB:FUNCTION:EWS_INCIDENT_ID <param1>	0 ~ 15			
READ:DAB:FUNCTION:SYNCHRONIZED_ALERT?				3.1.4.4 EWS_SYNCHRONIZED_ALERT
CONF:DAB:FUNCTION:SYNCHRONIZED_ALERT <param1>	OFF ON			
READ:DAB:FUNCTION:EWS_REPEAT_INTERVAL?				3.1.4.4 EWS_REPEAT_INTERVAL
CONF:DAB:FUNCTION:EWS_REPEAT_INTERVAL <param1>	10 ~ 3600			
READ:DAB:FUNCTION:EWS_ZONE? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_ZONE_00 ~ EWS_ZONE_03
CONF:DAB:FUNCTION:EWS_ZONE <param1> <param2>	[Zone index] 0 ~ 3	0 ~ 41		
READ:DAB:FUNCTION:EWS_SCF? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_SCF
CONF:DAB:FUNCTION:EWS_SCF <param1> <param2>	[Zone index] 0 ~ 3	OFF ON		
READ:DAB:FUNCTION:EWS_NUM_OF_DIGIT? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_NUM_OF_DIGIT
CONF:DAB:FUNCTION:EWS_NUM_OF_DIGIT <param1> <param2>	[Zone index] 0 ~ 3	0 ~ 5		
READ:DAB:FUNCTION:EWS_DIGIT_1? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_DIGIT_1
CONF:DAB:FUNCTION:EWS_DIGIT_1 <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xF		
READ:DAB:FUNCTION:EWS_DIGIT_2? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_DIGIT_2
CONF:DAB:FUNCTION:EWS_DIGIT_2 <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xF		
READ:DAB:FUNCTION:EWS_DIGIT_3? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_DIGIT_3

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DAB:FUNCTION:EWS_DIGIT_3 <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xF		
READ:DAB:FUNCTION:EWS_DIGIT_4? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_DIGIT_4
CONF:DAB:FUNCTION:EWS_DIGIT_4 <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xF		
READ:DAB:FUNCTION:EWS_DIGIT_5? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_DIGIT_5
CONF:DAB:FUNCTION:EWS_DIGIT_5 <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xF		
READ:DAB:FUNCTION:EWS_DIGIT_6? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_DIGIT_6
CONF:DAB:FUNCTION:EWS_DIGIT_6 <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xF		
READ:DAB:FUNCTION:EWS_SUB_CODES? <param1>	[Zone index] 0 ~ 3			3.1.4.4 EWS_SUB_CODES
CONF:DAB:FUNCTION:EWS_SUB_CODES <param1> <param2>	[Zone index] 0 ~ 3	0x0 ~ 0xFFFF		

9.4.6 DRM MULTIPLEX Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:MULTIPLEX:PROTOCOL?				4.1.1.1 PROTOCOL
CONF:DRM:MULTIPLEX:PROTOCOL	DRM30, DRM+			
READ:DRM:MULTIPLEX:ROBUSTNESS?				4.1.1.1 ROBUSTNESS
CONF:DRM:MULTIPLEX:ROBUSTNESS	[CONF:DRM:MULTIPLEX:PROTOCOL] For DRM30, A, B, C, D; For DRM+, E			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:MULTIPLEX:SPECTRUM?				4.1.1.1 SPECTRUM
CONF:DRM:MULTIPLEX:SPECTRUM <param1>	[CONF:DRM:MULTIPLEX:PROTOCOL] For DRM30, 4.5kHz, 5kHz, 9kHz, 10kHz, 18kHz, 20kHz; For DRM+, 100kHz			
READ:DRM:MULTIPLEX:INTERLEAVING?				4.1.1.1 INTERLEAVING
CONF:DRM:MULTIPLEX:INTERLEAVING <param1>	LONG, SHORT			
READ:DRM:MULTIPLEX:MSC_MODE?				4.1.1.1 MSC_MODE
CONF:DRM:MULTIPLEX:MSC_MODE <param1>	[CONF:DRM:MULTIPLEX:PROTOCOL] For DRM30, 64QAM, 64QAM_HIER_I, 64QAM_HIER_IQ, 16QAM; For DRM+, 16QAM, 4QAM			
READ:DRM:MULTIPLEX:SDC_MODE?				4.1.1.1 SDC_MODE
CONF:DRM:MULTIPLEX:SDC_MODE <param1>	[CONF:DRM:MULTIPLEX:PROTOCOL] For DRM30, 16QAM, 4QAM; For DRM+, 0.25, 0.5			
READ:DRM:MULTIPLEX:PRT_LEVEL_A?				4.1.1.1 PRT_LEVEL_A
CONF:DRM:MULTIPLEX:PRT_LEVEL_A <param1>	0 ~ 3			
READ:DRM:MULTIPLEX:PRT_LEVEL_B?				4.1.1.1 PRT_LEVEL_B
CONF:DRM:MULTIPLEX:PRT_LEVEL_B <param1>	0 ~ 3			
READ:DRM:MULTIPLEX:PRT_LEVEL_HIER?				4.1.1.1 PRT_LEVEL_HIER

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:MULTIPLEX:PRT_LEVEL_HIER <param1>	0 ~ 3			
READ:DRM:MULTIPLEX:SERVICE? <param1> <param2>	[service number] 0 ~ 3			4.1.1.1 SERVICE_0 - SERVICE_3
CONF:DRM:MULTIPLEX:SERVICE <param1> <param2>	[service number] 0 ~ 3	ON, OFF		

9.4.7 DRM SERVICE Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:SERVICE:LINK_1? <param1>	[service number] 0 ~ 3			4.1.2.1 LINK_1
CONF:DRM:SERVICE:LINK_1 <param1> <param2>	[service number] 0 ~ 3	OFF, STREAM_0 ~ STREAM_3		
READ:DRM:SERVICE:LINK_2? <param1>	[service number] 0 ~ 3			4.1.2.1 LINK_2
CONF:DRM:SERVICE:LINK_2 <param1> <param2>	[service number] 0 ~ 3	OFF, STREAM_0 ~ STREAM_3		
READ:DRM:SERVICE:SHORT_ID? <param1>	[service number] 0 ~ 3			4.1.2.1 SHORT_ID
CONF:DRM:SERVICE:SHORT_ID <param1> <param2>	[service number] 0 ~ 3	0 ~ 3		
READ:DRM:SERVICE:SID? <param1>	[service number] 0 ~ 3			4.1.2.1 SID
CONF:DRM:SERVICE:SID <param1> <param2>	[service number] 0 ~ 3	0x000000 ~ 0xFFFFFF		
READ:DRM:SERVICE:LABEL? <param1>	[service number] 0 ~ 3			4.1.2.1 LABEL
CONF:DRM:SERVICE:LABEL <param1> <param2>	[service number] 0 ~ 3	Max 16-byte Characters		
READ:DRM:SERVICE:LABEL_HEX? <param1>	[service number] 0 ~ 3			
CONF:DRM:SERVICE:LABEL_HEX <param1> <param2>	[service number] 0 ~ 3	Max 16-byte Hexadecimal Values		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:SERVICE:BIDI_FLAG? <param1>	[service number] 0 ~ 3			4.1.2.1 BIDI_FLAG
CONF:DRM:SERVICE:BIDI_FLAG <param1> <param2>	[service number] 0 ~ 3	0, 1		
READ:DRM:SERVICE:BASE_DIRECTION? <param1>	[service number] 0 ~ 3			4.1.2.1 BASE_DIRECTION
CONF:DRM:SERVICE:BASE_DIRECTION <param1> <param2>	[service number] 0 ~ 3	0, 1		
READ:DRM:SERVICE:CONTEXTUAL_FLAG? <param1>	[service number] 0 ~ 3			4.1.2.1 CONTEXTUAL_FLAG
CONF:DRM:SERVICE:CONTEXTUAL_FLAG <param1> <param2>	[service number] 0 ~ 3	0, 1		
READ:DRM:SERVICE:COMBINING_FLAG? <param1>	[service number] 0 ~ 3			4.1.2.1 COMBINING_FLAG
CONF:DRM:SERVICE:COMBINING_FLAG <param1> <param2>	[service number] 0 ~ 3	0, 1		
READ:DRM:SERVICE:LANGUAGE? <param1>	[service number] 0 ~ 3			4.1.2.1 LANGUAGE
CONF:DRM:SERVICE:LANGUAGE <param1> <param2>	[service number] 0 ~ 3	NO_SPECIFIED, ARABIC, BENGALI, CHINESE, DUTCH, ENGLISH, FRENCH, GERMAN, HINDI, JAPANESE, JAVANESE, KOREAN, PORTUGUESE, RUSSIAN, SPANISH, OTHER		
READ:DRM:SERVICE:LANGUAGE_CODE? <param1>	[service number] 0 ~ 3			4.1.2.1 LANGUAGE_CODE
CONF:DRM:SERVICE:LANGUAGE_CODE <param1> <param2>	[service number] 0 ~ 3	Max 3-byte Characters		
READ:DRM:SERVICE:COUNTRY_CODE? <param1>	[service number] 0 ~ 3			4.1.2.1 COUNTRY_CODE
CONF:DRM:SERVICE:COUNTRY_CODE <param1> <param2>	[service number] 0 ~ 3	Max 2-byte Characters		
READ:DRM:SERVICE:PRG_TYPE? <param1>	[service number] 0 ~ 3			4.1.2.1 PRG_TYPE
CONF:DRM:SERVICE:PRG_TYPE <param1> <param2>	[service number] 0 ~ 3	NO_TYPE, NEWS, CURRENT_AFFAIRS, INFORMATION, SPORTS, EDUCATION,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		DRAMA, CULTURE, SCIENCE, VARIED, POP_MUSIC, ROCK_MUSIC, EASY_MUSIC, LIGHT_CLASSIC, SERIOUS_CLASSIC, OTHER_MUSIC, WEATHER, FINANCE, CHILDREN, SOCIAL_AFFAIRS, RELIGION, PHONE_IN, TRAVEL, LEISURE, JAZZ_MUSIC, COUNTRY_MUSIC, NATIONAL_MUSIC, OLDIES_MUSIC, FOLK_MUSIC, DOCUMENTARY		
READ:DRM:SERVICE:DATA_CA? <param1>	[service number] 0 ~ 3			4.1.2.1 DATA_CA
CONF:DRM:SERVICE:DATA_CA <param1> <param2>	[service number] 0 ~ 3	OFF, ON		
READ:DRM:SERVICE:AUDIO_CA? <param1>	[service number] 0 ~ 3			4.1.2.1 AUDIO_CA
CONF:DRM:SERVICE:AUDIO_CA <param1> <param2>	[service number] 0 ~ 3	OFF, ON		

