

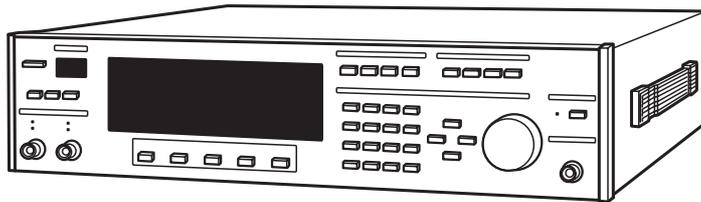
Part No. Z1-002-362, IB002775

Jul. 2008

Operation Manual

KSG Series
RDS/RBDS Signal Generator

KSG3420
KSG3421



Use of Operation Manual

Please read through and understand this Operation Manual before operating the product. After reading, always keep the manual nearby so that you may refer to it as needed. When moving the product to another location, be sure to bring the manual as well.

If you find any incorrectly arranged or missing pages in this manual, they will be replaced. If the manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact Kikusui distributor/agent, and provide the “Kikusui Part No.” given on the cover.

This manual has been prepared with the utmost care; however, if you have any questions, or note any errors or omissions, please contact Kikusui distributor/agent.

Reproduction and reprinting of this operation manual, whole or partially, without our permission is prohibited.

Both unit specifications and manual contents are subject to change without notice.

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Power Requirements of this Product

Power requirements of this product have been changed and the relevant sections of the Operation Manual should be revised accordingly.

(Revision should be applied to items indicated by a check mark)

Input voltage

The input voltage of this product is _____ VAC,
and the voltage range is _____ to _____ VAC. Use the product within this range only.

Input fuse

The rating of this product's input fuse is _____ A, _____ VAC, and _____.

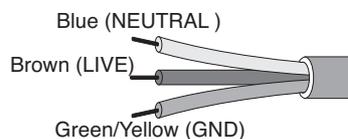
-
- ⚠ WARNING**
- To avoid electrical shock, always disconnect the AC power cord or turn off the switch on the switchboard before attempting to check or replace the fuse.
 - Use a fuse element having a shape, rating, and characteristics suitable for this product. The use of a fuse with a different rating or one that short circuits the fuse holder may result in fire, electric shock, or irreparable damage.
-

AC power cord

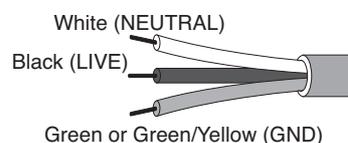
The product is provided with AC power cords described below. If the cord has no power plug, attach a power plug or crimp-style terminals to the cord in accordance with the wire colors specified in the drawing.

-
- ⚠ WARNING**
- The attachment of a power plug or crimp-style terminals must be carried out by qualified personnel.
-

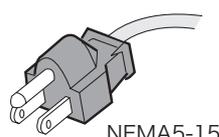
Without a plug



Without a plug



Plug for USA



Plug for Europe



Plug for China



Provided by Kikusui distributor/agent

Kikusui agents can provide you with suitable power cord.
For further information, contact Kikusui distributor/agent.



Safety Precautions

The following safety precautions must be observed to avoid fire hazard, electrical shock, accidents, and other failures. Keep them in mind and make sure that all of them are observed properly.



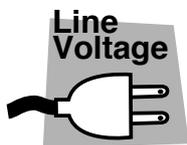
Users

- This product must be used only by qualified personnel who understand the contents of this operation manual.
- If it is handled by disqualified personnel, personal injury may result. Be sure to handle it under supervision of qualified personnel (those who have electrical knowledge.)
- This product is not designed or manufactured for general home or consumer use.



Purposes of use

- Do not use the product for purposes other than those described in the operation manual.



Input power

- Use the product with the specified input power voltage.
- For applying power, use the AC power cord provided. Note that the provided power cord is not use with some products that can switch among different input power voltages or use 100 V and 200 V without switching between them. In such a case, use an appropriate power cord.



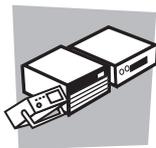
Fuse

- With products with a fuse holder on the exterior surface, the fuse can be replaced with a new one. When replacing a fuse, use the one which has appropriate shape, ratings, and specifications.



Cover

- There are parts inside the product which may cause physical hazards. Do not remove the external cover.



Installation

- When installing products be sure to observe "Installation" described in this manual.
- To avoid electrical shock, connect the protective ground terminal to electrical ground (safety ground).
- When applying power to the products from a switchboard, be sure work is performed by a qualified and licensed electrician or is conducted under the direction of such a person.
- When installing products with casters, be sure to lock the casters.



Relocation

- Turn off the power switch and then disconnect all cables when relocating the product.
- Use two or more persons when relocating the product which weights more than 20 kg. The weight of the products can be found on the rear panel of the product and/or in this operation manual.
- Use extra precautions such as using more people when relocating into or out of present locations including inclines or steps. Also handle carefully when relocating tall products as they can fall over easily.
- Be sure the operation manual be included when the product is relocated.



Operation

- Check that the AC input voltage setting and the fuse rating are satisfied and that there is no abnormality on the surface of the AC power cord. Be sure to unplug the AC power cord or stop applying power before checking.
- If any abnormality or failure is detected in the products, stop using it immediately. Unplug the AC power cord or disconnect the AC power cord from the switchboard. Be careful not to allow the product to be used before it is completely repaired.
- For output wiring or load cables, use connection cables with larger current capacity.
- Do not disassemble or modify the product. If it must be modified, contact Kikusui distributor/agent.



Maintenance and checking

- To avoid electrical shock, be absolutely sure to unplug the AC power cord or stop applying power before performing maintenance or checking.
- Do not remove the cover when performing maintenance or checking.
- To maintain performance and safe operation of the product, it is recommended that periodic maintenance, checking, cleaning, and calibration be performed.



Service

- Internal service is to be done by Kikusui service engineers. If the product must be adjusted or repaired, contact Kikusui distributor/agent.

Safety Symbols

For the safe use and safe maintenance of this product, the following symbols are used throughout this manual and on the product. Understand the meanings of the symbols and observe the instructions they indicate (the choice of symbols used depends on the products).



Indicates that a high voltage (over 1000 V) is used here. Touching the part causes a possibly fatal electric shock. If physical contact is required by your work, start work only after you make sure that no voltage is output here.

DANGER

Indicates an imminently hazardous situation which, if ignored, will result in death or serious injury.



Indicates a potentially hazardous situation which, if ignored, could result in death or serious injury.



Indicates a potentially hazardous situation which, if ignored, may result in damage to the product and other property.



Shows that the act indicated is prohibited.



Is placed before the sign “DANGER,” “WARNING,” or “CAUTION” to emphasize these. When this symbol is marked on the product, see the relevant sections in this manual.



Indicates a protective conductor terminal.



Indicates a chassis(frame) terminal.

Arrangement of this manual

This Operation Manual is made up of the following sections.

Preface

Provides a brief descriptions of the KSG3420/3421 and specifies its features.

Chapter 1 Setup

This chapter describes the steps taken before actually using the product such as unpacking, installation, etc.

Chapter 2 Basic Operations

This chapter describes basic operations of the KSG3420/3421 such as the power-up sequence, display switching, data entry, and memory operations.

Chapter 3 Signal Setting

This chapter describes the settings of the signal that is generated from the KSG3420/3421.

Chapter 4 Remote Control

This chapter describes external remote control such as GPIB and RS-232C.

Chapter 5 EON Network Operation

This chapter describes the EON network operation using the GPIB interface.

Chapter 6 Names and Functions of Parts

This chapter describes the names and functions of switches, displays, connectors, and other parts of the front panel and rear panel.

Read this chapter to learn about the details of the  (alert) marks indicated on the panel.

Chapter 7 Maintenance

This chapter describes maintenance and calibration of the KSG3420/3421. It also describes troubleshooting measures when you suspect that malfunction has occurred while using the KSG3420/3421.

Chapter 8 Specifications

This chapter describes the electrical and mechanical specifications of the KSG3420/3421 and accessories.

Appendix

Lists device messages.

Contents

Power Requirements of this Product	I
⚠ Safety Precautions	II
⚠ Safety Symbols	IV
Preface	P-1
About This Manual	P-1
Overview	P-2
Features	P-3
Chapter 1 Setup	1-1
1.1 Checking the Package Contents	1-2
1.2 Installation	1-3
1.3 Precautions When Moving the Unit	1-4
1.4 Checking the Input Power and Fuse	1-5
1.5 Connecting the Power Cord	1-6
1.6 Grounding	1-7
Chapter 2 Basic Operations	2-1
2.1 Turning On the Power	2-2
2.2 Adjusting the LCD	2-4
2.3 Data Entry Basics	2-5
2.4 Memory Operations	2-9
2.4.1 Basic Memory Operations	2-9
2.4.2 Scanning the Memory Group	2-10
2.5 Utility Menu	2-11
2.5.1 Plane Selection Screen	2-11
2.5.2 Index Screen	2-12
2.5.3 Utility 2 Screen	2-12
Chapter 3 Signal Setting	3-1
3.1 RDS/RBDS Signal Setting	3-2
3.1.1 Radio Data System main Screen	3-3
3.1.2 Group Sequence Screen	3-6
3.1.3 Radiotext Screen	3-10
3.1.4 Radio Data System sub Screen	3-12
3.1.5 Simulation Screen	3-14
3.1.6 AF.main Screen	3-15
3.1.7 Other Group.main Screen	3-18
3.1.8 Program Type Name Screen	3-21
3.1.9 Enhanced Other Net. xx xxx Screen	3-23
3.1.10 Enhanced Other Net.n sub Screen	3-28
3.1.11 AF Method A. EO Net.n Screen	3-30
3.1.12 Mapped Freq. EO Net.n Screen	3-32
3.1.13 Usage Code Seq. Net.n Screen	3-35
3.1.14 Modified MBS information Screen	3-42
3.1.15 Radio Data System SYS Screen	3-43
3.1.16 Memory Manage Screen	3-46

3.1.17	Hard Set Information Screen	3-48	
3.2	TRI Signal Setting	3-50	
3.3	Stereo Signal Setting (KSG3421 Only)	3-52	
3.3.1	Stereo Screen	3-52	
3.3.2	External Modulation	3-54	
3.3.3	Pre-emphasis	3-56	
Chapter 4	Remote Control		4-1
4.1	GPIB/RS-232C Control	4-2	
4.1.1	Overview	4-2	
4.1.2	Before Using the GPIB	4-2	
4.1.3	Before Using the RS-232C	4-4	
4.1.4	Messages and Terminators	4-5	
4.1.5	Device Messages	4-7	
4.2	Control Using the EXT I/O Connector	4-45	
4.2.1	Overview	4-45	
4.2.2	Description of the EXT I/O Connector Pins	4-46	
4.2.3	Panel Memory Recall	4-47	
4.2.4	Data Input/Output	4-48	
Chapter 5	EON Network Operation		5-1
5.1	Overview	5-2	
5.2	Setting the EON Network Operation	5-2	
5.2.1	REMOTE Setup Screen	5-2	
5.2.2	Address Map of EON System Screen	5-4	
5.3	Simulation Test Example of Receiver's EON Traffic Information	5-6	
5.3.1	System Configuration Example	5-6	
5.3.2	Network Configuration Setup	5-7	
5.3.3	Traffic Information Simulation Test	5-9	
5.3.4	Network Operation of RDS Data Other than TA	5-9	
5.4	Synchronization of Memory Operation	5-10	
Chapter 6	Names and Functions of Parts		6-1
6.1	Front Panel	6-2	
6.2	Rear Panel	6-8	
Chapter 7	Maintenance		7-1
7.1	Cleaning	7-2	
7.2	Inspection	7-2	
7.3	Calibration	7-2	
7.4	Backup Battery	7-3	
7.5	Malfunctions and Causes	7-3	
Chapter 8	Specifications		8-1
8.1	Specifications	8-2	
8.2	Outline Drawing	8-6	
Appendix			A-1
	Device Messages	A-1	
Index			I- 1



Preface

About This Manual

This operation manual describes the KSG3420/3421 RDS/RBDS Signal Generator.

Applicable Product Version

This manual applies to KSG3420/3421 with firmware version 1.0x or later. Furthermore, the application software Kikusui Quick Pattern Builder for KSG3420 Basic Edition (QPB3420) that comes with this product requires a KSG3420/3421 with firmware version 1.03 or later.

*1

NOTE *1 If you wish to use QPB3420 but the firmware version is before 1.03, the firmware must be upgraded. To check the firmware version, see section 2.5, "Utility Menu."
For information on having your KSG3420/3421 upgraded, contact Kikusui distributor/agent.

Overview

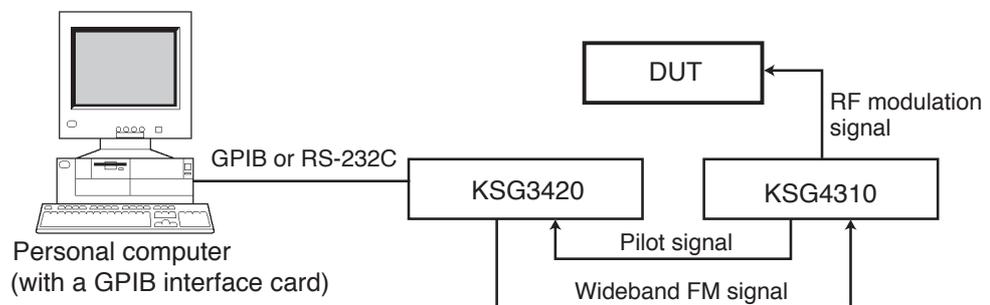
The KSG3420/3421 is a signal generator that generates 1) radio data system (RDS) signal conforming to “EN50067:1998,” 2) radio broadcast data system (RBDS) signal partly conforming to the “UNITED STATES RBDS STANDARD” prescribed by the National Radio System Committee (NRSC), and 3) stereo signal obtained by superimposing the traffic radio information (TRI or ARI) signal (KSG3421 only). In addition to using the KSG3420/3421 as a modulator for RDS and RBDS IC chips and FM broadcast equipment, it can be used to make adjustments, inspections, and characteristic measurements in prototype research divisions, e.g., for stereo demodulation (including RDS/RBDS) ICs and adapters as well as high-grade FM stereo receivers and tuners with RDS/RBDS.

The high-frequency output that can be passed by connecting the output signal of the KSG3420/3421 to the KSG series FM-AM standard signal generator enables stereo signals, RDS/RBDS signals, and composite signals with TRI signals superimposed to be supplied to stereo receivers, RDS/RBDS receivers, and TRI receivers.