9.4.8 DRM STREAM Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:STREAM:TYPE? <param1>	[stream number] 0 ~ 3			4.1.3.1 TYPE
CONF:DRM:STREAM:TYPE <param1> <param2>	[stream number] 0 ~ 3	AUDIO, DATA_PRBS, DATA_PACKET		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:STREAM:STREAM_ID? <param1>	[stream number] 0 ~ 3			4.1.3.1 STREAM_ID
READ:DRM:STREAM:CONTENTS? <param1>	[stream number] 0 ~ 3			4.1.3.1 CONTENTS
CONF:DRM:STREAM:CONTENTS <param1> <param2>	[stream number] 0 ~ 3	File name		
EXEC:DRM:STREAM:CONTENTS_RST <param1> <param2>	[stream number] 0 ~ 3	0.0 ~ 99.9		4.1.3.1 CONTENTS_RST
READ:DRM:STREAM:PART_A_LENGTH? <param1>	[stream number] 0 ~ 3			4.1.3.1 PART_A_LENGTH
CONF:DRM:STREAM:PART_A_LENGTH <param1> <param2>	[stream number] 0 ~ 3	0 ~ 1200		
READ:DRM:STREAM:PART_B_LENGTH? <param1>	[stream number] 0 ~ 3			4.1.3.1 PART_B_LENGTH
CONF:DRM:STREAM:PART_B_LENGTH <param1> <param2>	[stream number] 0 ~ 3	0 ~ 2400		
READ:DRM:STREAM:AUDIO_CODING? <param1>	[stream number] 0 ~ 3			4.1.3.2 AUDIO_CODING
READ:DRM:STREAM:SBR? <param1>	[stream number] 0 ~ 3			4.1.3.2 SBR
READ:DRM:STREAM:AUDIO_FS? <param1>	[stream number] 0 ~ 3			4.1.3.2 AUDIO_FS
READ:DRM:STREAM:AUDIO_MODE? <param1>	[stream number] 0 ~ 3			4.1.3.2 AUDIO_MODE
READ:DRM:STREAM:SURROUND? <param1>	[stream number] 0 ~ 3			4.1.3.2 SURROUND
READ:DRM:STREAM:TEXT_FLAG? <param1>	[stream number] 0 ~ 3			4.1.3.2 TEXT_FLAG
CONF:DRM:STREAM:TEXT_FLAG <param1> <param2>	[stream number] 0 ~ 3	OFF, ON		
READ:DRM:STREAM:HEADLINE_MODE? <param1>	[stream number] 0 ~ 3			4.1.3.2 HEADLINE_MODE
CONF:DRM:STREAM:HEADLINE_MODE <param1> <param2>	[stream number] 0 ~ 3	OFF, ON		
READ:DRM:STREAM:HEADLINE? <param1>	[stream number] 0 ~ 3			4.1.3.2 HEADLINE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:STREAM:HEADLINE <param1> <param2>	[stream number] 0 ~ 3	Max 32-byte Characters		
READ:DRM:STREAM:HEADLINE_HEX? <param1>	[stream number] 0 ~ 3			
CONF:DRM:STREAM:HEADLINE_HEX <param1> <param2>	[stream number] 0 ~ 3	Max 32-byte Hexadecimal Values		
READ:DRM:STREAM:TEXT? <param1>	[stream number] 0 ~ 3			4.1.3.2 TEXT
CONF:DRM:STREAM:TEXT <param1> <param2>	[stream number] 0 ~ 3	Max 128-byte Characters		
READ:DRM:STREAM:TEXT_HEX? <param1>	[stream number] 0 ~ 3			
CONF:DRM:STREAM:TEXT_HEX <param1>	[stream number] 0 ~ 3	Max 128-byte Hexadecimal Values		
READ:DRM:STREAM:BIDI_FLAG? <param1>	[stream number] 0 ~ 3			4.1.3.2 BIDI_FLAG
CONF:DRM:STREAM:BIDI_FLAG <param1> <param2>	[stream number] 0 ~ 3	0, 1		
READ:DRM:STREAM:BASE_DIRECTION? <param1>	[stream number] 0 ~ 3			4.1.3.2 BASE_DIRECTION
CONF:DRM:STREAM:BASE_DIRECTION <param1> <param2>	[stream number] 0 ~ 3	0, 1		
READ:DRM:STREAM:CONTEXTUAL_FLAG? <param1>	[stream number] 0 ~ 3			4.1.3.2 CONTEXTUAL_FLAG
CONF:DRM:STREAM:CONTEXTUAL_FLAG <param1> <param2>	[stream number] 0 ~ 3	0, 1		
READ:DRM:STREAM:COMBINING_FLAG? <param1>	[stream number] 0 ~ 3			4.1.3.2 COMBINING_FLAG
CONF:DRM:STREAM:COMBINING_FLAG <param1> <param2>	[stream number] 0 ~ 3	0, 1		
READ:DRM:STREAM:PATTERN? <param1>	[stream number] 0 ~ 3			4.1.3.3 PATTERN
CONF:DRM:STREAM:PATTERN <param1> <param2>	[stream number] 0 ~ 3	PRBS_SYNC, PRBS_ASYNC, 0000_0000, 1111_1111, 1010_1010,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		1111_0000		
READ:DRM:STREAM:DATA_UNIT? <param1>	[stream number] 0 ~ 3			4.1.3.4 DATA_UNIT
READ:DRM:STREAM:PACKET_ID? <param1>	[stream number] 0 ~ 3			4.1.3.4 PACKET_ID
READ:DRM:STREAM:ENHANCEMENT_FLAG? <param1>	[stream number] 0 ~ 3			4.1.3.4 ENHANCEMENT_FLAG
READ:DRM:STREAM:APPLICATION_DOMAIN? <param1>	[stream number] 0 ~ 3			4.1.3.4 APPLICATION_DOMAIN

9.4.9 DRM FUNCTION Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:FUNCTION:TEST_ITEM?				-
CONF:DRM:FUNCTION:TEST_ITEM <param1>	RECONFIGURATION, ANNOUNCEMENT, ALTERNATIVE_FREQ, TIME			
READ:DRM:FUNCTION:RC_MODE?				4.1.4.1 MODE
CONF:DRM:FUNCTION:RC_MODE <param1>	OFF, ON			
EXEC:DRM:FUNCTION:RC_EXECUTE				4.1.4.1 EXECUTE
READ:DRM:FUNCTION:AN_MODE?				4.1.4.2 MODE
CONF:DRM:FUNCTION:AN_MODE <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_TARGET_SYSTEM?				4.1.4.2 TARGET_SYSTEM
CONF:DRM:FUNCTION:AN_TARGET_SYSTEM <param1>	SAME_DRM, OTHER_DRM, AM, FM_RDS, DAB			
READ:DRM:FUNCTION:AN_SOURCE_SERVICE?				4.1.4.2 SOURCE_SERVICE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:FUNCTION:AN_SOURCE_SERVICE <param1>	SERVICE_0 ~ SERVICE_3, ALL_SERVICE			
READ:DRM:FUNCTION:AN_TARGET_SERVICE?				4.1.4.2 TARGET_SERVICE
CONF:DRM:FUNCTION:AN_TARGET_SERVICE <param1>	SERVICE_0 ~ SERVICE_3			
READ:DRM:FUNCTION:AN_SUPPORT_TRAVEL?				4.1.4.2 SUPPORT_TRAVEL
CONF:DRM:FUNCTION:AN_SUPPORT_TRAVEL <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SUPPORT_NEWS?				4.1.4.2 SUPPORT_NEWS
CONF:DRM:FUNCTION:AN_SUPPORT_NEWS <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SUPPORT_WEATHER?				4.1.4.2 SUPPORT_WEATHER
CONF:DRM:FUNCTION:AN_SUPPORT_WEATHER <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SUPPORT_WARNING?				4.1.4.2 SUPPORT_WARNING
CONF:DRM:FUNCTION:AN_SUPPORT_WARNING <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SWITCH_TRAVEL?				4.1.4.2 SWITCH_TRAVEL
CONF:DRM:FUNCTION:AN_SWITCH_TRAVEL <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SWITCH_NEWS?				4.1.4.2 SWITCH_NEWS
CONF:DRM:FUNCTION:AN_SWITCH_NEWS <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SWITCH_WEATHER?				4.1.4.2 SWITCH_WEATHER
CONF:DRM:FUNCTION:AN_SWITCH_WEATHER <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SWITCH_WARNING?				4.1.4.2 SWITCH_WARNING
CONF:DRM:FUNCTION:AN_SWITCH_WARNING <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_DRM_OTHER_SID?				4.1.4.2 OTHER_SID
CONF:DRM:FUNCTION:AN_DRM_OTHER_SID <param1>	0x000000 ~ 0xFFFFFF			
READ:DRM:FUNCTION:AN_RDS_OTHER_SID?				4.1.4.2