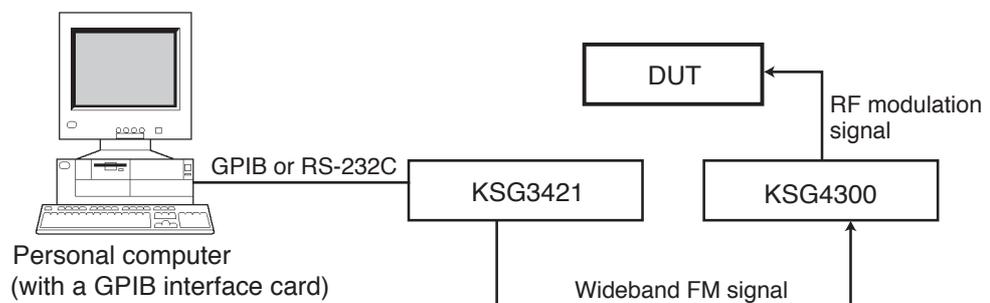
The RDS/RBDS data and clock (1187.5 Hz) signals are output at TTL levels from the rear panel of the KSG3420/3421. The signal can be used to test the logic section of the RDS/RBDS receiver.

You can create and edit the data directly on the LCD screen of the KSG3420/3421 or create and edit the data on a personal computer via the GPIB or RS-232C interface. The output data is modified in real time.

In addition, up to 100 different data sets can be stored in the KSG3420/3421 memory. Below is a system configuration example.



Combination with the KSG4310



Combination with the KSG4300

Fig. P-1 KSG3420/3421 System Configuration

Features

■ Stereo Signal Section

- The separation of right and left channels is 72 dB or higher in the mid-band (measured value).
- Excellent pilot phase stability eliminates the need for calibration.
- The internal modulation oscillator can be set in the range of 20 Hz to 20 kHz at 10-Hz resolution with extremely low distortion of 0.005 % or less (measured value). The internal modulation oscillator signal can be output, allowing the KSG3421 to be used as a spot oscillator with low distortion.

■ RDS/RBDS Signal

- Data can be created and edited on the LCD screen of the KSG3420/3421. Enhanced Other Networks (EON) data can be easily created and edited on the LCD screen.
- The data includes a data set consisting of PI, PS, AF, and so on and a group type sequence for sending the data set, each of which can be created and edited.
- Automatically extracts necessary codes from the data set based on the input data, configures the group data, and outputs the data in real time.
- Check word and offset word are automatically created.
- Data and group sequences can be inserted and deleted easily.
- The phase of the 57-kHz sub-carrier can be set to 0° or 90° (with respect to the 3rd harmonic of the 19-kHz pilot signal). In addition, the 57-kHz sub-carrier can be varied in the ±10° range in 1° steps.
- Provides excellent suppression ratio of the 57-kHz sub carrier.
- The RDS/RBDS data and 1187.5-Hz synchronization clock signal can be output from the rear panel. The 1187.5-Hz clock output can be inverted.

■ Operation

- Various data can be entered and modified easily on the LCD screen using the numerical keypad and rotary knob.

■ Memory Function

- All panel settings and RDS/RBDS data can be stored in memory. Up to 100 points can be stored and recalled.

■ External Control

- GPIB and RS-232C interfaces come standard.
- Most panel operations can be controlled remotely.



1

Chapter 1 Setup

This chapter describes the steps taken before actually using the product such as unpacking, installation, etc.

1.1 Checking the Package Contents

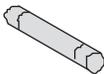
When you receive the product, check that all accessories are included and that the accessories have not been damaged during transportation. See the Fig. 1-1.

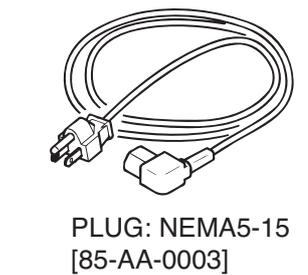
If any of the accessories are damaged or missing, contact your Kikusui agent or distributor.

The following accessories are supplied with the instrument.

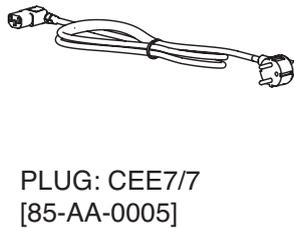
Total of four fuses are provided.

Two fuses are attached inside the fuse holder, one for the input circuit and another as a spare. The remaining two fuses are used when using the KSG3420/3421 in a voltage range other than the factory-shipped input line voltage range.

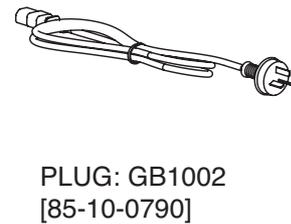
	Input Line Voltage	Inside the Fuse Holder	Provided Separately
 <input type="checkbox"/> Fuse (4 pcs.)	90 V-110 V	1 A (T) 2 pcs.	0.5 A (T) 2 pcs. [99-00-0028]
	104 V-126 V	1 A (T) 2 pcs.	0.5 A (T) 2 pcs. [99-00-0028]
	194 V-236 V	0.5 A (T) 2 pcs.	1 A (T) 2 pcs. [99-00-0029]
	207 V-250 V	0.5 A (T) 2 pcs.	1 A (T) 2 pcs. [99-00-0029]



or

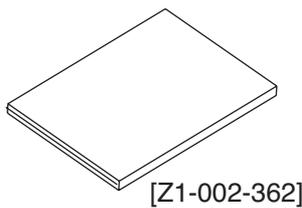


or

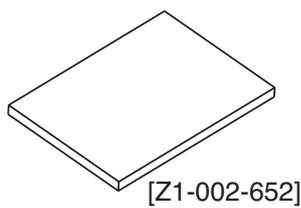


AC Power cord (1 pc.)

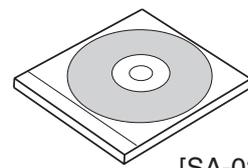
The power cord that is provided varies depending on the destination for the product at the factory-shipment.



Operation manual (1 pc.)



QPB3420 Basic Users Manual (1 pc.)



QPB3420 Basic CD (1 CD)

Fig. 1-1 Accessories

NOTE

- It is recommend that all packing materials be saved, in case the product needs to be transported at a later date.

1.2 Installation

Precautions Concerning Installation Location

This section describes the precautions to be taken when installing the KSG3420/3421. Make sure to observe them.

■ **Do not use the unit in a flammable atmosphere.**

To prevent the possibility of explosion or fire, do not use the unit near alcohol or thinner or in an atmosphere containing such vapors.

■ **Avoid locations where the unit is exposed to high temperature or direct sunlight.**

Do not place the unit near a heater or in areas subject to drastic temperature changes.

Operation temperature range: 0 °C to +40 °C

Storage temperature range: -10 °C to +60 °C

■ **Avoid locations of high humidity.**

Do not place the unit in high-humidity locations, i.e., near a boiler, humidifier, water supply, etc.

Operation humidity range: 20 % to 85 % [RH] (no condensation)

Storage humidity range: 0 to 90 % [RH] (no condensation)

Condensation may occur even in the operation humidity range. In such case, do not use the unit until the condensation dries up completely.

■ **Do not place the unit in a corrosive atmosphere.**

Do not install the unit in a corrosive atmosphere or in environments containing sulfuric acid mist, etc. This may cause corrosion of various conductors and bad contacts of connectors inside the unit leading to malfunction and failure, or in the worst case, a fire.

■ **Do not place the unit in a dusty location.**

Accumulation of dust can lead to electric shock or fire.

■ **Do not use the unit where ventilation is poor.**

Secure adequate space around the unit to prevent the possibility of fire caused by accumulation of heat.

■ **Do not place objects on top of the unit.**

Placing objects on top of the unit can cause failures (especially heavy objects).

■ **Do not place the unit on an inclined surface or location subject to vibrations.**

The unit may fall or tip over causing damages and injuries.

■ **Do not use the unit in a location subject to strong magnetic or electric fields.**

The unit may malfunction and cause electric shock or fire.

Using the Stand

The stand is used to tilt the front panel for easier viewing of the screen and improving the operability of the keys.

Pull the stand until it clicks in place.

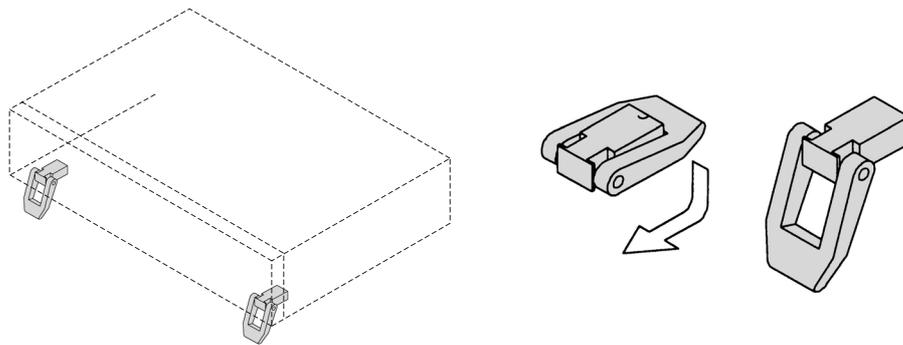


Fig. 1-2 Using the Stand

CAUTION • When using the stand, do not place objects on top of the unit or apply downward force from the top of the unit.

1.3 Precautions When Moving the Unit

When moving the unit to the installation location or when transporting the unit, note the following points.

■ Turn off the POWER switch.

Moving the unit while the power is turned on can cause electric shock or damage to the unit.

■ Remove all wiring.

Moving the unit with the cables connected can cause wires to break or injuries if the unit is dropped.

■ Put away the stand.

The stand may break if the unit is moved with the stand pulled out.

■ When transporting the unit, be sure to use the original packing materials.

Otherwise, damage may result from vibrations or from the unit falling during transportation. If you need packing materials, contact your Kikusui agent or distributor.

1.4 Checking the Input Power and Fuse

The KSG3420/3421 can use one of the four input line voltage ranges shown in Table 1-1. Check that the factory default setting matches the voltage that is going to be supplied to the unit. In addition, the input fuse must be of a rating that matches the input line voltage range.

-
- ⚠ WARNING** • To prevent the possibility of electric shock, make sure to unplug the power cord before checking or replacing the fuse.
- ⚠ CAUTION** • Use a fuse of shape, rating, and characteristics that conform to the unit. Using a fuse of a different rating or shorting the fuse holder can damage the unit.
-

Follow the procedures below to check (change) the input line voltage range and check (replace) the input fuse.

1. Turn off the POWER switch and unplug the power cord.
2. Remove the fuse holder cover. See Fig. 1-3.
3. Refer to Table 1-1 and check that the rating and the pre-arcing time-current characteristic of the fuse that is installed conform to the line voltage. If not, replace the fuse.
4. Insert the fuse holder cover so that the marker points to the line voltage that is to be used.

Table 1-1 Input Line Voltage Range

▼ MARK	LINE VOLTAGE	FUSE
100	90 V–110 V	250 VAC 1 A (T)
120	104 V–126 V	
220	194 V–236 V	250 VAC 0.5 A (T)
240	207 V–250 V	

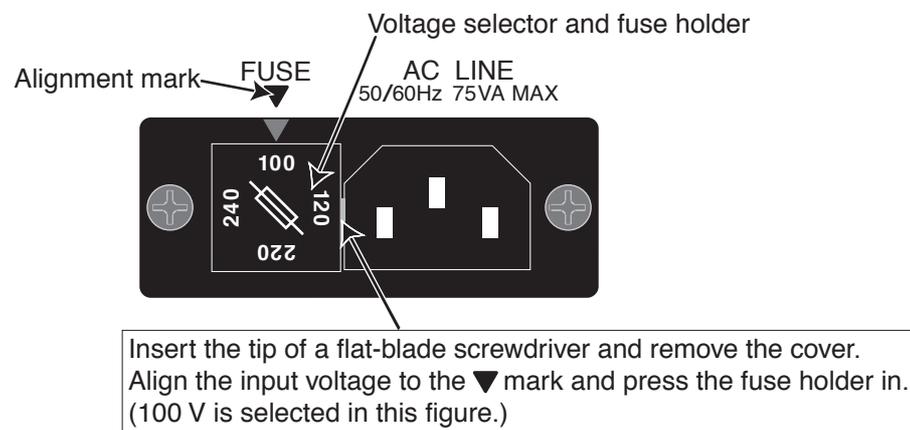


Fig. 1-3 Removing the Fuse Holder

1.5 Connecting the Power Cord

The power cord that is provided varies depending on the destination for the product at the factory-shipment.

-
- ⚠ WARNING**
- This instrument is designed to operate from the overvoltage category II. Do not operate it from the overvoltage category III or IV.
 - The AC power cord for 100 V system shown in Fig. 1-4 has a rated voltage of 125 VAC. If this AC power cord is used at the line voltage of a 200 V system, replace the power cord with that satisfying that line voltage. Appropriate power code must be selected by qualified personnel (those who have electrical knowledge). If such a power cord cannot be obtained, contact your Kikusui distributor/agent.
-

Do not use the power code attached to this product for the power code of other instruments.

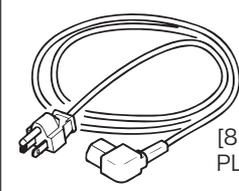
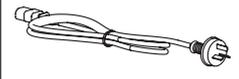
 <p>[85-AA-0003] PLUG:NEMA5-15</p>	Power cord for 100 V system Rated voltage: 125 VAC Rated current: 10 A
 <p>[85-AA-0005] PLUG:CEE7/7</p>	Power cord for 200 V system Rated voltage: 250 VAC Rated current: 10 A
 <p>[85-10-0790] PLUG:GB1002</p>	

Fig. 1-4 AC power cord

Follow the procedures below to connect the power cord.

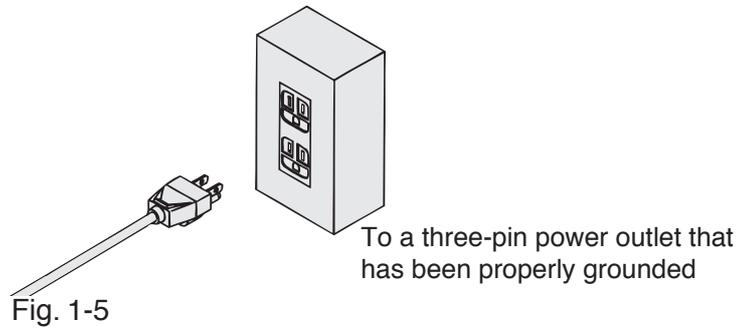
1. Confirm that the supply voltage is within the line voltage range of the generator.
2. Turn off the POWER switch.
3. Connect the power cord to the AC LINE connector on the rear panel.
Use the provided power code or power code that is selected by qualified personnel.
4. Insert the power plug to the outlet.