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:FUNCTION:AN_RDS_OTHER_SID <param1>	0x000000 ~ 0xFFFFFF			OTHER_SID
READ:DRM:FUNCTION:AN_DAB_OTHER_SID?				4.1.4.2 OTHER_SID
CONF:DRM:FUNCTION:AN_DAB_OTHER_SID <param1>	0x000000 ~ 0xFFFFFF			
READ:DRM:FUNCTION:AN_DRM_OTHER_FREQ?				4.1.4.2 OTHER_FREQ
CONF:DRM:FUNCTION:AN_DRM_OTHER_FREQ <param1>	0 ~ 327.67			
READ:DRM:FUNCTION:AN_RDS_OTHER_FREQ?				4.1.4.2 OTHER_FREQ
CONF:DRM:FUNCTION:AN_RDS_OTHER_FREQ <param1>	87.5 ~ 107.9			
READ:DRM:FUNCTION:AN_AM_OTHER_FREQ?				4.1.4.2 OTHER_FREQ
CONF:DRM:FUNCTION:AN_AM_OTHER_FREQ <param1>	0 ~ 32.767			
READ:DRM:FUNCTION:AN_DAB_OTHER_FREQ?				4.1.4.2 OTHER_FREQ
CONF:DRM:FUNCTION:AN_DAB_OTHER_FREQ <param1>	5A, 5B, 5C, 5D, 6A, 6B, 6C, 6D, 7A, 7B, 7C, 7D, 8A, 8B, 8C, 8D, 9A, 9B, 9C, 9D, 10A, 10B, 10C, 10D, 11A, 11B, 11C, 11D, 12A, 12B, 12C, 12D, 13A, 13B, 13C, 13D, 13E, 13F			
READ:DRM:FUNCTION:AN_REGION?				4.1.4.2 REGION
CONF:DRM:FUNCTION:AN_REGION <param1>	NO_RESTRICTION, RESTRICTION, RESTRICTION_DETAIL			
READ:DRM:FUNCTION:AN_LATITUDE?				4.1.4.2 LATITUDE
CONF:DRM:FUNCTION:AN_LATITUDE <param1>	-90.0 ~ 90.0			
READ:DRM:FUNCTION:AN_LATITUDE_EXT?				4.1.4.2 LATITUDE_EXT
CONF:DRM:FUNCTION:AN_LATITUDE_EXT <param1>	0.1 ~ 90.0			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:FUNCTION:AN_LONGITUDE?				4.1.4.2 LONGITUDE
CONF:DRM:FUNCTION:AN_LONGITUDE <param1>	-180.0 ~ 179.9			
READ:DRM:FUNCTION:AN_LONGITUDE_EXT?				4.1.4.2 LONGITUDE_EXT
CONF:DRM:FUNCTION:AN_LONGITUDE_EXT <param1>	0.1 ~ 179.9			
READ:DRM:FUNCTION:AN_SCHEDULE?				4.1.4.2 SCHEDULE
CONF:DRM:FUNCTION:AN_SCHEDULE <param1>	NO_RESTRICTION, RESTRICTION			
READ:DRM:FUNCTION:AN_START_TIME?				4.1.4.2 START_TIME
CONF:DRM:FUNCTION:AN_START_TIME <param1>	0 ~ 439			
READ:DRM:FUNCTION:AN_DURATION?				4.1.4.2 DURATION
CONF:DRM:FUNCTION:AN_DURATION <param1>	1 ~ 16383			
READ:DRM:FUNCTION:AN_MONDAY?				4.1.4.2 MONDAY
CONF:DRM:FUNCTION:AN_MONDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_TUESDAY?				4.1.4.2 TUESDAY
CONF:DRM:FUNCTION:AN_TUESDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_WEDNESDAY?				4.1.4.2 WEDNESDAY
CONF:DRM:FUNCTION:AN_WEDNESDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_THURSDAY?				4.1.4.2 THURSDAY
CONF:DRM:FUNCTION:AN_THURSDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_FRIDAY?				4.1.4.2 FRIDAY
CONF:DRM:FUNCTION:AN_FRIDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AN_SATURDAY?				4.1.4.2 SATURDAY
CONF:DRM:FUNCTION:AN_SATURDAY <param1>	OFF, ON			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:FUNCTION:AN_SUNDAY?				4.1.4.2 SUNDAY
CONF:DRM:FUNCTION:AN_SUNDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_DRM_TO_DRM:NUM?				4.1.4.3 NUM
CONF:DRM:FUNCTION:AF_DRM_TO_DRM:NUM <param1>	0 ~ 10			
READ:DRM:FUNCTION:AF_DRM_TO_DRM:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_FREQ
CONF:DRM:FUNCTION:AF_DRM_TO_DRM:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	0 ~ 327.67		
READ:DRM:FUNCTION:AF_DRM_TO_DRM:SYNC_MUX? <param1>	[AF index] 0 ~ 9			4.1.4.3 SYNC_MUX
CONF:DRM:FUNCTION:AF_DRM_TO_DRM:SYNC_MUX <param1> <param2>	[AF index] 0 ~ 9	NO, YES		
READ:DRM:FUNCTION:AF_SVC_TO_DRM:NUM?				4.1.4.3 NUM
CONF:DRM:FUNCTION:AF_SVC_TO_DRM:NUM <param1>	0 ~ 9			
READ:DRM:FUNCTION:AF_SVC_TO_DRM:TUNED_SVC? <param1>	[AF index] 0 ~ 9			4.1.4.3 TUNED_SVC
CONF:DRM:FUNCTION:AF_SVC_TO_DRM:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_0 ~ SERVICE_3		
READ:DRM:FUNCTION:AF_SVC_TO_DRM:OTHER_SID? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_SID
CONF:DRM:FUNCTION:AF_SVC_TO_DRM:OTHER_SID <param1> <param2>	[AF index] 0 ~ 9	0x000000 ~ 0xFFFFFF		
READ:DRM:FUNCTION:AF_SVC_TO_DRM:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_FREQ
CONF:DRM:FUNCTION:AF_SVC_TO_DRM:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	0 ~ 327.67		
READ:DRM:FUNCTION:AF_SVC_TO_DRM:SAME_SERVICE? <param1>	[AF index] 0 ~ 9			4.1.4.3 SAME_SERVICE
CONF:DRM:FUNCTION:AF_SVC_TO_DRM:SAME_SERVICE <param1> <param2>	[AF index] 0 ~ 9	NO, YES		
READ:DRM:FUNCTION:AF_SVC_TO_RDS:NUM?				4.1.4.3 NUM
CONF:DRM:FUNCTION:AF_SVC_TO_RDS:NUM <param1>	0 ~ 10			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:DRM:FUNCTION:AF_SVC_TO_RDS:TUNED_SVC? <param1>	[AF index] 0 ~ 9			4.1.4.3 TUNED_SVC
CONF:DRM:FUNCTION:AF_SVC_TO_RDS:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_0 ~ SERVICE_3		
READ:DRM:FUNCTION:AF_SVC_TO_RDS:OTHER_SID? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_SID
CONF:DRM:FUNCTION:AF_SVC_TO_RDS:OTHER_SID <param1> <param2>	[AF index] 0 ~ 9	0x000000 ~ 0xFFFFFF		
READ:DRM:FUNCTION:AF_SVC_TO_RDS:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_FREQ
CONF:DRM:FUNCTION:AF_SVC_TO_RDS:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	87.5 ~ 107.9		
READ:DRM:FUNCTION:AF_SVC_TO_RDS:SAME_SERVICE? <param1>	[AF index] 0 ~ 9			4.1.4.3 SAME_SERVICE
CONF:DRM:FUNCTION:AF_SVC_TO_RDS:SAME_SERVICE <param1> <param2>	[AF index] 0 ~ 9	NO, YES		
READ:DRM:FUNCTION:AF_SVC_TO_AM:NUM?				4.1.4.3 NUM
CONF:DRM:FUNCTION:AF_SVC_TO_AM:NUM <param1>	0 ~ 10			
READ:DRM:FUNCTION:AF_SVC_TO_AM:TUNED_SVC? <param1>	[AF index] 0 ~ 9			4.1.4.3 TUNED_SVC
CONF:DRM:FUNCTION:AF_SVC_TO_AM:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_0 ~ SERVICE_3		
READ:DRM:FUNCTION:AF_SVC_TO_AM:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_FREQ
CONF:DRM:FUNCTION:AF_SVC_TO_AM:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	0 ~ 32.767		
READ:DRM:FUNCTION:AF_SVC_TO_AM:SAME_SERVICE? <param1>	[AF index] 0 ~ 9			4.1.4.3 SAME_SERVICE
CONF:DRM:FUNCTION:AF_SVC_TO_AM:SAME_SERVICE <param1> <param2>	[AF index] 0 ~ 9	NO, YES		
READ:DRM:FUNCTION:AF_SVC_TO_DAB:NUM?				4.1.4.3 NUM
CONF:DRM:FUNCTION:AF_SVC_TO_DAB:NUM <param1>	0 ~ 10			
READ:DRM:FUNCTION:AF_SVC_TO_DAB:TUNED_SVC? <param1>	[AF index] 0 ~ 9			4.1.4.3 TUNED_SVC

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:FUNCTION:AF_SVC_TO_DAB:TUNED_SVC <param1> <param2>	[AF index] 0 ~ 9	SERVICE_0 ~ SERVICE_3		
READ:DRM:FUNCTION:AF_SVC_TO_DAB:OTHER_SID? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_SID
CONF:DRM:FUNCTION:AF_SVC_TO_DAB:OTHER_SID <param1> <param2>	[AF index] 0 ~ 9	0x000000 ~ 0xFFFFFF		
READ:DRM:FUNCTION:AF_SVC_TO_DAB:OTHER_FREQ? <param1>	[AF index] 0 ~ 9			4.1.4.3 OTHER_FREQ
CONF:DRM:FUNCTION:AF_SVC_TO_DAB:OTHER_FREQ <param1> <param2>	[AF index] 0 ~ 9	5A, 5B, 5C, 5D, 6A, 6B, 6C, 6D, 7A, 7B, 7C, 7D, 8A, 8B, 8C, 8D, 9A, 9B, 9C, 9D, 10A, 10B, 10C, 10D, 11A, 11B, 11C, 11D, 12A, 12B, 12C, 12D, 13A, 13B, 13C, 13D, 13E, 13F		
READ:DRM:FUNCTION:AF_SVC_TO_DAB:SAME_SERVICE? <param1>	[AF index] 0 ~ 9			4.1.4.3 SAME_SERVICE
CONF:DRM:FUNCTION:AF_SVC_TO_DAB:SAME_SERVICE <param1> <param2>	[AF index] 0 ~ 9	NO, YES		
READ:DRM:FUNCTION:AF_REGION?				4.1.4.3 REGION
CONF:DRM:FUNCTION:AF_REGION <param1>	NO_RESTRICTION, RESTRICTION, RESTRICTION_DETAIL			
READ:DRM:FUNCTION:AF_LATITUDE?				4.1.4.3 LATITUDE
CONF:DRM:FUNCTION:AF_LATITUDE <param1>	-90.0 ~ 90.0			
READ:DRM:FUNCTION:AF_LATITUDE_EXT?				4.1.4.3 LATITUDE_EXT
CONF:DRM:FUNCTION:AF_LATITUDE_EXT <param1>	0.1 ~ 90.0			
READ:DRM:FUNCTION:AF_LONGITUDE?				4.1.4.3 LONGITUDE
CONF:DRM:FUNCTION:AF_LONGITUDE <param1>	-180.0 ~ 179.9			
READ:DRM:FUNCTION:AF_LONGITUDE_EXT?				4.1.4.3 LONGITUDE_EXT

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:FUNCTION:AF_LONGITUDE_EXT <param1>	0.1 ~ 179.9			
READ:DRM:FUNCTION:AF_SCHEDULE?				4.1.4.3 SCHEDULE
CONF:DRM:FUNCTION:AF_SCHEDULE <param1>	NO_RESTRICTION, RESTRICTION			
READ:DRM:FUNCTION:AF_START_TIME?				4.1.4.3 START_TIME
CONF:DRM:FUNCTION:AF_START_TIME <param1>	0 ~ 439			
READ:DRM:FUNCTION:AF_DURATION?				4.1.4.3 DURATION
CONF:DRM:FUNCTION:AF_DURATION <param1>	1 ~ 16383			
READ:DRM:FUNCTION:AF_MONDAY?				4.1.4.3 MONDAY
CONF:DRM:FUNCTION:AF_MONDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_TUESDAY?				4.1.4.3 TUESDAY
CONF:DRM:FUNCTION:AF_TUESDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_WEDNESDAY?				4.1.4.3 WEDNESDAY
CONF:DRM:FUNCTION:AF_WEDNESDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_THURSDAY?				4.1.4.3 THURSDAY
CONF:DRM:FUNCTION:AF_THURSDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_FRIDAY?				4.1.4.3 FRIDAY
CONF:DRM:FUNCTION:AF_FRIDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_SATURDAY?				4.1.4.3 SATURDAY
CONF:DRM:FUNCTION:AF_SATURDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:AF_SUNDAY?				4.1.4.3 SUNDAY
CONF:DRM:FUNCTION:AF_SUNDAY <param1>	OFF, ON			
READ:DRM:FUNCTION:TIME?				4.1.4.4 TIME