1.6 Grounding

-
- ⚠ WARNING** • Electric shock may occur, if proper grounding is not furnished.
- Connect the ground terminal to an adequate earth ground.
- ⚠ CAUTION** • If you do not ground the unit, malfunction may occur due to external noise, or the noise generated by the unit may become large.
-

Make sure to ground the unit for your safety.

To ground the unit, connect the power cord to a three-pin power outlet that has been properly grounded.





2

Chapter 2 Basic Operations

This chapter describes basic operations of the KSG3420/3421 such as the power-up sequence, display switching, data entry, and memory operations.

2.1 Turning On the Power

1. Check that the POWER switch is turned off (O).
When the switch is depressed, the power is on; when switch is out, the power is off.
2. Check that the input line voltage range matches the voltage that is to be supplied to the KSG3420/3421.
See section 1.4, “Checking the Input Power and Fuse.”
3. Check that the power cord is correctly connected.
See section 1.5, “Connecting the Power Cord.”
4. Turn on (I) the POWER switch.

After a moment, the following screen appears.

```
Radio Data System main RDS
PI 0000 PTY 0:NONE
PIN 00-00-00 TA 0
PS N
.hex 2020202020202020
PI PTY PS <EON> <sub>
```

Fig. 2-1 Screen at Power-up

NOTE

- Fig. 2-1 is the screen that appears when the POWER switch is turned on using factory default settings (initialized). The KSG3420/3421 saves the settings immediately before the POWER switch is turned off. The settings are used the next time the POWER switch is turned on. Therefore, the actual screen that appears may differ from Fig. 2-1.
-

Initialization

The KSG3420/3421 boots up using factory default settings, if you turn on the POWER switch while pressing the [2nd] key.

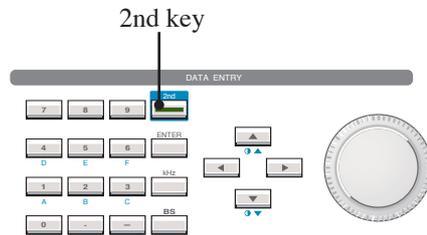


Fig. 2-2 2nd Key

In this case, the settings of the main items are as follows.

Table 2-1 Initial Values of Main Items

Common to the KSG3420/KSG3421

Item	Initial Value	Applicable Screen or Panel Display
RDS modulation level	1.60 %	Radio Data System SYS/Rds
Output level	3.00 V [p-p]	Radio Data System SYS/Output
RDS signal phase difference	90°	Radio Data System SYS/Phase
RDS modulation on/off	on	Front panel/RADIO DATA ON key
Clock polarity	Normal	Hard Set Information/Clock Polarity
Data polarity	Normal	Hard Set Information/Data Polarity
Output data	RDS	Hard Set Information/Output data
SK modulation level	4.7 %	Traffic Radio Information /SK
SK signal on/off	on	Traffic Radio Information /SK
DK modulation level	30 %	Traffic Radio Information /DK
DK signal on/off	on	Traffic Radio Information /DK
BK modulation level	60 %	Traffic Radio Information /BK
BK signal on/off	on	Traffic Radio Information /BK
BK area	A	Traffic Radio Information / AREA
Ext I/O Output	00 H	Utility 2 / I/O out
GPIO address	11	REMOTE Setup /ADDR

KSG3421 Only

Item	Initial Value	Applicable Screen Display
FM stereo modulation level	85.0 %	Stereo/Mod
Pilot level	10.0 %	Stereo/Pilot
AF source frequency	1.00 kHz	Stereo/Source
Pre-emphasis	off	Stereo/Pre-em
Stereo modulation mode	MAIN	Stereo/Channel

2.2 Adjusting the LCD

You can adjust the brightness of the backlight of the LCD using the panel key. The backlight brightness can be adjusted to 8 levels and can also be turned off.

■ Adjusting the Backlight by One Step

Press the [2nd] key to illuminate it. Then, press the [▲] key or the [▼] key. Pressing the [▲] key makes the backlight one step brighter; pressing the [▼] key makes the backlight one step darker.

■ Adjusting the Backlight Continuously

Pressing the [2nd] key and the [▲] key at the same time brightens the backlight continuously; pressing the [2nd] key and the [▼] key at the same time darkens the backlight continuously.

■ Turning Off the Backlight

Press the [2nd] key to illuminate it. Then, press the [BS] (backspace) key to turn off the backlight. To set the brightness back to the original setting, press one of the keys or turn the rotary knob.

NOTE

- You cannot turn off the backlight in the middle of a data entry operation. The above operation clears the data entry area, if you are in the middle of a data entry operation and the entered value has not been confirmed.
-

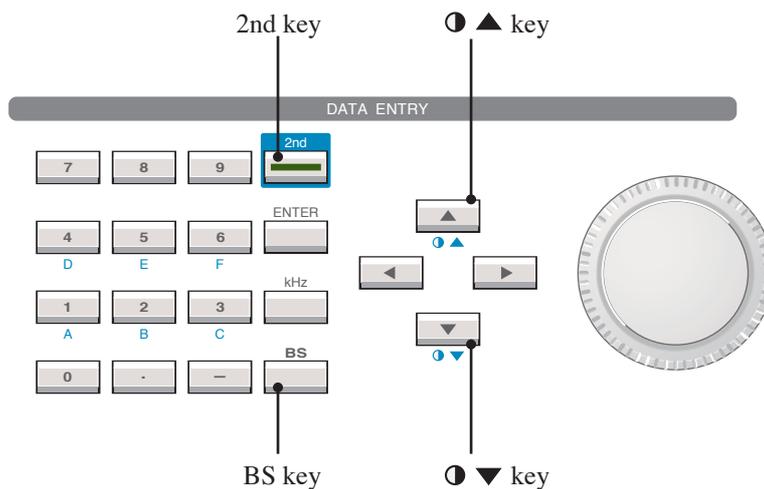


Fig. 2-3 Backlight Adjustment Keys

2.3 Data Entry Basics

This section describes the basic operations of switching screens and entering data.

Description of the Setup Screen

■ Screen Construction

Various setup screens are constructed as follows.

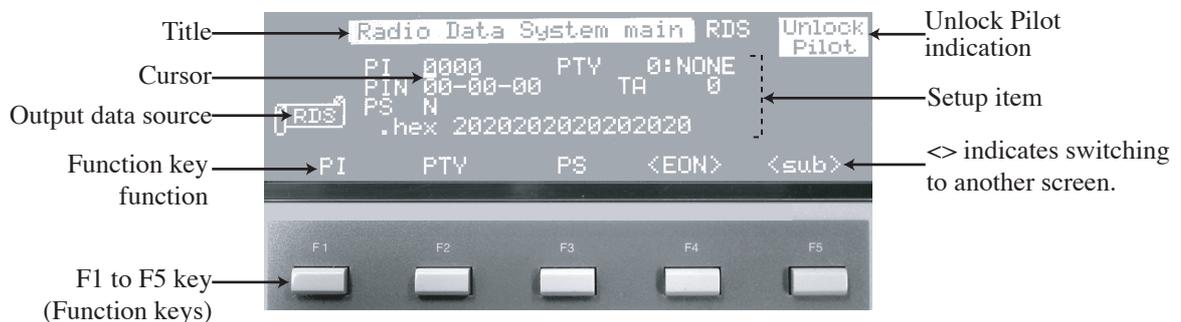


Fig. 2-4 Radio Data System main RDS Screen

Title

The screen title is displayed highlighted at the top section of the screen.

Setup item

Below the title, setup items of each screen are displayed. (Some screens have setup items on the title line.)

Output data source

Indicates the RDS/RBDS data source that is selected on the Hard Set Information screen. The data source is displayed on all setup screens. For details, see the description in section 3.1.17, "Hard Set Information Screen."

Unlock Pilot indication

This indication appears on all setup screens (except the Utility screen) when the 57-kHz sub-carrier cannot be synchronized such as when there is no pilot signal input or when the frequency is off from 19 kHz.

Function keys

The functions of the [F1] to [F5] keys (function keys) for the current screen are displayed at the bottom of the screen. The items enclosed in <> indicate that the screen will switch to another screen. For those items without <>, the cursor moves to the setup item. (Depending on the screen, the function of the key may turn on/off the setup item.)

Description of the Setup Screen (Continued)

For example, if you press the [F2] key in Fig. 2-4, the cursor moves to the setup item “PTY.” If you press the [F5] key, the screen switches from the Radio Data System main RDS to the Radio Data System sub screen.

In addition, the functional display of the function keys varies depending on whether the [2nd] key is illuminated. Fig. 2-5 is the screen corresponding to Fig. 2-4 (Radio Data System main RDS) when the [2nd] key is pressed and the key is illuminated. When the [2nd] key is illuminated, an asterisk “*” is displayed to the right of the line displaying the functions.



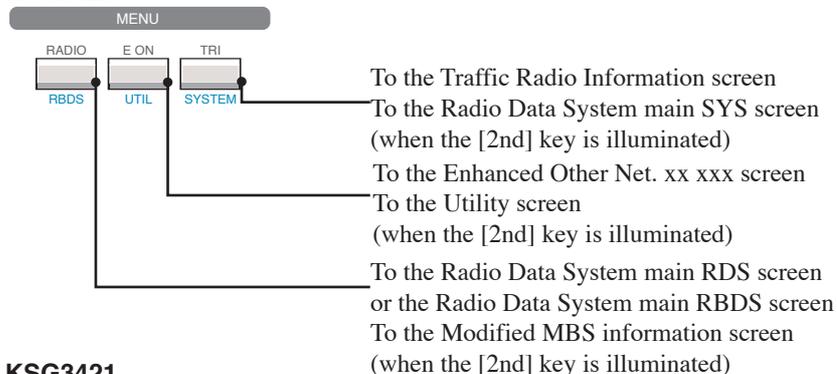
Fig. 2-5 Radio Data System main RDS Screen (When the 2nd Key Is Illuminated)

■ Switching Screens

Fig. 2-6 shows the screens that can be switched directly using the menu keys. Some of these screens can be entered using the function key on a certain screen such as the Enhanced Other Net. xx xxx screen.

The Radio Data System main RDS screen and the Radio Data System main RBDS screen are toggled by pressing the [RADIO] key when the [2nd] key is not illuminated.

KSG3420



KSG3421

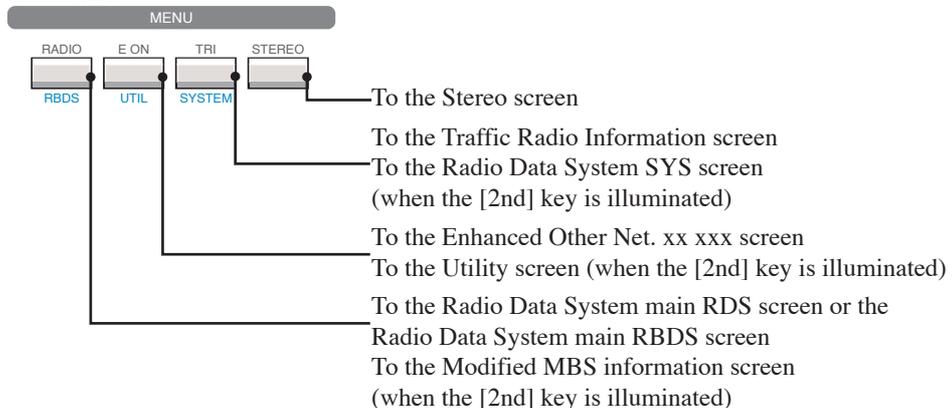


Fig. 2-6 Menu Keys

Description of Data Entry

To enter data for each setup item, the numeric keypad or rotary knob is used. (Some items can only be entered using the rotary knob.)

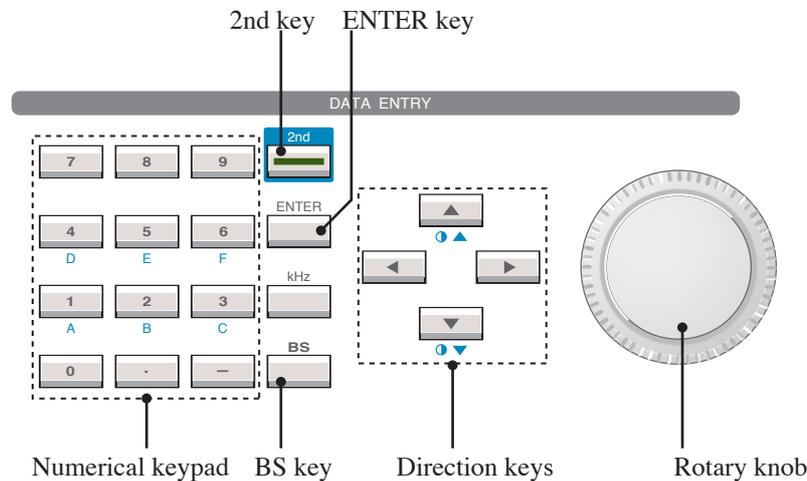


Fig. 2-7 Data Entry Section of the Front Panel

Here, the procedure for entering data is explained by setting the items as shown below using the Radio Data System main RDS screen.

- PI: 5FF0
- PTY: 14
- PS: 1

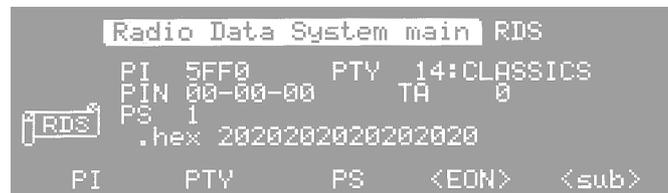


Fig. 2-8 Setup Example of Radio Data System main RDS Screen

■ Setting the PI to 5FF0

The PI can be set in the range of 0000 to FFFF using the numeric keypad or rotary knob.

Entry Using the Numeric Keypad

1. Move the cursor to the “PI” entry area.

Use the [F1] (PI) key to jump or the direction keys to move the cursor. However, when using the direction keys, the cursor moves only a single step each time a key is pressed. Even if a direction key is held down, the cursor does not move continuously.

2. Press the numeric key [5].

The entire data entry area (4 digits) is highlighted, and “5” is displayed at the left end.

Description of Data Entry (Continued)

3. Press the [2nd] key to illuminate it. Then, press the numeric key [6] (F).
5F is displayed in the data entry area.
If the [2nd] key is not illuminated when you press the numeric key 6 (F), **56** is displayed. Press the [BS] (backspace) key to delete “6.”
4. In the same fashion, enter F and 0. Then, press the [ENTER] key to confirm the entered value.
The entered value is confirmed only when the [ENTER] key is pressed.
Enter all required digits when entering values using the numeric keypad. If you fall short of entering all the digits, the missing digits are automatically set to “0.”

NOTE

- When the entered value has not been confirmed and you press the [2nd] key to illuminate the key followed by the [BS] key, the data entry area is cleared.
-

Entry Using the Rotary Knob

1. Move the cursor to the left end of the “PI” entry area.
2. Turn the rotary knob to display “5.”
Values entered using the rotary knob are confirmed when they are set.
3. Press the [▶] key once to move the cursor to the next digit.
4. In the same fashion, enter F, F, and 0.