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:DRM:FUNCTION:TIME <param1>	OFF, ON			
READ:DRM:FUNCTION:YEAR?				4.1.4.4 YEAR
CONF:DRM:FUNCTION:YEAR <param1>	1900 ~ 2200			
READ:DRM:FUNCTION:MONTH?				4.1.4.4 MONTH
CONF:DRM:FUNCTION:MONTH <param1>	1 ~ 12			
READ:DRM:FUNCTION:DAY?				4.1.4.4 DAY
CONF:DRM:FUNCTION:DAY <param1>	1 ~ 31			
READ:DRM:FUNCTION:HOUR?				4.1.4.4 HOUR
CONF:DRM:FUNCTION:HOUR <param1>	0 ~ 23			
READ:DRM:FUNCTION:MINUTE?				4.1.4.4 MINUTE
CONF:DRM:FUNCTION:MINUTE <param1>	0 ~ 59			
READ:DRM:FUNCTION:LTO?				4.1.4.4 LTO
CONF:DRM:FUNCTION:LTO <param1>	-31 ~ 31			

9.4.10 ETI/MDI Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ETI:CONFIG:MODE?				-
CONF:ETI:CONFIG:MODE <param1>	ETI, MDI, DRM_IQ			
READ:ETI:CONFIG:CONTENTS?				5.1.2, 5.2.3, 5.3.2 CONTENTS
CONF:ETI:CONFIG:CONTENTS <param1>	File name			
EXEC:ETI:CONFIG:CONTENTS_RST <param1>	0.0 ~ 99.9			5.1.2, 5.2.3, 5.3.2 CONTENTS_RST

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ETI:CONFIG:TII?				5.1.3 TII
CONF:ETI:CONFIG:TII <param1>	OFF, ON			
READ:ETI:CONFIG:TII_SUB_ID?				5.1.3 SUB_ID
CONF:ETI:CONFIG:TII_SUB_ID <param1>	0 ~ 23			
READ:ETI:CONFIG:TII_MAIN_ID?				5.1.3 MAIN_ID
CONF:ETI:CONFIG:TII_MAIN_ID <param1>	0 ~ 69			
READ:ETI:CONFIG:AF_CRC_CHECK?				5.2.3 AF_CRC_CHECK
CONF:ETI:CONFIG:AF_CRC_CHECK <param1>	OFF, ON			
READ:ETI:CONFIG:SAMPLING_FREQ?				5.3.2 SAMPLING_FREQ
CONF:ETI:CONFIG:SAMPLING_FREQ <param1>	48, 192, 250			
READ:ETI:CONFIG:IQ_SWAP?				5.3.2 IQ_SWAP
CONF:ETI:CONFIG:IQ_SWAP <param1>	OFF, ON			
READ:ETI:CONFIG:IQ_POLARITY?				5.3.2 IQ_POLARITY
CONF:ETI:CONFIG:IQ_POLARITY <param1>	POSITIVE, NEGATIVE			

9.4.11 ANALOG FM Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:FM:CHANNEL? <param1>	[channel number] 0 ~ 2			6.1.2 CHANNEL
CONF:ANALOG:FM:CHANNEL <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:FM:FREQUENCY? <param1>	[channel number] 0 ~ 2			6.1.2 FREQUENCY

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:ANALOG:FM:FREQUENCY <param1> <param2>	[channel number] 0 ~ 2	76 ~ 108		
READ:ANALOG:FM:FM_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 FM_MODE
CONF:ANALOG:FM:FM_MODE <param1> <param2>	[channel number] 0 ~ 2	MONO, STEREO, WAVE, SWEEP, EXT_IN		
READ:ANALOG:FM:AUDIO_FREQ? <param1>	[channel number] 0 ~ 2			6.1.2 AUDIO_FREQ
CONF:ANALOG:FM:AUDIO_FREQ <param1> <param2>	[channel number] 0 ~ 2	0 ~ 20		
READ:ANALOG:FM:STEREO_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 STEREO_MODE
CONF:ANALOG:FM:STEREO_MODE <param1> <param2>	[channel number] 0 ~ 2	LEFT_AND_RIGHT, LEFT_ONLY, RIGHT_ONLY		
READ:ANALOG:FM:AUDIO_FREQ_R? <param1>	[channel number] 0 ~ 2			6.1.2 AUDIO_FREQ_R
CONF:ANALOG:FM:AUDIO_FREQ_R <param1> <param2>	[channel number] 0 ~ 2	0 ~ 20		
READ:ANALOG:FM:AUDIO_FREQ_L? <param1>	[channel number] 0 ~ 2			6.1.2 AUDIO_FREQ_L
CONF:ANALOG:FM:AUDIO_FREQ_L <param1> <param2>	[channel number] 0 ~ 2	0 ~ 20		
READ:ANALOG:FM:CONTENTS? <param1>	[channel number] 0 ~ 2			6.1.2 CONTENTS
CONF:ANALOG:FM:CONTENTS <param1> <param2>	[channel number] 0 ~ 2	File name		
EXEC:ANALOG:FM:CONTENTS_RST <param1>	[channel number] 0 ~ 2	0.0 ~ 99.9		6.1.2 CONTENTS_RST
READ:ANALOG:FM:WAVE_FS? <param1>	[channel number] 0 ~ 2			6.1.2 WAVE_FS
READ:ANALOG:FM:WAVE_CH? <param1>	[channel number] 0 ~ 2			6.1.2 WAVE_CH
READ:ANALOG:FM:WAVE_BITS? <param1>	[channel number] 0 ~ 2			6.1.2 WAVE_BITS
READ:ANALOG:FM:SWEEP_START? <param1>	[channel number] 0 ~ 2			6.1.2 SWEEP_START

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:ANALOG:FM:SWEEP_START <param1> <param2>	[channel number] 0 ~ 2	0 ~ 15		
READ:ANALOG:FM:SWEEP_STOP? <param1>	[channel number] 0 ~ 2			6.1.2 SWEEP_STOP
CONF:ANALOG:FM:SWEEP_STOP <param1> <param2>	[channel number] 0 ~ 2	0 ~ 15		
READ:ANALOG:FM:SWEEP_TIME? <param1>	[channel number] 0 ~ 2			6.1.2 SWEEP_TIME
CONF:ANALOG:FM:SWEEP_TIME <param1> <param2>	[channel number] 0 ~ 2	20 ~ 10000		
READ:ANALOG:FM:AUDIO_IN_GAIN?				6.1.2 AUDIO_IN_GAIN
CONF:ANALOG:FM:AUDIO_IN_GAIN <param1>	0 ~ 50			
READ:ANALOG:FM:AUDIO_IN_LEVEL?				6.1.2 AUDIO_IN_LEVEL
READ:ANALOG:FM:FM_DEVIATION? <param1>	[channel number] 0 ~ 2			6.1.2 FM_DEVIATION
CONF:ANALOG:FM:FM_DEVIATION <param1> <param2>	[channel number] 0 ~ 2	0 ~ 75		
READ:ANALOG:FM:PRE_EMPHASIS? <param1>	[channel number] 0 ~ 2			6.1.2 PRE_EMPHASIS
CONF:ANALOG:FM:PRE_EMPHASIS <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:FM:TIME_CONSTANT? <param1>	[channel number] 0 ~ 2			6.1.2 TIME_CONSTANT
CONF:ANALOG:FM:TIME_CONSTANT <param1> <param2>	[channel number] 0 ~ 2	25, 50, 75		
READ:ANALOG:FM:PILOT_LEVEL? <param1>	[channel number] 0 ~ 2			6.1.2 PILOT_LEVEL
CONF:ANALOG:FM:PILOT_LEVEL <param1> <param2>	[channel number] 0 ~ 2	0 ~ 15		
READ:ANALOG:FM:PILOT_LEVEL_PERCENT? <param1>	[channel number] 0 ~ 2			
CONF:ANALOG:FM:PILOT_LEVEL_PERCENT <param1> <param2>	[channel number] 0 ~ 2	0 ~ 15		
READ:ANALOG:FM:PILOT_LEVEL_KHZ? <param1>	[channel number] 0 ~ 2			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:ANALOG:FM:PILOT_LEVEL_KHZ <param1> <param2>	[channel number] 0 ~ 2	0 ~ 11.3		
READ:ANALOG:FM:RDS_LEVEL_PERCENT? <param1>	[channel number] 0 ~ 2			6.1.2 RDS_LEVEL
CONF:ANALOG:FM:RDS_LEVEL_PERCENT <param1> <param2>	[channel number] 0 ~ 2	0.0 ~ 5.0		
READ:ANALOG:FM:RDS_LEVEL_KHZ? <param1>	[channel number] 0 ~ 2			
CONF:ANALOG:FM:RDS_LEVEL_KHZ <param1> <param2>	[channel number] 0 ~ 2	0.00 ~ 3.75		
READ:ANALOG:FM:RDS_PHASE? <param1>	[channel number] 0 ~ 2			6.1.2 RDS_PHASE
CONF:ANALOG:FM:RDS_PHASE <param1> <param2>	[channel number] 0 ~ 2	0 ~ 359		

9.4.12 ANALOG RDS Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:RDS_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 RDS_MODE
CONF:ANALOG:RDS:RDS_MODE <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:PID? <param1>	[channel number] 0 ~ 2			6.1.2 PID
CONF:ANALOG:RDS:PID <param1> <param2>	[channel number] 0 ~ 2	0x0001 ~ 0xFFFF		
READ:ANALOG:RDS:REF? <param1>	[channel number] 0 ~ 2			6.1.2
CONF:ANALOG:RDS:REF <param1> <param2>	[channel number] 0 ~ 2	1 ~ 255		
READ:ANALOG:RDS:COUNTRY? <param1>	[channel number] 0 ~ 2			6.1.2 COUNTRY