■ Setting the PTY to 14

The PTY can be set in the range of 0 to 31 using the numeric keypad or rotary knob.

Entry Using the Numeric Keypad

1. Move the cursor to the “PTY” entry area.
2. Enter [1] and [4] using the numeric keypad. Then, press the [ENTER] key to confirm the entered value.
If you enter a value outside the selectable range and press the [ENTER] key, the value returns to the previous value.

Entry Using the Rotary Knob

1. Move the cursor to the left end of the “PTY” entry area.
2. Turn the rotary knob to display 14.

■ Setting the PS to 1

The selectable values of PS are N, 0, 1, and 2. The value can only be entered using the rotary knob. You cannot enter the value by pressing the numeric key [1].

2.4 Memory Operations

The KSG3420/3421 allows 100 sets (addresses 00 to 99) of panel settings to be stored to the memory. In addition, the memory can be grouped, and the settings can be recalled sequentially within the group. You can create up to 11 groups from 00 to 10.

NOTE

- When the KSG3420/3421 is shipped from the factory (initialized condition), the memory contains no information. No default settings are written in addresses 00 through 99. Settings are written for the first time when you specify an address and perform a store operation. Hence, settings can only be recalled from the memory addresses that have been written through the store operation. However, you can specify memory addresses to be recalled even if no settings have been stored.

If you do so, the panel settings that are recalled are the previous panel settings that existed before the recall operation. However, the displayed screen is always the Radio Data System main RDS screen regardless of the screen before the recall operation.

2.4.1 Basic Memory Operations

Specifying the Memory Address

When performing a recall or store operation of the memory, you specify the memory address that you wish to recall or store. To specify the address, use the numeric keypad or the [▼] key or the [▲] key in the memory operation section. The following three methods are available in specifying the address.

1. Specifying only the one's digit of the address

Press the [RCL] key (or the [2nd] [STORE] key), and then the numeric key [-]. Press one of the numeric keys from [0] to [9]. The ten's digit does not change; the one's digit is set to the pressed value.

2. Specifying two digits of the address

Press the [RCL] key or the [2nd] [STORE] key, and then enter the two-digit address using the numeric keys from [0] to [9].

3. Specifying the address using the [▼] key or [▲] key

When storing the settings, press the [2nd] [STORE] key followed by the [▼] key or [▲] key of the memory operation section. When recalling settings, press only the [▼] key or [▲] key of the memory operation section.

If the [▼] key is pressed, the address is set to an address that is decreased by 1 within the memory group. If the [▲] key is pressed, the address is set to an address that is increased by 1 within the memory group (the next address after the end address is the start address).

Storing to the Memory

1. Press the [2nd] key to illuminate it. Then, press the [STORE] key.
“STORE” is displayed at the upper left corner of the screen.
2. Specify the memory address you wish to store to.
The specified address is displayed on the memory address display.
When the store operation completes, the “STORE” indication on the display disappears.

Recalling from the Memory

1. Press the [RCL] key.
“RECALL” is displayed at the upper left corner of the screen.
2. Specify the memory address you wish to recall from.
The specified address is displayed on the memory address display.
When the recall operation completes, the “RECALL” indication on the display disappears.

2.4.2 Scanning the Memory Group

Scanning of the memory group refers to the action of sequentially recalling between the start address and end address that have been assigned to the memory group beforehand.

You can arbitrarily specify the time until the next address is recalled, the addresses that are not to be recalled, and the address at which scanning is to be stopped.

The memory group is assigned using the Memory manage screen. For details, see section 3.1.16, “Memory Manage Screen.”

1. Press the [2nd] key to illuminate it. Then, press the [SYSTEM] key.
The Radio Data System SYS screen appears.
2. Press the [2nd] key to illuminate it. Then, press the [F1] (<memo>) key.
The Memory manage screen appears.
3. Specify the memory group you wish to scan.
If necessary, set the required items to the memory group such as the start address.
4. Press the [2nd] key to illuminate it. Then, press the [▲] (GRP SCAN) key.
The addresses between the start address and end address are sequentially recalled from the specified memory group.
The address that is being recalled is displayed on the memory address display.
5. To stop the scanning of the memory group, press the [RCL] key.

2.5 Utility Menu

Press the [2nd] key to illuminate it. Then, press the [UTIL] menu key. The Utility screen shown in Fig. 2-9 appears.

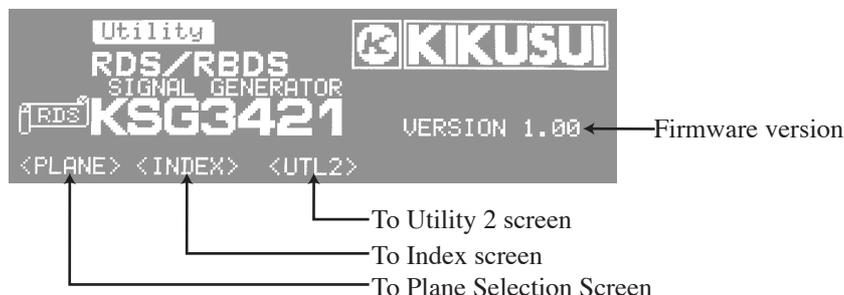


Fig. 2-9 Utility Screen

This screen enables you to check the firmware version of the KSG3420/3421 and enter the following three screens.

- Plane Selection screen
 - You can jump directly to a specified screen.
- Index screen
 - You can jump the cursor directly to a specified setup item.
- Utility 2 screen
 - Sets the data input/output of the EXT I/O connector on the rear panel.

2.5.1 Plane Selection Screen

The Plane Selection screen is entered by pressing the [F1] (<PLANE>) key on the Utility screen shown in Fig. 2-9. You can directly jump to a specified screen from this screen.

You cannot return to the original Utility screen from this screen. To do so, press the [2nd] [UTIL] key.

Screens are called “Planes” on the KSG3420/3421.



Fig. 2-10 Plane Selection Screen

■ To Jump to an Arbitrary Screen

1. Turn the rotary knob and position the cursor in front of the name of the screen you wish to jump to.

Rotating the rotary knob clockwise scrolls the screen names up; rotating it counter-clockwise scrolls the screen names down.

You can also use the [▲] key or [▼] key to move the cursor in front of the desired screen name.

2. Press the [F1] (<JUMP>) key.

The screen switches to the screen that was selected in step 1.

2.5.2 Index Screen

The Index screen is entered by pressing the [F2] (<INDEX>) key on the Utility screen shown in Fig. 2-9. You can jump the cursor directly to a specified setup item on this screen.

You cannot return to the original Utility screen from this screen. To do so, press the [2nd] [UTIL] key.

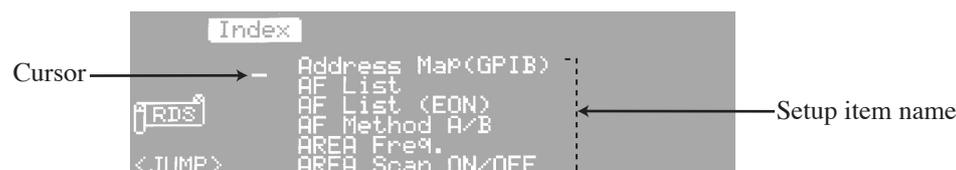


Fig. 2-11 Index Screen

■ To Jump to an Arbitrary Setup Item

1. Turn the rotary knob and position the cursor in front of the name of the setup item you wish to jump to.

Rotating the rotary knob clockwise scrolls the item names up; rotating it counter-clockwise scrolls the item names down.

You can also use the [▲] key or [▼] key to move the cursor in front of the desired setup item name.

2. Press the [F1] (<JUMP>) key.

The screen switches to the screen that contains the item name that was selected in step 1, and the cursor jumps to the item name.

2.5.3 Utility 2 Screen

The Utility 2 screen is entered by pressing the [F3] (<UTL2>) key on the Utility screen shown in Fig. 2-9. The data input/output of the EXT I/O connector on the rear panel is set on this screen.

To return to the original Utility screen from this screen, press the [F5] (<prev>) key. For details on this screen, see section 4.2.4, “Data Input/Output.”



Fig. 2-12 Utility 2 Screen

3

Chapter 3 Signal Setting

This chapter describes the settings of the signal that is generated from the KSG3420/3421.

3.1 RDS/RBDS Signal Setting

The structure of the setup screens used to set the RDS/RBDS signal is as follows. You can directly enter the screens that are indicated in gray using the menu keys.

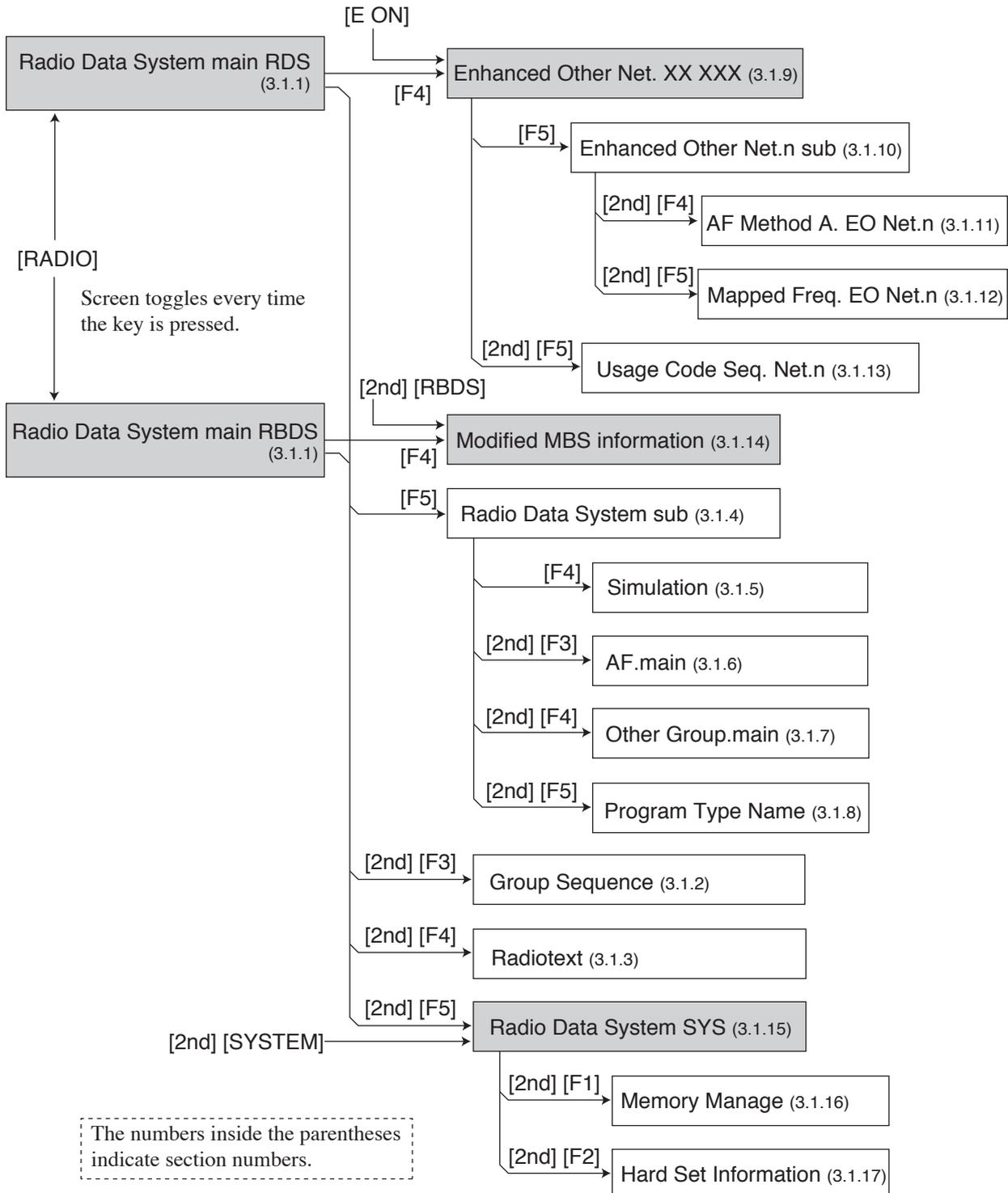


Fig. 3-1 Hierarchy of the RDS/RBDS Signal Setup Screen

3.1.1 Radio Data System main Screen

This is the top screen used to set the RDS/RBDS signal. You can toggle the Radio Data System main RDS screen and the Radio Data System main RBDS by pressing the [RADIO] menu key.

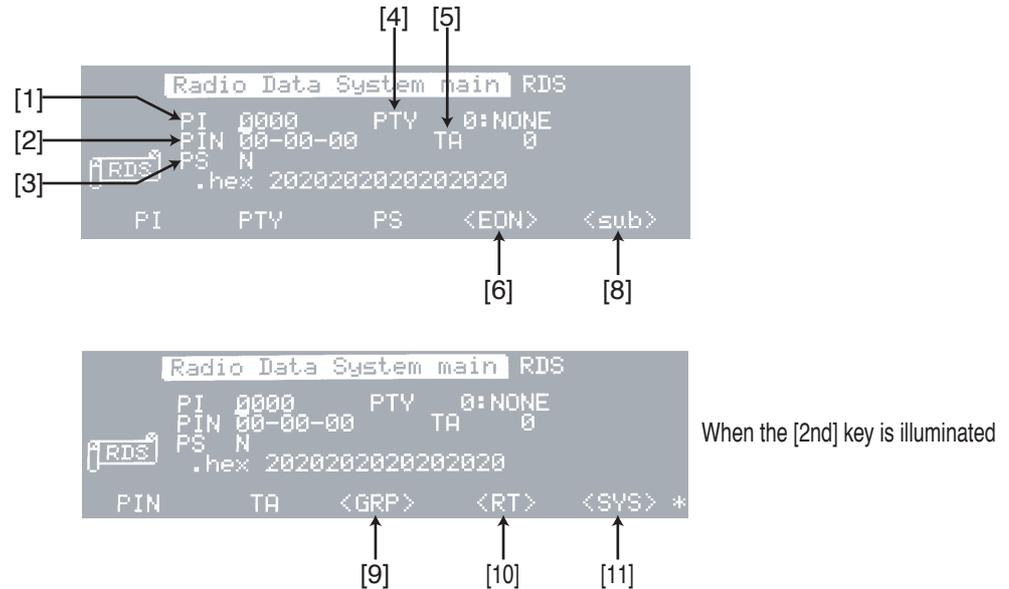


Fig. 3-2 Radio Data System main RDS Screen

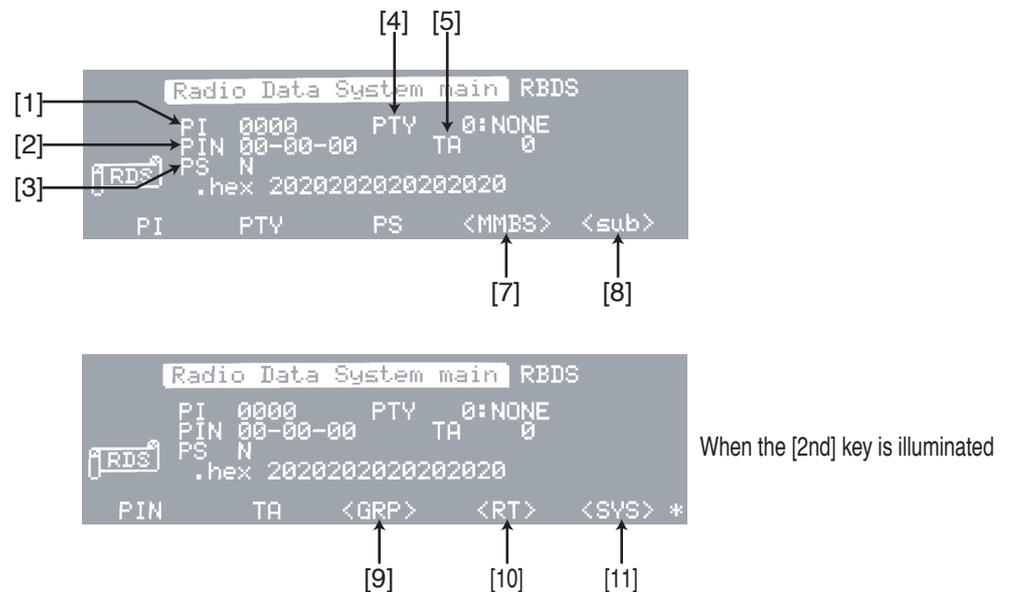


Fig. 3-3 Radio Data System main RBDS Screen

3.1.1 Radio Data System main Screen (Continued)

Screen Description

[1] PI (Programme Identification)

Indicates the program identification (ID) code.