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:ANALOG:RDS:COUNTRY <param1> <param2>	[channel number] 0 ~ 2	1 ~ 15		
READ:ANALOG:RDS:AREA_CODE? <param1>	[channel number] 0 ~ 2			6.1.2 AREA_CODE
CONF:ANALOG:RDS:AREA_CODE <param1> <param2>	[channel number] 0 ~ 2	LOCAL, INTERNATIONAL, NATIONAL, SUPRA-REGIONAL, REGIONAL_01 ~ REGIONAL_12		
READ:ANALOG:RDS:ECC? <param1>	[channel number] 0 ~ 2			6.1.2 ECC
CONF:ANALOG:RDS:ECC <param1> <param2>	[channel number] 0 ~ 2	0x00 ~ 0xFF		
READ:ANALOG:RDS:MUSIC_SPEECH? <param1>	[channel number] 0 ~ 2			6.1.2 MUSIC_SPEECH
CONF:ANALOG:RDS:MUSIC_SPEECH <param1> <param2>	[channel number] 0 ~ 2	MUSIC, SPEECH		
READ:ANALOG:RDS:PS_NAME? <param1>	[channel number] 0 ~ 2			6.1.2 PS_NAME
CONF:ANALOG:RDS:PS_NAME <param1> <param2>	[channel number] 0 ~ 2	Max 8-byte Characters		
READ:ANALOG:RDS:PS_NAME_HEX? <param1>	[channel number] 0 ~ 2			
CONF:ANALOG:RDS:PS_NAME_HEX <param1> <param2>	[channel number] 0 ~ 2	Max 8-byte Hexadecimal Values		
READ:ANALOG:RDS:LANGUAGE? <param1>	[channel number] 0 ~ 2			6.1.2 LANGUAGE
CONF:ANALOG:RDS:LANGUAGE <param1> <param2>	[channel number] 0 ~ 2	0x00 ~ 0xFF		
READ:ANALOG:RDS:TMC? <param1>	[channel number] 0 ~ 2			6.1.2 TMC
CONF:ANALOG:RDS:TMC <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:TMC_LTN? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_LTN
CONF:ANALOG:RDS:TMC_LTN <param1> <param2>	[channel number]	0 ~ 63		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
	0 ~ 2			
READ:ANALOG:RDS:TMC_MGS_AFI? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_MGS_AFI
CONF:ANALOG:RDS:TMC_MGS_AFI <param1> <param2>	[channel number] 0 ~ 2	0, 1		
READ:ANALOG:RDS:TMC_MGS_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_MGS_MODE
CONF:ANALOG:RDS:TMC_MGS_MODE <param1> <param2>	[channel number] 0 ~ 2	0, 1		
READ:ANALOG:RDS:TMC_MGS_I? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_MGS_I
CONF:ANALOG:RDS:TMC_MGS_I <param1> <param2>	[channel number] 0 ~ 2	0, 1		
READ:ANALOG:RDS:TMC_MGS_N? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_MGS_N
CONF:ANALOG:RDS:TMC_MGS_N <param1> <param2>	[channel number] 0 ~ 2	0, 1		
READ:ANALOG:RDS:TMC_MGS_R? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_MGS_R
CONF:ANALOG:RDS:TMC_MGS_R <param1> <param2>	[channel number] 0 ~ 2	0, 1		
READ:ANALOG:RDS:TMC_MGS_U? <param1>	[channel number] 0 ~ 2			6.1.2 TMC_MGS_U
CONF:ANALOG:RDS:TMC_MGS_U <param1> <param2>	[channel number] 0 ~ 2	0, 1		
READ:ANALOG:RDS:TMC_GROUP? <param1> <param2>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4		6.1.2 TMC_GROUP
CONF:ANALOG:RDS:TMC_GROUP <param1> <param2> <param3>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4	OFF, ON	
READ:ANALOG:RDS:TMC_DIVERSION? <param1> <param2>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4		6.1.2 TMC_DIVERSION
CONF:ANALOG:RDS:TMC_DIVERSION <param1> <param2> <param3>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4	0, 1	
READ:ANALOG:RDS:TMC_DIRECTION? <param1> <param2>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4		6.1.2 TMC_DIRECTION
CONF:ANALOG:RDS:TMC_DIRECTION <param1> <param2> <param3>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4	0, 1	

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:TMC_LOCATION? <param1> <param2>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4		6.1.2 TMC_LOCATION
CONF:ANALOG:RDS:TMC_LOCATION <param1> <param2> <param3>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4	0 ~ 65535	
READ:ANALOG:RDS:TMC_EVENT? <param1> <param2>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4		6.1.2 TMC_EVENT
CONF:ANALOG:RDS:TMC_EVENT <param1> <param2> <param3>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4	0 ~ 2047	
READ:ANALOG:RDS:TMC_EXTENT? <param1> <param2>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4		6.1.2 TMC_EXTENT
CONF:ANALOG:RDS:TMC_EXTENT <param1> <param2> <param3>	[channel number] 0 ~ 2	[tmc group number] 0 ~ 4	0 ~ 7	
READ:ANALOG:RDS:TP? <param1>	[channel number] 0 ~ 2			6.1.2 TP
CONF:ANALOG:RDS:TP <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:TA? <param1>	[channel number] 0 ~ 2			6.1.2 TA
CONF:ANALOG:RDS:TA <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:EON? <param1>	[channel number] 0 ~ 2			6.1.2 EON
CONF:ANALOG:RDS:EON <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:EON_CH? <param1>	[channel number] 0 ~ 2			6.1.2 EON_CH
CONF:ANALOG:RDS:EON_CH <param1> <param2>	[channel number] 0 ~ 2	FM_RDS_0, FM_RDS_1, FM_RDS_2		
READ:ANALOG:RDS:EON_PID? <param1>	[channel number] 0 ~ 2			6.1.2 EON_PID
READ:ANALOG:RDS:EON_PS_NAME? <param1>	[channel number] 0 ~ 2			6.1.2 EON_PS_NAME
READ:ANALOG:RDS:EON_PS_NAME_HEX? <param1>	[channel number] 0 ~ 2			
READ:ANALOG:RDS:EON_AF? <param1>	[channel number] 0 ~ 2			6.1.2 EON_AF

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:EON_TP? <param1>	[channel number] 0 ~ 2			6.1.2 EON_TP
READ:ANALOG:RDS:EON_TA? <param1>	[channel number] 0 ~ 2			6.1.2 EON_TA
READ:ANALOG:RDS:EON_SWITCH? <param1>	[channel number] 0 ~ 2			6.1.2 EON_SWITCH
CONF:ANALOG:RDS:EON_SWITCH <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:EON_PTY? <param1>	[channel number] 0 ~ 2			6.1.2 EON_PTY
CONF:ANALOG:RDS:EON_PTY <param1> <param2>	[channel number] 0 ~ 2	DEFAULT, NEWS, WEATHER, ALARM		
READ:ANALOG:RDS:RADIO_TEXT_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 RADIO_TEXT_MODE
CONF:ANALOG:RDS:RADIO_TEXT_MODE <param1> <param2>	[channel number] 0 ~ 2	OFF, RT, RT+, eRT, eRT+		
READ:ANALOG:RDS:HEADLINE_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 HEADLINE_MODE
CONF:ANALOG:RDS:HEADLINE_MODE <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:RADIO_TEXT_HEADLINE? <param1>	[channel number] 0 ~ 2			6.1.2 HEADLINE
CONF:ANALOG:RDS:RADIO_TEXT_HEADLINE <param1> <param2>	[channel number] 0 ~ 2	Max 32-byte Characters		
READ:ANALOG:RDS:RADIO_TEXT_HEADLINE_HEX? <param1>	[channel number] 0 ~ 2			
CONF:ANALOG:RDS:RADIO_TEXT_HEADLINE_HEX <param1> <param2>	[channel number] 0 ~ 2	Max 32-byte Hexadecimal Values		
READ:ANALOG:RDS:RADIO_TEXT? <param1>	[channel number] 0 ~ 2			6.1.2 RADIO_TEXT
CONF:ANALOG:RDS:RADIO_TEXT <param1> <param2>	[channel number] 0 ~ 2	Max 32-byte Characters		
READ:ANALOG:RDS:RADIO_TEXT_HEX? <param1>	[channel number] 0 ~ 2			
CONF:ANALOG:RDS:RADIO_TEXT_HEX <param1> <param2>	[channel number] 0 ~ 2	Max 32-byte Hexadecimal Values		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:RADIO_TEXT_CH? <param1>	[channel number] 0 ~ 2			6.1.2 RADIO_TEXT_CH
CONF:ANALOG:RDS:RADIO_TEXT_CH <param1> <param2>	[channel number] 0 ~ 2	2A, 2B		
READ:ANALOG:RDS:TAG0_TYPE? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_TYPE
CONF:ANALOG:RDS:TAG0_TYPE <param1> <param2>	[channel number] 0 ~ 2	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:ANALOG:RDS:TAG0_START? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_START
CONF:ANALOG:RDS:TAG0_START <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG0_LENGTH? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_LENGTH
CONF:ANALOG:RDS:TAG0_LENGTH <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG1_TYPE? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_TYPE
CONF:ANALOG:RDS:TAG1_TYPE <param1> <param2>	[channel number] 0 ~ 2	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:ANALOG:RDS:TAG1_START? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_START
CONF:ANALOG:RDS:TAG1_START <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG1_LENGTH? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_LENGTH
CONF:ANALOG:RDS:TAG1_LENGTH <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG2_TYPE? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_TYPE
CONF:ANALOG:RDS:TAG2_TYPE <param1> <param2>	[channel number] 0 ~ 2	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1, RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:ANALOG:RDS:TAG2_START? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_START
CONF:ANALOG:RDS:TAG2_START <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG2_LENGTH? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_LENGTH

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
CONF:ANALOG:RDS:TAG2_LENGTH <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG3_TYPE? <param1>	[channel number] 0 ~ 2			
CONF:ANALOG:RDS:TAG3_TYPE <param1> <param2>	[channel number] 0 ~ 2	DUMMY, ITEM_TITLE, ITEM_ALBUM, ITEM_TRACKNUMBER, ITEM_ARTIST, ITEM_COMPOSITION, ITEM_MOVEMENT, ITEM_CONDUCTOR, ITEM_COMPOSER, ITEM_BAND, ITEM_COMMENT, ITEM_GENRE, INFO_NEWS, INFO_NEWS_LOCAL, INFO_STOCKMARKET, INFO_SPORT, INFO_LOTTERY, INFO_HOROSCOPE, INFO_DAILY_DIVERSION, INFO_HEALTH, INFO_EVENT, INFO_SCENE, INFO_CINEMA, INFO_TV, INFO_DATE_TIME, INFO_WEATHER, INFO_TRAFFIC, INFO_ALARM, INFO_ADVERTISEMENT, INFO_URL, INFO_OTHER, STATIONNAME_SHORT, STATIONNAME_LONG, PROGRAMME_NOW, PROGRAMME_NEXT, PROGRAMME_PART, PROGRAMME_HOST, PROGRAMME_EDITORIAL_STAFF, PROGRAMME_FREQUENCY, PROGRAMME_HOMEPAGE, PROGRAMME_SUBCHANNEL, PHONE_HOTLINE, PHONE_STUDIO, PHONE_OTHER, SMS_STUDIO, SMS_OTHER, EMAIL_HOTLINE, EMAIL_STUDIO, EMAIL_OTHER, MMS_OTHER, CHAT, CHAT_CENTER, VOTE_QUESTION, VOTE_CENTRE, RFU_1,		6.1.2 TAG_TYPE

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		RFU_2, PRIVATE_1, PRIVATE_2, PRIVATE_3, DESCRIPTOR_PLACE, DESCRIPTOR_APPOINTMENT, DESCRIPTOR_IDENTIFIER, DESCRIPTOR_PURCHASE, DESCRIPTOR_GET_DATA		
READ:ANALOG:RDS:TAG3_START? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_START
CONF:ANALOG:RDS:TAG3_START <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:TAG3_LENGTH? <param1>	[channel number] 0 ~ 2			6.1.2 TAG_LENGTH
CONF:ANALOG:RDS:TAG3_LENGTH <param1> <param2>	[channel number] 0 ~ 2	0 ~ 63		
READ:ANALOG:RDS:ENCODING_FLAG? <param1>	[channel number] 0 ~ 2			6.1.2 ENCODING_FLAG
CONF:ANALOG:RDS:ENCODING_FLAG <param1> <param2>	[channel number] 0 ~ 2	UTF_16, UTF_8		
READ:ANALOG:RDS:TEXT_DIRECTION? <param1>	[channel number] 0 ~ 2			6.1.2 TEXT_DIRECTION
CONF:ANALOG:RDS:TEXT_DIRECTION <param1> <param2>	[channel number] 0 ~ 2	LTR, RTL		
READ:ANALOG:RDS:PRG_TYPE_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 PRG_TYPE_MODE
CONF:ANALOG:RDS:PRG_TYPE_MODE <param1> <param2>	[channel number] 0 ~ 2	RBDS, RDS		
READ:ANALOG:RDS:PRG_TYPE? <param1>	[channel number] 0 ~ 2			6.1.2 PRG_TYPE
CONF:ANALOG:RDS:PRG_TYPE <param1> <param2>	[channel number] 0 ~ 2	NO_TYPE, NEWS, CURRENT_AFFAIRS, INFORMATION, SPORTS, EDUCATION, DRAMA, CULTURE, SCIENCE, VARIED, POP_MUSIC, ROCK_MUSIC, EASY_MUSIC,		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
		LIGHT_CLASSIC, SERIOUS_CLASSIC, OTHER_MUSIC, WEATHER, FINANCE, CHILDREN, SOCIAL_AFFAIRS, RELIGION, PHONE_IN, TRAVEL, LEISURE, JAZZ_MUSIC, COUNTRY_MUSIC, NATIONAL_MUSIC, OLDIES_MUSIC, FOLK_MUSIC, DOCUMENTARY, ALARM_TEST, ALARM		
READ:ANALOG:RDS:PRG_TYPE_NAME? <param1>	[channel number] 0 ~ 2			6.1.2 PRG_TYPE_NAME
CONF:ANALOG:RDS:PRG_TYPE_NAME <param1> <param2>	[channel number] 0 ~ 2	Max 8-byte Characters		
READ:ANALOG:RDS:AF_MODE? <param1>	[channel number] 0 ~ 2			6.1.2 AF_MODE
CONF:ANALOG:RDS:AF_MODE <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:AF_METHOD? <param1>	[channel number] 0 ~ 2			6.1.2 AF_METHOD
CONF:ANALOG:RDS:AF_METHOD <param1> <param2>	[channel number] 0 ~ 2	A, B		
READ:ANALOG:RDS:AF_NUM? <param1>	[channel number] 0 ~ 2			6.1.2 AF_NUM
CONF:ANALOG:RDS:AF_NUM <param1> <param2>	[channel number] 0 ~ 2	0 ~ 24		
READ:ANALOG:RDS:AF_01? <param1>	[channel number] 0 ~ 2			6.1.2 AF_01
CONF:ANALOG:RDS:AF_01 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_02? <param1>	[channel number] 0 ~ 2			6.1.2 AF_02
CONF:ANALOG:RDS:AF_02 <param1> <param2>	[channel number]	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
	0 ~ 2			
READ:ANALOG:RDS:AF_03? <param1>	[channel number] 0 ~ 2			6.1.2 AF_03
CONF:ANALOG:RDS:AF_03 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_04? <param1>	[channel number] 0 ~ 2			6.1.2 AF_04
CONF:ANALOG:RDS:AF_04 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_05? <param1>	[channel number] 0 ~ 2			6.1.2 AF_05
CONF:ANALOG:RDS:AF_05 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_06? <param1>	[channel number] 0 ~ 2			6.1.2 AF_06
CONF:ANALOG:RDS:AF_06 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_07? <param1>	[channel number] 0 ~ 2			6.1.2 AF_07
CONF:ANALOG:RDS:AF_07 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_08? <param1>	[channel number] 0 ~ 2			6.1.2 AF_08
CONF:ANALOG:RDS:AF_08 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_09? <param1>	[channel number] 0 ~ 2			6.1.2 AF_09
CONF:ANALOG:RDS:AF_09 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_10? <param1>	[channel number] 0 ~ 2			6.1.2 AF_10
CONF:ANALOG:RDS:AF_10 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_11? <param1>	[channel number] 0 ~ 2			6.1.2 AF_11
CONF:ANALOG:RDS:AF_11 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:AF_12? <param1>	[channel number] 0 ~ 2			6.1.2 AF_12
CONF:ANALOG:RDS:AF_12 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_13? <param1>	[channel number] 0 ~ 2			6.1.2 AF_13
CONF:ANALOG:RDS:AF_13 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_14? <param1>	[channel number] 0 ~ 2			6.1.2 AF_14
CONF:ANALOG:RDS:AF_14 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_15? <param1>	[channel number] 0 ~ 2			6.1.2 AF_15
CONF:ANALOG:RDS:AF_15 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_16? <param1>	[channel number] 0 ~ 2			6.1.2 AF_16
CONF:ANALOG:RDS:AF_16 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_17? <param1>	[channel number] 0 ~ 2			6.1.2 AF_17
CONF:ANALOG:RDS:AF_17 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_18? <param1>	[channel number] 0 ~ 2			6.1.2 AF_18
CONF:ANALOG:RDS:AF_18 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_19? <param1>	[channel number] 0 ~ 2			6.1.2 AF_19
CONF:ANALOG:RDS:AF_19 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_20? <param1>	[channel number] 0 ~ 2			6.1.2 AF_20
CONF:ANALOG:RDS:AF_20 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:AF_21? <param1>	[channel number] 0 ~ 2			6.1.2 AF_21
CONF:ANALOG:RDS:AF_21 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_22? <param1>	[channel number] 0 ~ 2			6.1.2 AF_22
CONF:ANALOG:RDS:AF_22 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_23? <param1>	[channel number] 0 ~ 2			6.1.2 AF_23
CONF:ANALOG:RDS:AF_23 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_24? <param1>	[channel number] 0 ~ 2			6.1.2 AF_24
CONF:ANALOG:RDS:AF_24 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_NUM_SAME? <param1>	[channel number] 0 ~ 2			6.1.2 AF_NUM_SAME
CONF:ANALOG:RDS:AF_NUM_SAME <param1> <param2>	[channel number] 0 ~ 2	0 ~ 24		
READ:ANALOG:RDS:AF_SAME_01? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_01
CONF:ANALOG:RDS:AF_SAME_01 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_02? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_02
CONF:ANALOG:RDS:AF_SAME_02 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_03? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_03
CONF:ANALOG:RDS:AF_SAME_03 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_04? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_04
CONF:ANALOG:RDS:AF_SAME_04 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:AF_SAME_05? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_05
CONF:ANALOG:RDS:AF_SAME_05 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_06? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_06
CONF:ANALOG:RDS:AF_SAME_06 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_07? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_07
CONF:ANALOG:RDS:AF_SAME_07 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_08? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_08
CONF:ANALOG:RDS:AF_SAME_08 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_09? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_09
CONF:ANALOG:RDS:AF_SAME_09 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_10? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_10
CONF:ANALOG:RDS:AF_SAME_10 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_11? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_11
CONF:ANALOG:RDS:AF_SAME_11 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_12? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_12
CONF:ANALOG:RDS:AF_SAME_12 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_13? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_13
CONF:ANALOG:RDS:AF_SAME_13 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:AF_SAME_14? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_14
CONF:ANALOG:RDS:AF_SAME_14 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_15? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_15
CONF:ANALOG:RDS:AF_SAME_15 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_16? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_16
CONF:ANALOG:RDS:AF_SAME_16 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_17? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_17
CONF:ANALOG:RDS:AF_SAME_17 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_18? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_18
CONF:ANALOG:RDS:AF_SAME_18 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_19? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_19
CONF:ANALOG:RDS:AF_SAME_19 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_20? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_20
CONF:ANALOG:RDS:AF_SAME_20 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_21? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_21
CONF:ANALOG:RDS:AF_SAME_21 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_22? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_22
CONF:ANALOG:RDS:AF_SAME_22 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:AF_SAME_23? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_23
CONF:ANALOG:RDS:AF_SAME_23 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_SAME_24? <param1>	[channel number] 0 ~ 2			6.1.2 AF_SAME_24
CONF:ANALOG:RDS:AF_SAME_24 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_NUM_VARIANT? <param1>	[channel number] 0 ~ 2			6.1.2 AF_NUM_VARIANT
CONF:ANALOG:RDS:AF_NUM_VARIANT <param1> <param2>	[channel number] 0 ~ 2	0 ~ 6		
READ:ANALOG:RDS:AF_VARIANT_01? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_01
CONF:ANALOG:RDS:AF_VARIANT_01 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_02? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_02
CONF:ANALOG:RDS:AF_VARIANT_02 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_03? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_03
CONF:ANALOG:RDS:AF_VARIANT_03 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_04? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_04
CONF:ANALOG:RDS:AF_VARIANT_04 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_05? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_05
CONF:ANALOG:RDS:AF_VARIANT_05 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_06? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_06
CONF:ANALOG:RDS:AF_VARIANT_06 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:AF_VARIANT_07? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_07
CONF:ANALOG:RDS:AF_VARIANT_07 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_08? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_08
CONF:ANALOG:RDS:AF_VARIANT_08 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_09? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_09
CONF:ANALOG:RDS:AF_VARIANT_09 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_10? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_10
CONF:ANALOG:RDS:AF_VARIANT_10 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_11? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_11
CONF:ANALOG:RDS:AF_VARIANT_11 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:AF_VARIANT_12? <param1>	[channel number] 0 ~ 2			6.1.2 AF_VARIANT_12
CONF:ANALOG:RDS:AF_VARIANT_12 <param1> <param2>	[channel number] 0 ~ 2	87.6 ~ 107.9		
READ:ANALOG:RDS:PIN_DAY? <param1>	[channel number] 0 ~ 2			6.1.2 PIN_DAY
CONF:ANALOG:RDS:PIN_DAY <param1> <param2>	[channel number] 0 ~ 2	1 ~ 31		
READ:ANALOG:RDS:PIN_HOUR? <param1>	[channel number] 0 ~ 2			6.1.2 PIN_HOUR
CONF:ANALOG:RDS:PIN_HOUR <param1> <param2>	[channel number] 0 ~ 2	0 ~ 23		
READ:ANALOG:RDS:PIN_MINUTE? <param1>	[channel number] 0 ~ 2			6.1.2 PIN_MINUTE
CONF:ANALOG:RDS:PIN_MINUTE <param1> <param2>	[channel number] 0 ~ 2	0 ~ 59		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:TIME? <param1>	[channel number] 0 ~ 2			6.1.2 TIME
CONF:ANALOG:RDS:TIME <param1> <param2>	[channel number] 0 ~ 2	OFF, ON		
READ:ANALOG:RDS:YEAR?				6.1.2 YEAR
CONF:ANALOG:RDS:YEAR <param1>	1900 ~ 2200			
READ:ANALOG:RDS:MONTH?				6.1.2 MONTH
CONF:ANALOG:RDS:MONTH <param1>	1 ~ 12			
READ:ANALOG:RDS:DAY?				6.1.2 DAY
CONF:ANALOG:RDS:DAY <param1>	1 ~ 31			
READ:ANALOG:RDS:HOUR?				6.1.2 HOUR
CONF:ANALOG:RDS:HOUR <param1>	0 ~ 23			
READ:ANALOG:RDS:MINUTE?				6.1.2 MINUTE
CONF:ANALOG:RDS:MINUTE <param1>	0 ~ 59			
READ:ANALOG:RDS:LTO?				6.1.2 LTO
CONF:ANALOG:RDS:LTO <param1>	-31 ~ 31			
READ:ANALOG:RDS:DI? <param1>	[channel number] 0 ~ 2			6.1.2 DI
READ:ANALOG:RDS:DI_MONO_STEREO? <param1>	[channel number] 0 ~ 2			6.1.2 DI_MONO_STEREO
CONF:ANALOG:RDS:DI_MONO_STEREO <param1> <param2>	[channel number] 0 ~ 2	MONO, STEREO		
READ:ANALOG:RDS:DI_HEAD? <param1>	[channel number] 0 ~ 2			6.1.2 DI_HEAD
CONF:ANALOG:RDS:DI_HEAD <param1> <param2>	[channel number] 0 ~ 2	NOT_ARTIFICIAL, ARTIFICIAL		
READ:ANALOG:RDS:DI_COMPRESSED? <param1>	[channel number] 0 ~ 2			6.1.2 DI_COMPRESSED
CONF:ANALOG:RDS:DI_COMPRESSED <param1> <param2>	[channel number] 0 ~ 2	NO, YES		