The nation ID, area ID, and program service ID are specified using 4 bits, 4 bits, and 8 bits, respectively. Enter a 4-digit hexadecimal number from 0000 to FFFF for the 16 bits.

You can use the numeric keypad or rotary knob to enter the value.

[2] PIN (Programme Item Number)

Indicates the program item number. Codes such as the scheduled broadcast start time are sent. The code is used for program reception reservation, for example.

Enter the data, which is delimited by a hyphen every 2 digits (dd-hh-mm), as follows.

Date (dd): Consists of 5 bits. Enter a 2-digit decimal number from 00 to 31.

Hour (hh): Consists of 5 bits. Enter a 2-digit decimal number from 00 to 31.

The actual hour is up to 23 hours. However, you can specify a number from 00 to 31 for checking programs and other purposes.

Minute (mm): Consists of 6 bits. Enter a 2-digit decimal number from 00 to 63.

The actual minute is up to 59 minutes. However, you can specify a number from 00 to 63 for checking programs and other purposes.

You can use the numeric keypad or rotary knob to enter the value.

When using the numeric keypad, use the [-] key between the date, hour, and minute.

[3] PS (Programme Service name)

Indicates the program service name. It is used to send the abbreviation of the broadcast station, program name, and so on.

Specify the code table using the rotary knob according to Fig. 3-4.

Code table assignment

0: Code table of Fig. E.1 in EN50067:1998

1: Code table of Fig. E.2 in EN50067:1998

2: Code table of Fig. E.3 in EN50067:1998

N: No code table

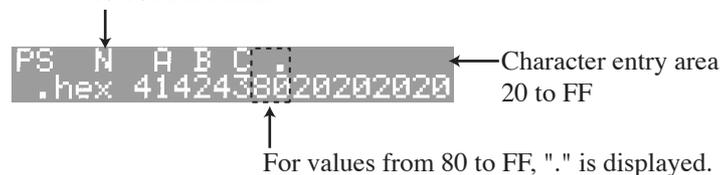


Fig. 3-4PS Entry

Use the [▶] key to move from the code table assignment position to the character entry area. You can enter 8 ASCII characters from 20 to FF in the character entry area using the numeric keypad or rotary knob. The hexadecimal values entered are converted into ASCII characters. An ASCII character appears for every 2 hexadecimal characters entered from left to right. "." is displayed for values greater than or equal to 80.

[4] PTY (Programme TYPe)

Indicates the program type used to identify the program contents.

Consists of 5 bits. Enter a 2-digit decimal number from 00 to 31. You can use the numeric keypad or rotary knob to enter the value.

[5] TA (Traffic Announcement flag)

Indicates the announce ID for traffic information. One bit is used as traffic information broadcasting ID signal.

Specify the number of insertions of type-15B groups at the time of TA change.

Specify a value from 0 to 9. A value of 0 indicates that there is no automatic insertion. You can use the numeric keypad or rotary knob to enter the value.

The TA is turned on or off using the [TA] key on the panel. When the [TA] key is illuminated, the TA bit is set to 1.

[6] <EON>

Switches to the Enhanced Other Net. xx xxx Screen in section 3.1.9.

[7] <MMBS>

Switches to the Modified MBS information Screen in section 3.1.14.

[8] <sub>

Switches to the Radio Data System sub Screen in section 3.1.4.

[9] <GRP>

Switches to the Group Sequence Screen in section 3.1.2.

[10] <RT>

Switches to the Radiotext Screen in section 3.1.3.

[11] <SYS>

Switches to the Radio Data System SYS Screen in section 3.1.15.

3.1.2 Group Sequence Screen

Press the [2nd] [F3] (<GRP>) key on the Radio Data System main Screen in section 3.1.1 to enter this screen.

This screen is used to edit the group sequence (the sequence of group types that should be followed when data is output from the KSG3420/3421).

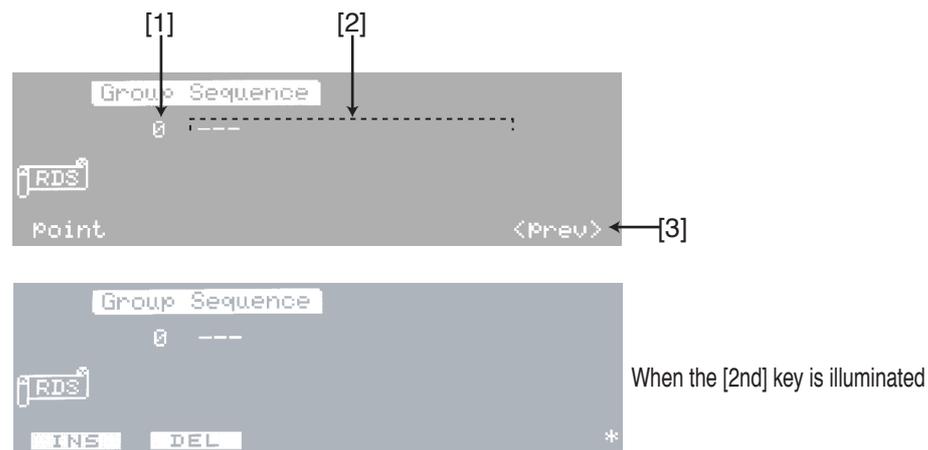


Fig. 3-5 Group Sequence Screen

Screen Description

[1] point

Indicates the location number of the group type displayed at the upper left corner of the data edit area [2] within all group types.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the group sequence.

[3] <prev>

Returns to the previous Radio Data System main screen.

Group Sequence Editing

This section describes the procedure for adding data from a condition in which no data is present as shown in Fig. 3-5.

■ Entering Data

1. If the cursor is located at point, use the [▶] key to move the cursor to the data edit area.

2. As an example, enter group type 1A. Enter [1] [2nd] [A] [ENTER] using the numeric keypad.

When data is entered, the cursor moves to the next entry position as shown in Fig. 3-6.

You can correct the group type that has been entered previously using the rotary knob.



Fig. 3-6 Data Entry Example 1 of the Group Sequence Screen

3. Enter 15 data items as shown in Fig. 3-7.

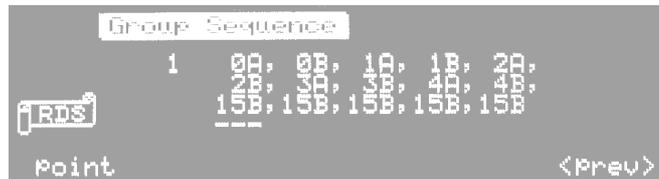


Fig. 3-7 Data Entry Example 2 of the Group Sequence Screen

4. Press the [F1] (point) key to move the cursor to point. Turn the rotary knob clockwise until the point value no longer increases.

Fig. 3-8 shows that the 15th data is “15B.”



Fig. 3-8 Data Entry Example 3 of the Group Sequence Screen

5. Next, turn the rotary knob counter-clockwise 5 steps. 6 data items appear as shown in Fig. 3-9.

Fig. 3-9 shows that the 10th data is “4B.”



Fig. 3-9 Data Entry Example 4 of the Group Sequence Screen

- To specify user-defined group types UD1 and UD2, enter D1 and D2, respectively, using the numeric keypad.
- To specify the MMBS group type (offset word E = 0) MBS, enter E0.

3.1.2 Group Sequence Screen (Continued)

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. “15B” is inserted before the data where the cursor is. Replace the value with the desired data.

“15B” is forcibly inserted for data area allocation and data security.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

User-Defined Group UD1 and UD2

For a description on editing UD1 and UD2, see the explanation in section 3.1.7, “Other Group.main Screen.”

■ UD1

This group type allows any offset word A, B, C, C', D, E, or F to be applied to any block 1 to 4. There are no limitations on the information word of each block. For each block from 1 to 4, enter a 4-digit hexadecimal value for the information word and a 3-digit hexadecimal value for the offset word.

To specify the offset word A, B, C, C', D, E, and F, enter a 3-digit hexadecimal value according to the following table.

Table 3-1 Offset Word Code Table

Offset Word	HEX Code
A	0FC
B	198
C	168
C'	350
D	1B4
E	0
F	194

When a UD1 data item is output from the KSG3420/3421, a prescribed check word is calculated for the information word, and the specified offset is appended.

■ UD2

With this user-defined group, there are no limitations on the definition of both the information word and the check word + offset word. Enter the data using a 7-digit hexadecimal value.

When a UD2 data item is output from the KSG3420/3421, the data is not subject to any processing.

3.1.3 Radiotext Screen

Press the [2nd] [F4] (<RT>) key on the Radio Data System main Screen in section 3.1.1 to enter this screen.

You can edit up to 64 characters of radio text.

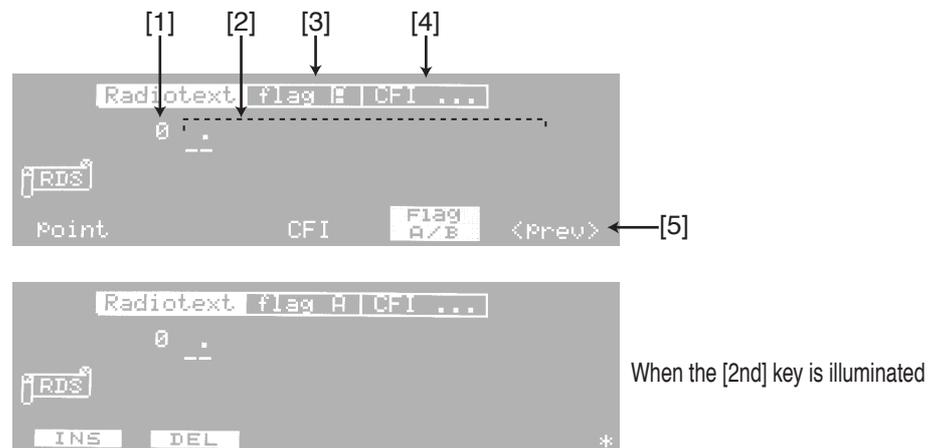


Fig. 3-10 Radiotext Screen

Screen Description

[1] point

Indicates the location number of the text character displayed at the upper left corner of the data edit area [2] within all text characters.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the text characters.

[3] flag

Indicates the Text A/Text B flag.

Press the [F4] (Flag A/B) key to toggle between flag A and flag B. You can also use the rotary knob.

[4] CFI (Change Flag Interval)

When flag [3] is set to "A," this value indicates the interval for the Text A flag to switch to the Text B flag. When flag [3] is set to "B," this value indicates the interval for the Text B flag to switch to the Text A flag.

Enter the CFI using a decimal value from 0 to 255. You can use the numeric keypad or rotary knob to enter the value. If there is no data item in the data edit area, you cannot set this value.

[5] <prev>

Returns to the previous Radio Data System main screen.

Data Editing

■ Entering Data

If the cursor is located at point, use the [▶] key to move the cursor to the data edit area. Use the numeric keypad to enter a 2-digit hexadecimal value and the [ENTER] key to confirm. Up to 64 characters can be entered.

The 2-digit hexadecimal value entered is displayed at the bottom section; the corresponding character is displayed at the top section. Values that can be entered are 0A, 0D, and 20 to FF. However, "." is displayed for 0A, 0D, and values greater than or equal to 80.

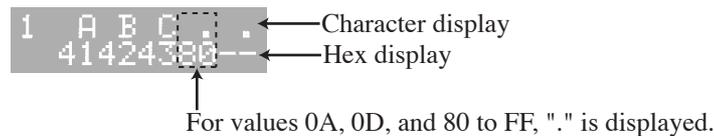


Fig. 3-11 Text Display

- For a description on the data display corresponding to the point value, see “Group Sequence Editing” in section 3.1.2, “Group Sequence Screen.”

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. A space (20 H) is inserted before the data where the cursor is. Replace the value with the desired data.

A space is forcibly inserted for data area allocation.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

3.1.4 Radio Data System sub Screen

Press the [F5] (<sub>>) key on the Radio Data System main Screen in section 3.1.1 to enter this screen.

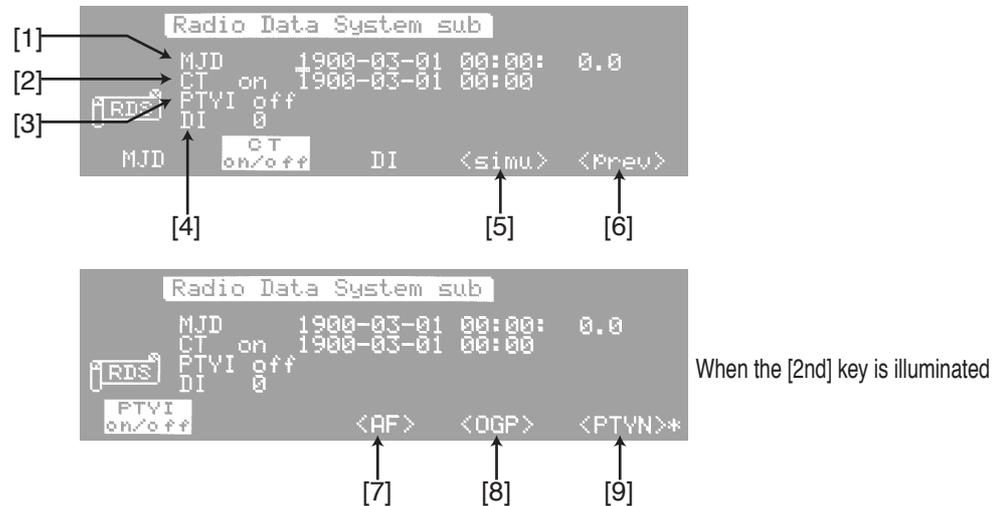


Fig. 3-12 Radio Data System sub Screen

Screen Description

[1] MJD (Modified Julian Day)

Enter the initial value. When the initial value is entered, the initial CT [2] value is also set.

Enter the value as follows.

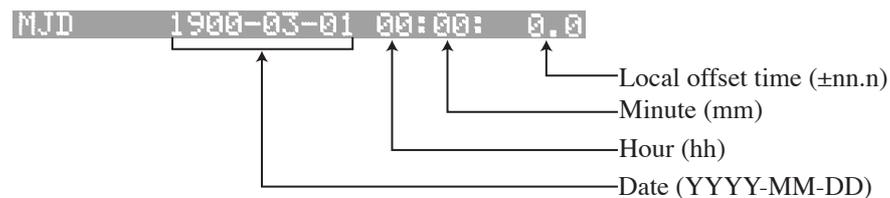


Fig. 3-13 MJD Entry

Date (YYYY-MM-DD):

Enter 17 bits in the range of March 1st, 1900 to February 28, 2100.

Hour (hh): Enter 5 bits in the range of 00 to 31.

The actual hour is up to 23 hours. However, you can specify a number from 00 to 31 for checking programs and other purposes.

Minute (mm): Enter 6 bits in the range of 00 to 63.

The actual minute is up to 59 minutes. However, you can specify a number from 00 to 63 for checking programs and other purposes.

Local offset time (±nn.n):

Enter the time in the range of ±0.0 to 15.5.

- Enter the data according to the following format using the numeric keypad: 1989-1-20-12-30--15.5. Use the [-] key to enter hyphens.
- You can also use the rotary knob to change the data. When using the rotary knob, the 8-digit value consisting of year, month, and day change together.
- “hh:mm ±nn.n” is included in the MJD on the screen.

[2] CT (Clock Time and date)

Indicates the time information in minutes. Turns on/off the automatic increment function of the minute and the 4A interrupt output function.

When CT is on, the CT value is incremented every minute based on the initial value of the MJD, and a 4A interrupt is output to the group sequence. In addition, when the CT is switched from off to on, the minute value is incremented, and a 4A interrupt is output to the group sequence.

When the CT is off, the automatic increment and interrupt functions mentioned above do not operate. The automatic increment function also stops under GPIB or RS-232C control.

The automatic increment per minute changes the minute, hour, and date.

The [F2] (CT on/off) key is used to switch the CT on and off. You can also use the rotary knob.

[3] PTYI (dynamic Programme TYpe Indicator)

Indicates the on/off state of the PTYI

Press the [2nd] [F1] (PTYI on/off) key to toggle between on and off. You can also use the rotary knob.

[4] DI (Decoder Identification)

Indicates the decoder ID. It is used to turn or off the transmission condition ID, monaural, stereo, decoder, etc.

Enter 3 bits using a decimal value from 0 to 7. You can use the numeric keypad or rotary knob to enter the value.

[5] <simu>

Switches to the Simulation Screen in section 3.1.5.

[6] <prev>

Returns to the previous Radio Data System main screen.

[7] <AF>

Switches to the AF.main Screen in section 3.1.6.

[8] <OGP>

Switches to the Other Group.main Screen in section 3.1.7.

[9] <PTYN>

Switches to the Program Type Name Screen in section 3.1.8.

3.1.5 Simulation Screen

Press the [F4] (<simu>) key on the Radio Data System sub Screen in section 3.1.4 to enter this screen.

This screen displays the data that is output from the KSG3420/3421 using hexadecimal values. The output data is based on the group type sequence that was specified on the Group Sequence Screen in section 3.1.2.

-
- NOTE**
- When the data is modified, the change is displayed approximately 8 groups (equal to the number of output buffers) later on the Simulation screen.
-

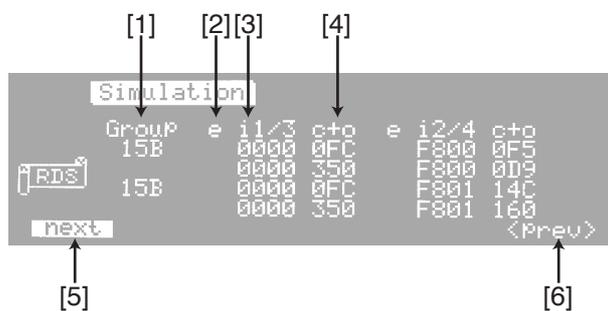


Fig. 3-14 Simulation Screen

Screen Description

[1] Group

Indicates the group type. Displays the contents of the group type code and version code in the information word of the 2nd block.

[2] e

Displays “*” when an error bit is set. For a description on the error function, see section 3.1.15, “Radio Data System SYS Screen.”

[3] i

Indicates the contents of the information word using 4-digit hexadecimal values. “i1/3” indicates that the first and second lines display the first and third blocks, respectively; “i2/4” indicates the first and second lines display the second and fourth blocks, respectively.

[4] c+o

Indicates the contents of the check word + offset using 3-digit hexadecimal values.

[5] next

Indicates the data of the next group type.

[6] <prev>

Returns to the previous Radio Data System sub screen.

3.1.6 AF.main Screen

Press the [2nd] [F3] (<AF>) key on the Radio Data System sub Screen in section 3.1.4 to enter this screen.

This screen is used to edit the frequency list (alternative frequency) for the same program.

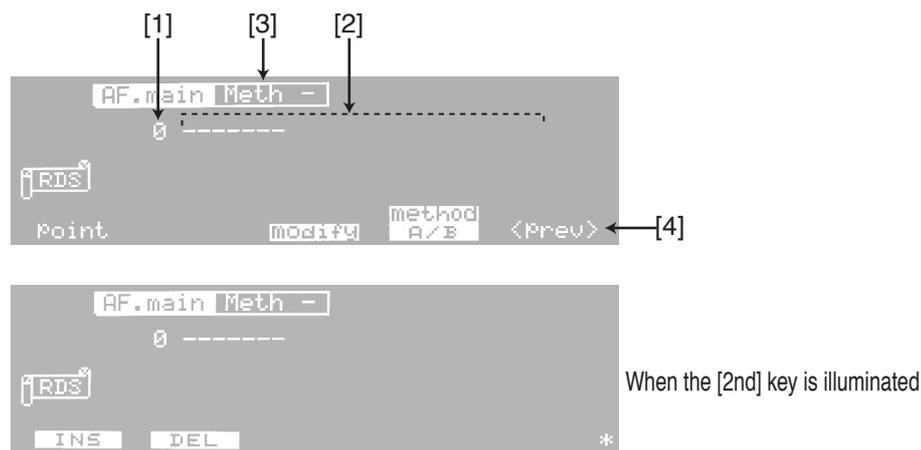


Fig. 3-15 AF.main Screen

Screen Description

[1] point

Indicates the location number of the frequency displayed at the upper left corner of the data edit area [2] within all frequencies.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the frequency.

[3] Meth

Indicates the method.

Press the [F4] (method A/B) key to toggle between Meth A and Meth B. You can also use the rotary knob. If there is no data item in the data edit area, you cannot set this value.

[4] <prev>

Returns to the previous Radio Data System sub screen.

3.1.6 AF.main Screen (Continued)

Data Editing

■ Entering Data

If the cursor is located at point, use the [▶] key to move the cursor to the data edit area.

Enter the frequency in the following range.

FM: 87.5 MHz to 107.9 MHz in 0.1 MHz steps

MF: 531 kHz to 1602 kHz in 9 kHz steps

LF: 153 kHz to 279 kHz in 9 kHz steps

You can enter the frequency value using the numeric keypad. However, the method of confirming the value varies depending on the frequency band. Use the [ENTER] key for the FM band, [kHz] key for the MF and LF bands.

NOTE

- Confirmation using the [ENTER] key signifies an FM band, and the value becomes the input value + MHz. Therefore, if you enter “531” and press the [ENTER] key, the maximum value in the FM band, “107.9,” is entered.

- You can enter the filler code by entering “F” from the numeric keypad. It is displayed as “FL” on the screen.
- For a description on the data display corresponding to the point value, see “Group Sequence Editing” in section 3.1.2, “Group Sequence Screen.”

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. “FL” is inserted before the data where the cursor is. Replace the value with the desired data.

“FL” is forcibly inserted for data area allocation.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

Frequency Modification

You can modify the FM band frequency entered as follows. Items 1 through 6 are cyclically switched by pressing the [F3] (modify) key.

1. AF frequency.
2. If Method A is selected, the frequency of the main transmitter that is output in pair with the Number of freq code (":" is displayed after the value).
If Method B is selected, the header frequency (":" is displayed after the value).
3. FM band frequency in the Adjacent-Region ("*" is displayed before the value).
4. FM band frequency with +25 k offset (value + 25 kHz).
5. FM band frequency with +50 k offset (value + 50 kHz).
6. FM band frequency with +75 k offset (value + 75 kHz).

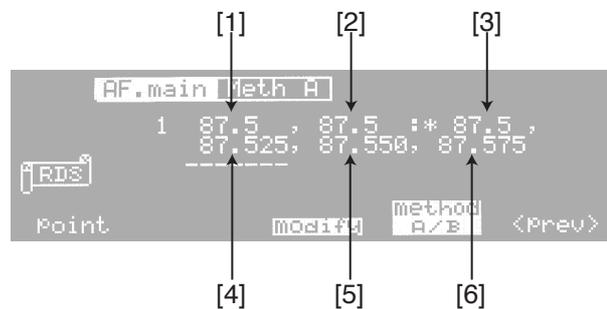


Fig. 3-16 Modification Example

3.1.7 Other Group.main Screen

Press the [2nd] [F4] (<OGP>) key on the Radio Data System sub Screen in section 3.1.4 to enter this screen.

This screen is used to edit the spare bit of the Other Group (group types 1A, 3A to 9A, 11A to 13A, 1B, 3B to 9B, 11B to 13B and user-defined group types UD1 and UD2). The KSG3420/3421 handles the spare bit of group types 1A, 1B, and 4A as Other Group.

NOTE

- The lowest 3 bits (unused) of information block 2 of group type 14B are not handled as spare bits. They are set to 000, and the value cannot be set to any other value.

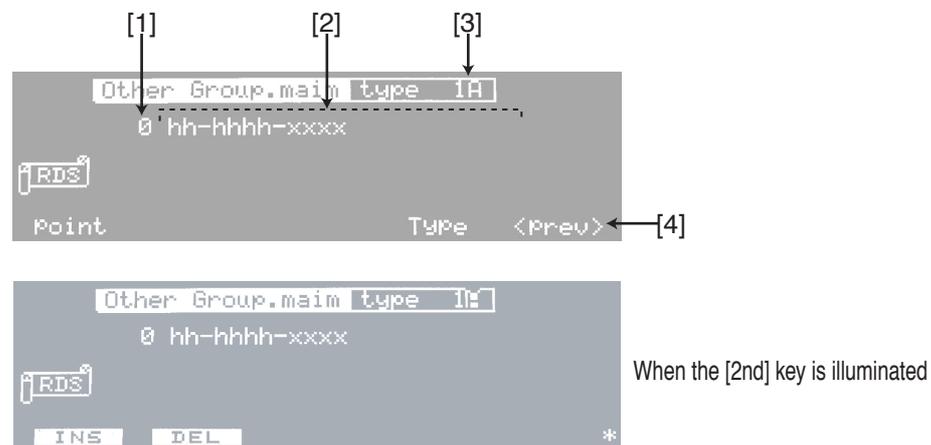


Fig. 3-17 Other Group.main Screen

Screen Description

[1] point

Indicates the location number of the Other Group displayed at the upper left corner of the data edit area [2] within all Other Groups.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the Other Group.

[3] Type

Indicates the Other Group type.

To set the Other Group type, enter the group type using a hexadecimal value from the numeric keypad. You can also use the rotary knob to select the Other Group type.

[4] <prev>

Returns to the previous Radio Data System sub screen.

Data Editing

■ Entering Data

If the cursor is located at point, use the [▶] key to move the cursor to the data edit area.

The number of digits to be entered is automatically set according to the group type. Fig. 3-18 shows the insertion position of the spare bit for each group type.

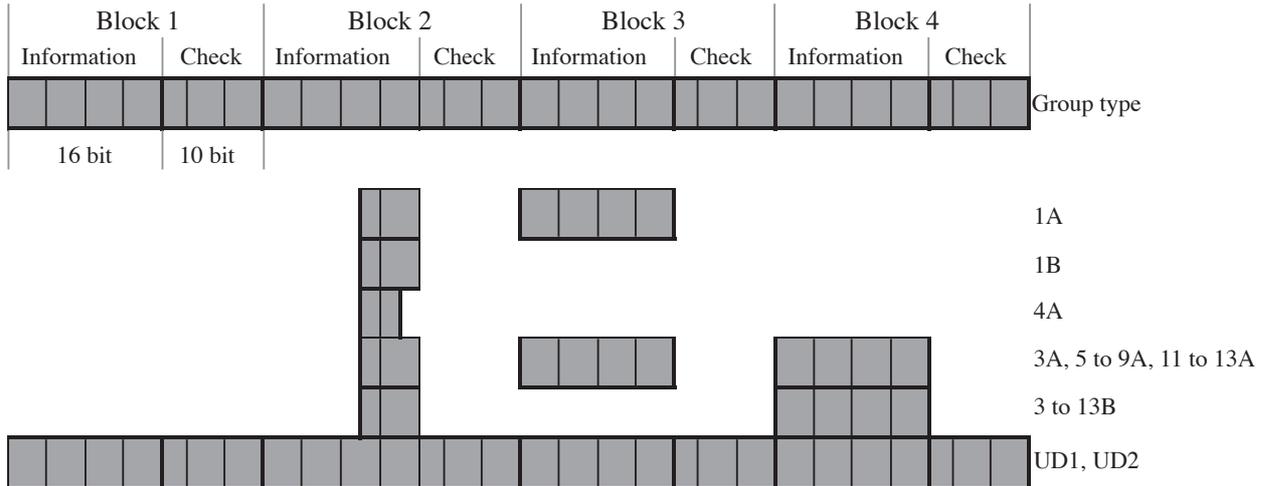


Fig. 3-18 Insertion Position of the Spare Bit of Each Group Type

- For hh-hhhh-xxxx, enter the data in the same fashion as 12-3456. The xxxx part is automatically set inside the KSG3420/3421.
- For a description on the data display corresponding to the point value, see “Group Sequence Editing” in section 3.1.2, “Group Sequence Screen.”