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:RDS:DI_PTY? <param1>	[channel number] 0 ~ 2			6.1.2 DI_PTY
CONF:ANALOG:RDS:DI_PTY <param1> <param2>	[channel number] 0 ~ 2	STATIC, DYNAMIC		

9.4.13 ANALOG AM Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:AM:AM_INDEX?				6.1.3 AM_INDEX
CONF:ANALOG:AM:AM_INDEX <param1>	0.0 ~ 100.0			
READ:ANALOG:AM:MODE?				6.1.3 MODE
CONF:ANALOG:AM:MODE <param1>	MONO, WAVE, SWEEP, EXT_IN			
READ:ANALOG:AM:AUDIO_FREQ?				6.1.3 AUDIO_FREQ
CONF:ANALOG:AM:AUDIO_FREQ <param1>	0 ~ 20			
READ:ANALOG:AM:CONTENTS?				6.1.3 CONTENTS
CONF:ANALOG:AM:CONTENTS <param1>	File name			
EXEC:ANALOG:AM:CONTENTS_RST <param1>	0.0 ~ 99.9			6.1.3 CONTENTS_RST
READ:ANALOG:AM:WAVE_FS?				6.1.3 WAVE_FS
READ:ANALOG:AM:WAVE_CH?				6.1.3 WAVE_CH
READ:ANALOG:AM:WAVE_BITS?				6.1.3 WAVE_BITS
READ:ANALOG:AM:SWEEP_START?				6.1.3 SWEEP_START
CONF:ANALOG:AM:SWEEP_START <param1>	0 ~ 15			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:ANALOG:AM:SWEEP_STOP?				6.1.3 SWEEP_STOP
CONF:ANALOG:AM:SWEEP_STOP <param1>	0 ~ 15			
READ:ANALOG:AM:SWEEP_TIME?				6.1.3 SWEEP_TIME
CONF:ANALOG:AM:SWEEP_TIME <param1>	20 ~ 10000			
READ:ANALOG:AM:AUDIO_IN_GAIN?				6.1.3 AUDIO_IN_GAIN
CONF:ANALOG:AM:AUDIO_IN_GAIN <param1>	0 ~ 50			
READ:ANALOG:AM:AUDIO_IN_LEVEL?				6.1.3 AUDIO_IN_LEVEL

9.4.14 AUDIO ANALYZER Commands

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:AUDIO:TRIGGER?				7.1.2 TRIGGER
CONF:AUDIO:TRIGGER <param1>	OFF, LEFT, RIGHT			
READ:AUDIO:REF_FREQ_MODE?				7.2.2 REF_MODE
CONF:AUDIO:REF_FREQ_MODE <param1>	MANUAL, AUTO			
READ:AUDIO:REF_FREQ_L?				7.2.2 REF_FREQ_L
CONF:AUDIO:REF_FREQ_L <param1>	0.4 ~ 20.0			
READ:AUDIO:REF_FREQ_R?				7.2.2 REF_FREQ_R
CONF:AUDIO:REF_FREQ_R <param1>	0.4 ~ 20.0			
READ:AUDIO:WEIGHTING_FILTER?				7.1.2, 7.2.2 FILTER
CONF:AUDIO:WEIGHTING_FILTER <param1>	OFF, A_WEIGHT, C_WEIGHT, CCIR			

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:AUDIO:AVG_NUM?				7.1.2, 7.2.2 AVG_NUM
CONF:AUDIO:AVG_NUM <param1>	1 ~ 100			
READ:AUDIO:CURRENT_AVG_NUM?				-
EXEC:AUDIO:AVG_RESET				-
READ:AUDIO:FREQ_R?				7.1.2, 7.2.2 FREQ_R
READ:AUDIO:FREQ_L?				7.1.2, 7.2.2 FREQ_L
READ:AUDIO:PK_PK_R?				7.1.2, PK_PK_R
READ:AUDIO:PK_PK_L?				7.1.2, PK_PK_L
READ:AUDIO:RMS_R?				7.1.2, RMS_R
READ:AUDIO:RMS_L?				7.1.2, RMS_L
READ:AUDIO:Q_PK_R?				7.1.2, Q_PK_R
READ:AUDIO:Q_PK_L?				7.1.2, Q_PK_L
READ:AUDIO:SINAD_R?				7.2.2, SINAD_R
READ:AUDIO:SINAD_L?				7.2.2, SINAD_L
READ:AUDIO:SNR_R?				7.2.2, SNR_R
READ:AUDIO:SNR_L?				7.2.2, SNR_L
READ:AUDIO:THD_R?				7.2.2, THD_R
READ:AUDIO:THD_L?				7.2.2, THD_L
READ:AUDIO:THDN_R?				7.2.2, THDN_R

COMMAND	<param1> RANGE	<param2> RANGE	<param3> RANGE	REFERENCE
READ:AUDIO:THDN_L?				7.2.2, THDN_L
READ:AUDIO:SEPARATE_R?				7.2.2, SEPARATE_R
READ:AUDIO:SEPARATE_L?				7.2.2, SEPARATE_L

Appendices

A.1. Language Table
A.2. Regional Frequency Table
A.3. Country Id
A.4. Character set

A.1 Language Table

Following table shows language information used for DAB/DMB.

[European languages]

Language	Code(hex)
Unknown/not applicable	00
Albanian	01
Breton	02
Catalan	03
Croatian	04
Welsh	05
Czech	06
Danish	07
German	08
English	09
Spanish	0A
Esperanto	0B
Estonian	0C
Basque	0D
Faroese	0E
French	0F
Frisian	10
Irish	11
Gaelic	12
Galician	13
Icelandic	14
Italian	15
Lappish	16
Latin	17
Latvian	18

Language	Code(hex)
Luxembourg	19
Lithuanian	1A
Hungarian	1B
Maltese	1C
Dutch	1D
Norwegian	1E
Occitan	1F
Polish	20
Portuguese	21
Romanian	22
Romansh	23
Serbian	24
Slovak	25
Slovene	26
Finnish	27
Swedish	28
Turkish	29
Flemish	2A
Walloon	2B
rfu	2C
rfu	2D
rfu	2E
rfu	2F
Reserved for national assignment	30-3F

[Other language]

Language	Code (hex)
Amharic	7F
Arabic	7E
Armenian	7D
Assamese	7C
Azerbaijani	7B

Language	Code (hex)
Marathi	5F
Ndebele	5E
Nepali	5D
Oriya	5C
Papiamento	5B

Bambora	7A
Belarusian	79
Bengali	78
Bulgarian	77
Burmese	76
Chinese	75
Churash	74
Dari	73
Fulani	72
Georgian	71
Greek	70
Gujarati	6F
Guarani	6E
Hausa	6D
Hebrew	6C
Hindi	6B
Indonesian	6A
Japanese	69
Kannada	68
Kazakh	67
Khmer	66
Korean	65
Laotian	64
Macedonian	63
Malagasy	62
Malaysian	61
Moldavian	60

Persian	5A
Punjabi	59
Pushtu	58
Quechua	57
Russian	56
Ruthenian	55
Serbo-Croatian	54
Shona	53
Sinhalese	52
Somali	51
Sranan Tongo	50
Swahili	4F
Tadzhik	4E
Tamil	4D
Tatar	4C
Telugu	4B
Thai	4A
Ukrainian	49
Urdu	48
Uzbek	47
Vietnamese	46
Zulu	45
ruf	44
ruf	43
ruf	42
ruf	41
Background sound/clean feed	40

A.2 Regional Frequency Table

1) BAND-III

EU Band - III (MHz)	
5A	174.928
5B	176.640
5C	178.352
5D	180.064
6A	181.936
6B	183.648
6C	185.360
6D	187.072

Korea Band - III (MHz)	
ROK 7A	175.280
ROK 7B	177.008
ROK 7C	178.736
ROK 8A	181.280
ROK 8B	183.008
ROK 8C	184.736
ROK 9A	187.280
ROK 9B	189.008

China Band - III (MHz)	
CN 6A	168.160
CN 6B	169.872
CN 6C	171.584
CN 6D	173.296
CN 6N	175.008
CN 7A	176.720
CN 7B	178.432
CN 7C	180.144

7A	188.928
7B	190.640
7C	192.352
7D	194.064
8A	195.936
8B	197.648
8C	199.360
8D	201.072
9A	202.928
9B	204.640
9C	206.352
9D	208.064
10A	209.936
10N	210.096
10B	211.648
10C	213.360
10D	215.072
11A	216.928
11N	217.088
11B	218.640
11C	220.352
11D	222.064
12A	223.936
12N	224.096
12B	225.648
12C	227.360
12D	229.072
13A	230.784
13B	232.496
13C	234.208
13D	235.776
13E	237.488
13F	239.200

ROK 9C	190.736
ROK 10A	193.280
ROK 10B	195.008
ROK 10C	196.736
ROK 11A	199.280
ROK 11B	201.008
ROK 11C	202.736
ROK 12A	205.280
ROK 12B	207.008
ROK 12C	208.736
ROK 13A	211.280
ROK 13B	213.008
ROK 13C	214.736

CN 7D	181.856
CN 8A	184.160
CN 8B	185.872
CN 8C	187.584
CN 8D	189.296
CN 8N	191.008
CN 9A	192.720
CN 9B	194.432
CN 9C	196.144
CN 9D	197.856
CN 10A	200.160
CN 10B	201.872
CN 10C	203.584
CN 10D	205.296
CN 10N	207.008
CN 11A	208.720
CN 11B	210.432
CN 11C	212.144
CN 11D	213.856
CN 12A	216.432
CN 12B	218.144
CN 12C	219.856
CN 12D	221.568