Example 1

For group type 1A, enter using hexadecimal values as follows by considering the lower 5 bits of the information word of block 2 and the 16 bits of the information word of block 3 to be continuous.

The result is as follows.

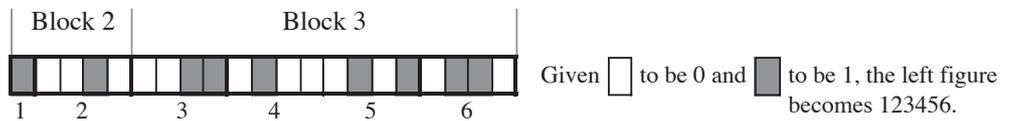


Fig. 3-19 Information Word of Block 2 and Block 3

3.1.7 Other Group.main Screen (Continued)

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. Data consisting of all zeroes (zero-filled data) is inserted before the data where the cursor is at. Replace the value with the desired data.

Data consisting of all zeroes is forcibly inserted for data area allocation.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

3.1.8 Program Type Name Screen

Press the [2nd] [F5] (<PTYN>) key on the Radio Data System sub Screen in section 3.1.4 to enter this screen.

This screen is used to set the character string corresponding to the PTY number of the Radio Data System main screen. The Program Type Name is output from group 10A.

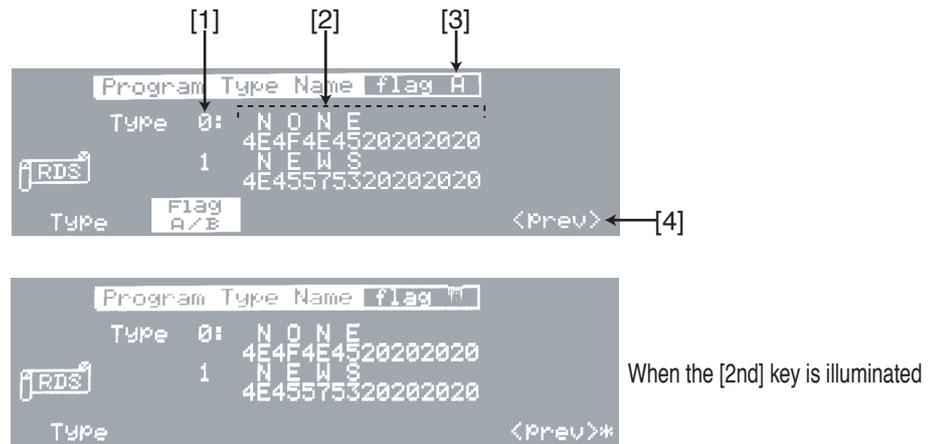


Fig. 3-20 Program Type Name Screen

Screen Description

[1] Type

Indicates the program type number from 0 to 31.

[2] Data edit area

This area is used to enter the Program Type Name. You can enter an arbitrary 8-character string corresponding to the program type number from 0 to 31.

You can set a different Program Type Name for flag A and flag B [3].

[3] flag

Indicates flag A/B.

Press the [F2] (Flag A/B) key to toggle between flag A and flag B. You can also use the rotary knob.

[4] <prev>

Returns to the previous Radio Data System sub screen.

3.1.8 Program Type Name Screen (Continued)

Data Editing

■ Entering Data

If the cursor is located at the program type number, use the [▶] key to move the cursor to the data edit area. Use the numeric keypad to enter a 2-digit hexadecimal value and the [ENTER] key to confirm. Up to 8 characters can be entered.

The 2-digit hexadecimal value entered is displayed at the bottom section; the corresponding character is displayed at the top section. Values that can be entered are 20 to FF. However, “.” is displayed for values greater than or equal to 80.

■ Scrolling the displayed data

Only 2 data items are displayed on the screen. However, you can edit other data items by scrolling the screen.

To scroll the screen, press the [F1] (Type) key and move the cursor to the program type number. Turn the rotary knob clockwise to display data with larger numbers; turn it counter-clockwise to display smaller numbers.

■ Initial value of the Program Type Name

Table 3-2 shows the factory-default settings and the settings after initialization of the Program Type Name for flag A. For flag B, the PTYN characters of Table 3-2 are lowercase characters from the 2nd character.

Table 3-2 Initial Values of PTYN (for flag A)

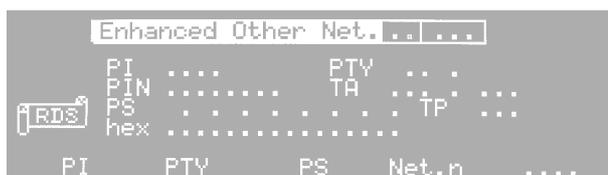
PTY	PTYN		PTY	PTYN	
	RDS Mode	RBDS Mode		RDS Mode	RBDS Mode
0	NONE	NONE	16	WEATHER	R & B
1	NEWS	NEWS	17	FINANCE	SOFT R
2	AFFAIRS	INFORM	18	CHILDREN	LANGUAGE
3	INFO	SPORTS	19	SOCIAL	REL MUSC
4	SPORT	TALK	20	RELIGION	REL TALK
5	EDUCATE	ROCK	21	PHONE IN	PERSNLTY
6	DRAMA	CLS ROCK	22	TRAVEL	PUBLIC
7	CULTURE	ADLT HIT	23	LEISURE	COLLEGE
8	SCIENCE	SOFT RCK	24	JAZZ	
9	VARIED	TOP 40	25	COUNTRY	
10	POP M	COUNTRY	26	NATION M	
11	ROCK M	OLDIES	27	OLDIES	
12	EASY M	SOFT	28	FOLK M	
13	LIGHT M	NOSTALGA	29	DOCUMENT	WEATHER
14	CLASSICS	JAZZ	30	TEST	TEST
15	OTHER M	CLASSICL	31	ALARM!	ALERT!

3.1.9 Enhanced Other Net. xx xxx Screen

You can enter this screen directly using the [EON] menu key. You can also press the [F4] (<EON>) key on the Radio Data System main RDS Screen in section 3.1.1.

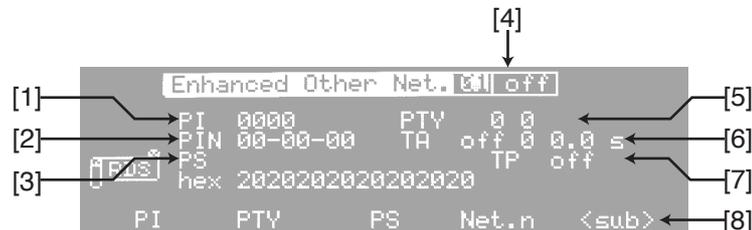
If the Other Network data area is not set such as after initialization, the screen appears as shown in Fig. 3-21. In such case, you cannot enter data in the setup items.

If any of the Other Network data area is set, the Enhanced Other Net.01 on/off screen appears as shown in Fig. 3-22.



When the [2nd] key is illuminated

Fig. 3-21 Enhanced Other Net. ... Screen



When the [2nd] key is illuminated

Fig. 3-22 Enhanced Other Net.01 off Screen

3.1.9 Enhanced Other Net. xx xxx Screen (Continued)

Setting of the Other Network Data Area

To enter data on the Enhanced Other Net... .. screen, you must first set the Other Network data area.

■ Inserting an Other Network data area

1. Press the [2nd] key on the Enhanced Other Net... .. screen and then the [F1] (INS) key.

The cursor can be located at any setup item.

As shown in Fig. 3-22, the screen title changes to Enhanced Other Net.01 off, and the initial values of setup items are displayed.

2. To insert another new Other Network data area, press the [2nd] key again followed by the [F1] (INS) key.

A new data area is inserted before the Enhanced Other Net.01 off screen that was set in step 1, and the preexisting Enhanced Other Net.01 off screen changes to the Enhanced Other Net.02 off screen.

3. To display the Enhanced Other Net.02 off screen, press the [F4] (Net.n) key to move the cursor to the network number item and set the value to "02" using the rotary knob.

The number of Other Network data can be increased to 99 in a similar fashion.

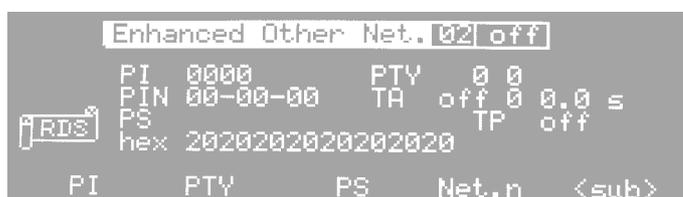


Fig. 3-23 Enhanced Other Net.02 on/off Screen

■ Deleting an other network data area

An example is given for the case when Other Network data is set from 01 to 03 and 02 is to be deleted.

1. Press the [F4] (Net.n) key to move the cursor to the network number item and set the value to "02" using the rotary knob.
2. Press the [2nd] key followed by the [F2] (DEL) key.

The current Enhanced Other Net.02 is deleted, and Enhanced Other Net.03 becomes Enhanced Other Net.02.

Screen Description

[1] PI (Programme Identification)

Indicates the program identification (ID) code of EON.

The nation ID, area ID, and program service ID are specified using 4 bits, 4 bits, and 8 bits, respectively. Enter a 4-digit hexadecimal number from 0000 to FFFF for a total of 16 bits.

You can use the numeric keypad or rotary knob to enter the value.

[2] PIN (Programme Item Number)

Indicates the program item number of EON. Codes such as the scheduled broadcast start time are sent. The code is used for program reception reservation, for example.

Enter the data, which is delimited by a hyphen every two digits (dd-hh-mm), as follows.

Date (dd): Consists of 5 bits. Enter a 2-digit decimal number from 00 to 31.

Hour (hh): Consists of 5 bits. Enter a 2-digit decimal number from 00 to 31.

The actual hour is up to 23 hours. However, you can specify a number from 00 to 31 for checking programs and other purposes.

Minute (mm): Consists of 6 bits. Enter a 2-digit decimal number from 00 to 63.

The actual minute is up to 59 minutes. However, you can specify a number from 00 to 63 for checking programs and other purposes.

You can use the numeric keypad or rotary knob to enter the value.

When using the numeric keypad, use the [-] key between the date, hour, and minute.

[3] PS (Programme Service name)

Indicates the program service name of EON. It is used to send the abbreviation of the broadcast station, program name, and so on.

To enter the program service name, use the numeric keypad to enter a 2-digit hexadecimal value and the [ENTER] key to confirm. Up to 8 characters can be entered.

The 2-digit hexadecimal value entered is displayed at the bottom section; the corresponding character is displayed at the top section. Values that can be entered are 20 to FF. However, "." is displayed for values greater than or equal to 80.

[4] Net.n on/off

Indicates the network number and on/off state of EON.

Use the numeric keypad or rotary knob to specify the network number.

Use the rotary knob to turn on/off the Other Network. Only the Other Network data set to "on" are output.

3.1.9 Enhanced Other Net. xx xxx Screen (Continued)

[5] PTY (Programme TYpe) N n

N indicates EON program type.

Consists of 5 bits. Enter a 2-digit decimal number from 00 to 31. You can use the numeric keypad or rotary knob to enter the value.

Parameter n indicates the number of type 14A (usage code 13) output interrupts to be inserted in the normal group sequence when N is changed from the numeric keypad.

Specify a value from 0 to 9. A value of 0 indicates that there is no insertion. You can use the numeric keypad or rotary knob to enter the value.

NOTE

- If insertion is specified (if n is set to 1 to 9), you can no longer use the rotary knob to set parameter N.

[6] TA (Traffic Announcement flag) on/off n T

Parameter on/off indicates the on/off state of TA of EON.

Press the [2nd] [F4] (TA on/off) key to toggle between on and off. You can also use the rotary knob.

Parameter n indicates the number of type 14B output interrupts to be inserted in the normal group sequence when TA changes (on to off or off to on) when the TP of EON is on.

Specify a value from 0 to 9. A value of 0 indicates that there is no insertion. You can use the numeric keypad or rotary knob to enter the value.

Parameter T indicates the delay for TA of traffic information having the same network information to change when TA changes (on to off or off to on).

You can set the value in 0.1 steps in the range of 0.0 to 9.9. You can use the numeric keypad or rotary knob to enter the value.

NOTE

- As shown in Fig. 3-24, if you set the delay T and change TA of EON (TA on in the figure), then additionally change TA several more times, no delay occurs until the processing of the first TA change is finished. In addition, TA of traffic information when the delay arrives is set to the state immediately before (TA off in the figure).

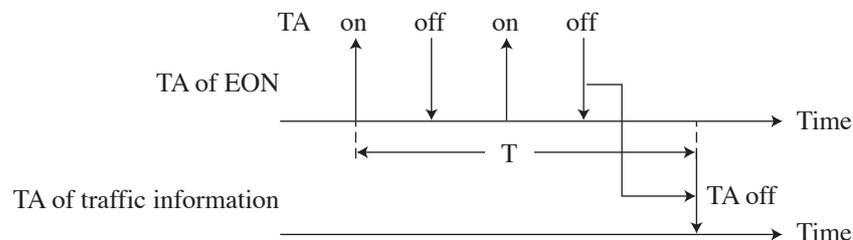


Fig. 3-24

- If you change the delay T while the delay is activated (from the time TA of EON is changed to the time the TA change is reflected in TA of traffic information after delay T), the delay that existed when the delay function was started is processed.

[7] TP on/off

Indicates the on/off state of TP of EON

Use the rotary knob to toggle between on and off.

[8] <sub>

Switches to the Enhanced Other Net.n sub Screen in section 3.1.10.

[9] <UCS>

Switches to the Usage Code Seq. Net.n Screen in section 3.1.13.

3.1.10 Enhanced Other Net.n sub Screen

Press the F5 (<sub>>) key on the Enhanced Other Net.n on/off Screen in section 3.1.9 to enter this screen.