2) BAND L

Canada L - Band (MHz)	
L1	1452.816
L2	1454.560
L3	1456.304
L4	1458.048
L5	1459.729
L6	1461.536
L7	1463.280
L8	1465.024
L9	1466.768
L10	1468.512
L11	1470.256

L-Band (T-DAB) (MHz)	
LA	1452.960
LB	1454.672
LC	1456.384
LD	1458.096
LE	1459.808
LF	1461.520
LG	1463.232
LH	1464.944
LI	1466.656
LJ	1468.368
LK	1470.080

L12	1472.000
L13	1473.744
L14	1475.488
L15	1477.232
L16	1478.976
L17	1480.720
L18	1482.464
L19	1484.280
L20	1485.952
L21	1487.696
L22	1489.440
L23	1491.184

LL	1471.792
LN	1473.504
LM	1475.216
LO	1476.928
LP	1478.640
L-Band (S-DAB)	
LQ	148.352
LR	1482.064
LS	1483.776
LT	1485.488
LU	1487.200
LV	1488.912
LW	1490.624

A.3 Country Id

1) ITU Region 1 (European broadcasting area)

Country	ITU code	ECC	Country Id
Albania	ALB	E0	9
Algeria	ALG	E0	2
Andorra	AND	E0	3
Austria	AUT	E0	A
Azores (Portugal)	AZR	E0	8
Belgium	BEL	E0	6
Belarus (ex USSR)	BLR	E3	F
Bosnia i Hercegovina	bih	E4	F
Bulgaria	BUL	E1	8
Canaries (Spain)	CNR	E0	E
Croatia	HRV	E3	C
Cyprus	CYP	E1	2
Czech Republic	czr	E2	2
Denmark	DNK	E1	9
Egypt	EGY	E0	F
Estonia (ex USSR)	EST	E4	2
Faroe (Denmark)	DNK	E1	9
Finland	FNL	E1	6
France	F	E1	F
Germany	D	E0	D
		E0	1
Gibraltar (UK)	GIB	E1	A

Country	ITU code	ECC	Country Id
Lebanon	LBN	E3	A
Libya	LBY	E1	D
Liechtenstein	LIE	E2	9
Lithuania (ex USSR)	LTU	E2	C
Luxembourg	LUX	E1	7
Macedonia	mkd	E4	3
Madeira	MDR	E2	8
Malta	MLT	E0	C
Marocco	MRC	E2	1
Moldova	MDA	E4	1
Monaco	MCO	E2	B
Montenegro	men	E3	1
Netherlands	HOL	E3	8
Norway	NOR	E2	F
Poland	POL	E2	3
Portugal	POR	E4	8
Roumania	ROU	E1	E
Russian Federation	RUS	E0	7
San Marino	SM	E1	3
Serbia	srb	E2	D
Slovenia	SVN	E4	9
Slovak Republic	slr	E2	5

Greece	GRC	E1	1
Hungary	HNG	E0	B
Iceland	ISL	E2	A
Iraq	IRQ	E1	B
Ireland	IRL	E3	2
Israel	ISR	E0	4
Italy	I	E0	5
Jordan	JOR	E1	5
Latvia (ex USSR)	LVA	E3	9

Spain	E	E2	E
Sweden	S	E3	E
Switzerland	SUI	E1	4
Syria	SYR	E2	6
Tunisia	TUN	E2	7
Turkey	TUR	E3	3
Ukraine	UKR	E4	6
United Kingdom	G	E1	C
Vatican	CVA	E2	4

2) ITU Region 1 (African broadcasting area)

Country	ITU code	ECC	Country Id
Ascension island	ASC	D1	A
Angola	AGL	D0	6
Algeria	ALG	E0	2
Burundi	BDI	D1	9
Benin	BEN	D0	E
Burkina Faso	BFA	D0	B
Botswana	BOT	D1	B
Cabinda	cba	D3	4
Cameroon	CME	D0	1
Canary Islands	CNR	E0	E
Central African Republic	CAF	D0	2
Chad	TCD	D2	9
Congo	COG	D0	C
Comoros	COM	D1	C
Cape Verde	CPV	D1	6
Côte d'ivoire	CTI	D2	C
Djibouti	DJI	D0	3
Egypt	EGY	EO	F
Ethiopia	ETH	D1	E
Gabon	GAB	D0	8
Ghana	GHA	D1	3
Gambia	GMB	D1	8
Guinea-Bissau	GNB	D2	A
Equatorial Guinea	GNE	D0	7
Republic of Guinea	GUI	D0	9
Kenya	KEN	D2	6
Liberia	LBR	D1	2
Libya	LBY	E1	D
Lesotho	LSO	D3	6

Country	ITU code	ECC	Country Id
Mauritius	MAU	D3	A
Madagascar	MDG	D0	4
Malawi	MWI	D0	F
Mali	MLI	D0	5
Marocco	MRC	E2	1
Mauritania	MIN	D1	4
Mozambique	MOZ	D2	3
Niger	NGR	D2	8
Nigeria	NIG	D1	F
Namibia	NMB	D1	1
Rwanda	RRW	D3	5
Sao Tome & Principe	STP	D1	5
Seychelles	SEY	D3	8
Senegal	SEN	D1	7
Sierra Leone	SRI	D2	1
Somalia	SOM	D2	7
South Africa	AFS	D0	A
Sudan	SDN	D3	C
Swaziland	SWZ	D2	5
Togo	TGO	D0	D
Tunisia	TUN	E2	7
Tanzania	TZA	D1	D
Uganda	UGA	D2	4
Western Sahara	AOE	D3	3
Zaire	ZAI	D2	B
Zambia	ZMB	D2	E
Zanzibar	ZAN	D2	D
Zimbabwe	ZWE	D2	2

3) ITU Region 1 (Former Soviet Union area)

Country	ITU code	ECC	Country Id
Armenia	ARM	E4	A
Azerbaijan	AZE	E3	B
Belarus	BLR	E3	F
Estonia	EST	E4	2
Georgia	GEO	E4	C
Kazakhstan	KAZ	E3	D
Kyrgyzstan	KGZ	E4	3
Latvia	LVA	E3	9

Country	ITU code	ECC	Country Id
LIthuania	LTU	E2	C
Moldova	MDA	E4	1
Russian Federation	RUS	E0	7
Tajikistan	TJK	E3	5
Turkmenistan	TKM	E4	E
Ukraine	UKR	E4	6
Uzbekistan	UZB	E4	B

4) ITU Region 2 (North and South Americas)

Country	ITU code	ECC	Country Id
Anguilla	AIA	A2	1
Antigua & Barbuda	ATG	A2	2
Argentina	ARG	A2	A
Aruba	ABW	A4	3
Bahamas	BAH	A2	F
Barbados	BRB	A2	5
Belize	BLZ	A2	6
Bermuda	BER	A2	C
Bolivia	BOL	A3	1
Brazil	B	A2	B
Canada	CAN	A1	C
Cayman Islands	CYM	A2	7
Chile	CHL	A3	C
Colombia	CLM	A3	2
Costa Rica	CTR	A2	8
Cuba	CUB	A2	9
Dominica	DMA	A3	A
Dominican Republic	DOM	A3	B
Ecuador	EQA	A2	3
EL Salvador	SLV	A4	C
Falkland Islands	FLK	A2	4
Greenland	GRL	A1	F
Grenada	GRD	A3	D
Guadeloupe	GDL	A2	E
Guatemala	GTM	A4	1

Country	ITU code	ECC	Country Id
Guyana	GUY	A3	F
Haiti	HTI	A4	D
Honduras	HND	A4	2
Jamaica	JMC	A3	3
Martinique	MRT	A3	4
Mexico	MEX	A4	F
Montserrat	MSR	A4	5
Netherlands Antilles	ATN	A2	D
Nicaragua	NCG	A3	7
Panama	PNR	A3	9
Paraguay	PRG	A3	6
Peru	PRU	A4	7
Puerto Rico	PTR	A3	8
St. KItts	SCN	A4	A
St. Lucia	LCA	A4	B
St. Pierre & Michelon	SPM	A6	F
St. Vincent	VCT	A5	C
Surinam	SUR	A4	8
Trinidad & Tobago	TRD	A4	6
Turks & Caicos islands	TCA	A3	E
United States of America	USA	A0	1..9, A, B, D, E
Uruguay	URG	A4	9
Venezuela	VEN	A4	E
Virgin islands (British)	VRG	A5	F
Virgin islands (USA)	VIR	A5	F

5) ITU Region 3 (Asia and Pacific)

Country	ITU code	ECC	Country Id

Country	ITU code	ECC	Country Id

Afghanistan	AFG	F0	A
Saudi Arabia	ARS	F0	9
Australia:			
Capital Territory	act	F0	1
New South Wales	ans	F0	2
Victoria	avi	F0	3
Queensland	aqu	F0	4
South Australia	asa	F0	5
Western Australia	awa	F0	6
Tasmania	ata	F0	7
Northern Territory	ant	F0	8
Bangladesh	BGD	F1	3
Bahrain	BHR	F0	E
Myanmar (Burma)	BRM	F0	B
Brunei Darussalam	BRU	F1	B
Bhutan	BTN	F1	2
Cambodia	CBG	F2	3
China	CHN	F0	C
Sri Lanka	CLN	F1	C
Fiji	FJI	F1	5
Hong Kong	HKG	F1	F
India	IND	F2	5
Indonesia	INS	F2	C
Iran	IRN	F0	8
Iraq	IRQ	E1	B
Japan	J	F2	9
Kiribati	KIR	F1	1

Korea(South)	KOR	F1	E
Korea(North)	KRE	F0	D
Kuwait	KWT	F2	1
Laos	LAO	F3	1
Macau	MAC	F2	6
Malaysia	MLA	F0	F
Maldives	MLD	F2	B
Micronesia	mic	F3	E
Mongolia	MNG	F3	F
Nepal	NPL	F2	E
Nauru	NRU	F1	7
New Zealand	NZL	F1	9
Oman	OMA	F1	6
Pakistan	PAK	F1	4
Philippines	PHL	F2	8
Papua New Guinea	PNG	F3	9
Qatar	QAT	F2	2
Solomon Island	SLM	F1	A
Western Samoa	SMO	F2	4
Singapore	SNG	F2	A
Taiwan	twn	F1	D
Thailand	THA	F3	2
Tonga	TON	F3	3
United Arab Emirates	UAE	F2	D
Vietnam	VTN	F2	7
Vanuatu	VUT	F2	F
Yemen	YEM	F3	B

A.4 Character Set

0 : complete EBU Latin based repertoire
1 : EBU Latin based common core, Cyrillic, Greek
2 : EBU Latin based core, Arabic, Hebrew, Cyrillic and Greek
3 : ISO Latin Alphabet No 2
15 : ISO 10646-1 using UTF-8 transformation format

The remaining codes are reserved for future definition.