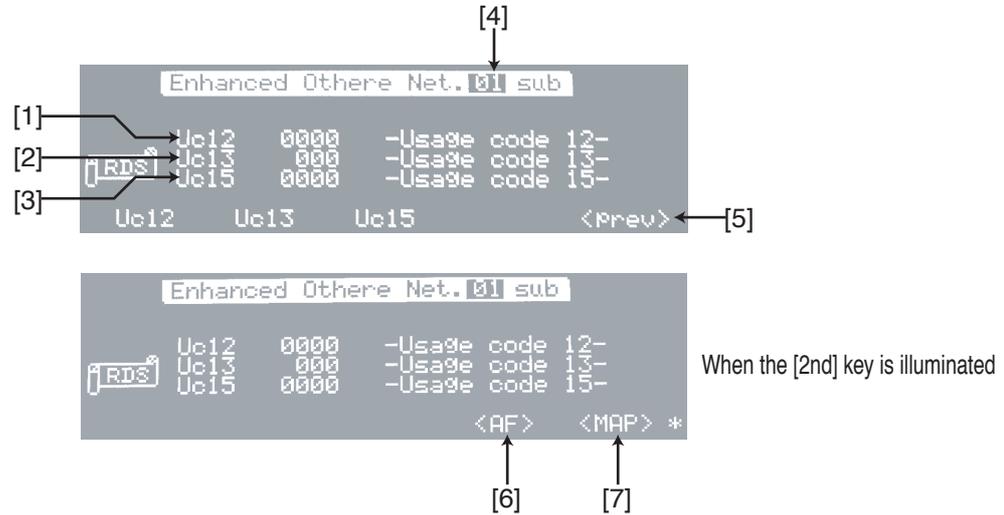


Fig. 3-25 Enhanced Other Net.n sub Screen

Screen Description

[1] Uc12

Indicates in hexadecimal value the 16-bit data of information block 3 corresponding to usage code 12 of type 14A.

Enter a 4-digit hexadecimal value from 0000 to FFFF using the numeric keypad or rotary knob.

[2] Uc13

Indicates in hexadecimal value 10 bits (the Reserved section in Fig. 3-26) within the 16-bit data of information block 3 corresponding to usage code 13 of type 14A.

Enter a 3-digit hexadecimal number from 000 to 7FE using the numeric keypad or rotary knob.

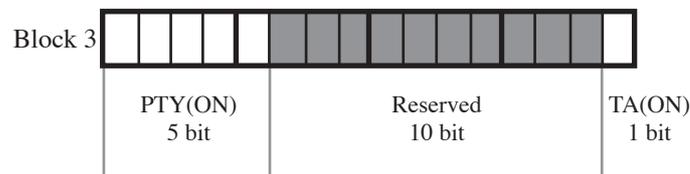


Fig. 3-26 Information Block 3

[3] Uc15

Indicates in hexadecimal value the 16-bit data of information block 3 corresponding to usage code 15 of type 14A.

Enter a 4-digit hexadecimal number from 0000 to FFFF using the numeric keypad or rotary knob.

[4] Net.n

Indicates the network number of EON that was specified on the Enhanced Other Net.n on/off screen.

[5] <prev>

Returns to the previous Enhanced Other Net.n on/off screen.

[6] <AF>

Switches to the AF Method A. EO Net.n Screen in section 3.1.11.

[7] <MAP>

Switches to the Mapped Freq. EO Net.n Screen in section 3.1.12.

3.1.11 AF Method A. EO Net.n Screen

Press the [2nd] [F4] (<AF>) key on the Enhanced Other Net.n sub screen in section 3.1.10 to enter this screen.

This screen is used to enter the EON AF frequency through Method A.

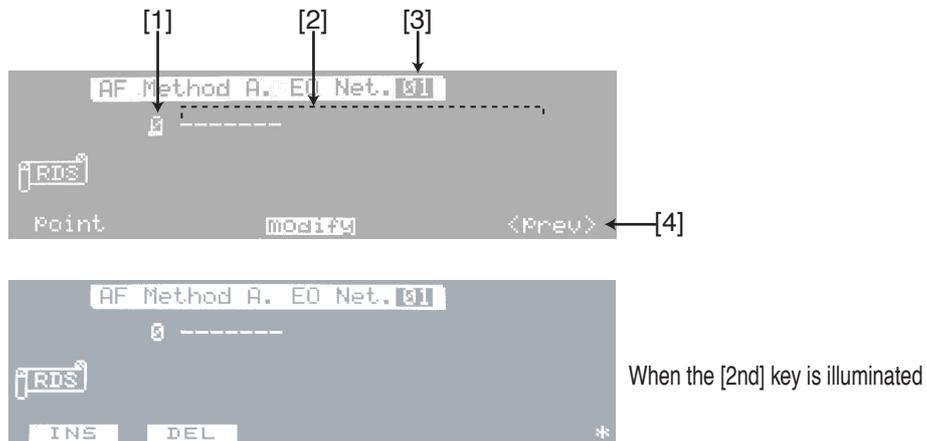


Fig. 3-27 AF Method A. EO Net.n Screen

Screen Description

[1] point

Indicates the location number of the AF frequency displayed at the upper left corner of the data edit area [2] within all the specified AF frequencies.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the frequency.

[3] Net.n

Indicates the network number of EON that was specified on the Enhanced Other Net.n on/off screen.

[4] <prev>

Returns to the previous Radio Data System sub screen.

Data Editing

■ Entering Data

If the cursor is located at point, use the [▶] key to move the cursor to the data edit area. Enter the frequency in the following range.

FM: 87.5 MHz to 107.9 MHz in 0.1 MHz steps

MF: 531 kHz to 1602 kHz in 9 kHz steps

LF: 153 kHz to 279 kHz in 9 kHz steps

You can enter the frequency value using the numeric keypad. However, the method of confirming the value varies depending on the frequency band. Use the [ENTER] key for the FM band, [kHz] key for the MF and LF bands.

NOTE

- Confirmation using the [ENTER] key signifies an FM band, and the value becomes the input value + MHz. Therefore, if you enter “531” and press the [ENTER] key, the maximum value in the FM band, “107.9,” is entered.
- In the EN 50067:1998 specifications, the FM band carrier frequency 87.5 MHz that was defined in EBU Tech.3244-E is not used. However, the KSG3420/3421 allows entry of the frequency for checking programs and other purposes.

-
- You can enter the filler code by entering “F” from the numeric keypad. It is displayed as “FL” on the screen.
 - For a description on the data display corresponding to the point value, see “Group Sequence Editing” in section 3.1.2, “Group Sequence Screen.”

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. “FL” is inserted before the data where the cursor is. Replace the value with the desired data.

“FL” is forcibly inserted for data area allocation.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

Frequency Modification

You can modify the FM band frequency entered as follows. Items 1 through 4 are cyclically switched by pressing the [F3] (modify) key.

1. AF frequency.
2. FM band frequency with +25 k offset (value + 25 kHz).
3. FM band frequency with +50 k offset (value + 50 kHz).
4. FM band frequency with +75 k offset (value + 75 kHz).

NOTE

- In the EN 50067:1998 specifications, the frequency offset that was defined in EBU Tech.3244-E has been deleted. However, the KSG3420/3421 allows addition of the frequency offset using the modify function. However, because of the limitations on the AF data transmission, the entry of the FM band AF frequency must be limited to the 2nd and subsequent positions.
-

3.1.12 Mapped Freq. EO Net.n Screen

Press the [2nd] [F5] (<MAP>) key on the Enhanced Other Net.n sub screen in section 3.1.10 to enter this screen.

This screen is used to enter the EON AF frequency through Mapped Frequency.

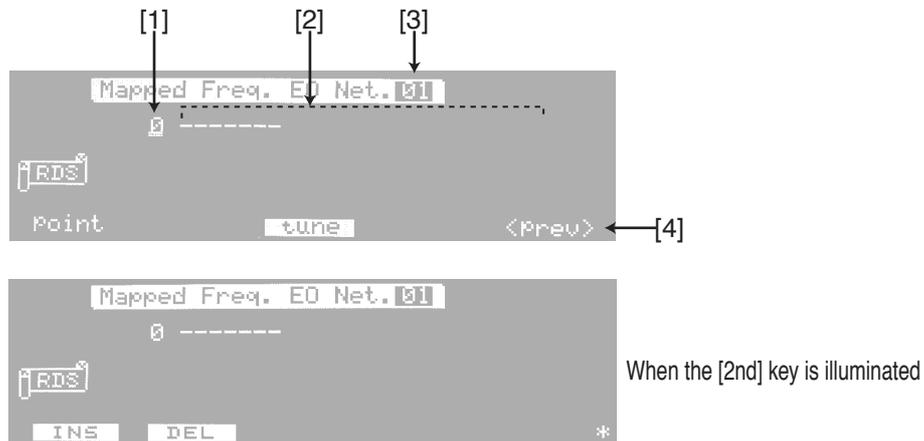


Fig. 3-28 Mapped Freq. EO Net.n Screen

Screen Description

[1] point

Indicates the location number of the AF frequency displayed at the upper left corner of the data edit area [2] within all the specified AF frequencies.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the frequency.

[3] Net.n

Indicates the network number of EON that was specified on the Enhanced Other Net.n on/off screen.

[4] <prev>

Returns to the previous Radio Data System sub screen.

Data Editing

■ Entering Data

If the cursor is located at point, use the [▶] key to move the cursor to the data edit area.

Enter the frequency in the following range.

FM: 87.5 MHz to 107.9 MHz in 0.1 MHz steps

MF: 531 kHz to 1602 kHz in 9 kHz steps

LF: 153 kHz to 279 kHz in 9 kHz steps

You can enter the frequency value using the numeric keypad. However, the method of confirming the value varies depending on the frequency band. Use the [ENTER] key for the FM band, [kHz] key for the MF and LF bands.

NOTE

- Confirmation using the [ENTER] key signifies an FM band, and the value becomes the input value + MHz. Therefore, if you enter “531” and press the [ENTER] key, the maximum value in the FM band, “107.9,” is entered.
- In the EN 50067:1998 specifications, the FM band carrier frequency 87.5 MHz that was defined in EBU Tech.3244-E is not used. However, the KSG3420/3421 allows entry of the frequency for checking programs and other purposes.

-
- You can enter the filler code by entering “F” from the numeric keypad. It is displayed as “FL” on the screen.
 - For a description on the data display corresponding to the point value, see “Group Sequence Editing” in section 3.1.2, “Group Sequence Screen.”

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. “FL” is inserted before the data where the cursor is. Replace the value with the desired data.

“FL” is forcibly inserted for data area allocation.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

3.1.12 Mapped Freq. EO Net.n Screen (Continued)

Tuning Frequency Assignment

To specify the Tuning Frequency, position the cursor at the value you wish to specify and press the [F3] (tune) key. When a value is specified, a “:” is displayed after the value. To clear, press the [F3] (tune) key again.

Example 1

Map data:

Map Data Group 1			
Tuning Freq.1	95 MHz	89 MHz	Mapped Freq.1
Same as above	95 MHz	91 MHz	Mapped Freq.2
Same as above	95 MHz	92 MHz	Mapped Freq.3
Same as above	95 MHz	101 MHz	Mapped Freq.4
Same as above	95 MHz	153 kHz	Mapped LF Freq.

Map Data Group 2			
Tuning Freq.2	88 MHz	96 MHz	Mapped Freq.1

Map Data Group 3			
Tuning Freq.3	102 MHz	90 MHz	Mapped Freq.1
Same as above	102 MHz	100 MHz	Mapped Freq.2
Same as above	102 MHz	531 kHz	Mapped MF Freq.

Fig. 3-29 shows the screen when the map data groups above are set in the KSG3420/3421. Tuning Frequency of each map data group can be specified using the [F3] (tune) key.

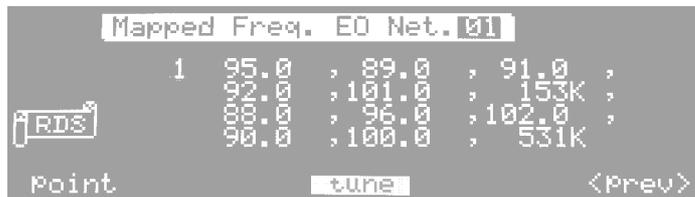


Fig. 3-29 Setup Screen of Example 1

3.1.13 Usage Code Seq. Net.n Screen

Press the [2nd] [F5] (<UCS>) key on the Enhanced Other Net.n on/off screen in section 3.1.9 to enter this screen.

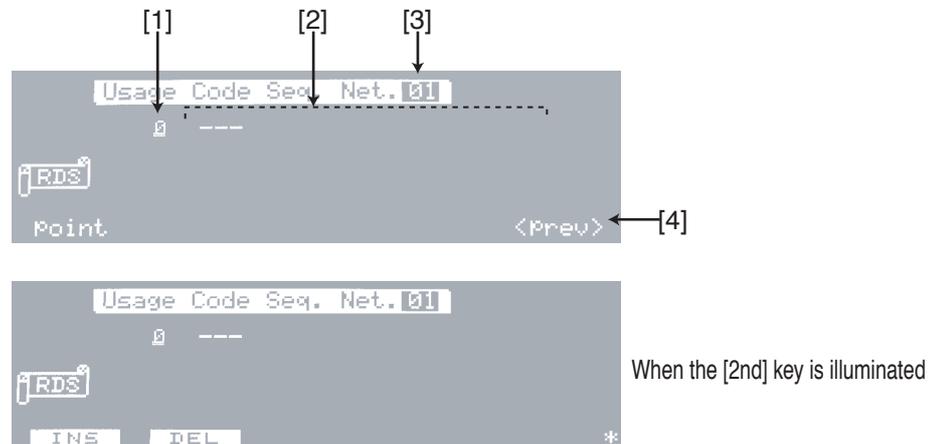


Fig. 3-30 Usage Code Seq. Net.n Screen

Screen Description

[1] point

Indicates the location number of the usage code displayed at the upper left corner of the data edit area [2] within all usage codes.

If there is no data in the data edit area, 0 is displayed.

[2] Data edit area

This is the area used to enter the usage code.

[3] Net.nn

Indicates the network number of EON that was specified on the Enhanced Other Net.n on/off screen.

[4] <prev>

Returns to the previous Enhanced Other Net.n on/off screen.

Data Editing

■ Entering Data

If the cursor is located at point, use the [▶] key to move the cursor to the data edit area.

Use the numeric keypad to enter the usage code and the [ENTER] key to confirm.

- For a description on the data display corresponding to the point value, see “Group Sequence Editing” in section 3.1.2, “Group Sequence Screen.”

3.1.13 Usage Code Seq. Net.n Screen (Continued)

■ Inserting Data

To insert data, move the cursor to the desired position and press the [2nd] [F1] (INS) key. "14" is inserted before the data where the cursor is. Replace the value with the desired data.

"14" is forcibly inserted for data area allocation.

To add data items, move the cursor to the position after the last data item, and enter the data directly using the numeric keypad. You cannot use the rotary knob to insert data.

■ Deleting Data

The data item at the cursor is deleted using the [2nd] [F2] (DEL) key.

Example 1

Output eight PS characters, AF (Method A:88 MHz, 90 MHz, 103 MHz), PTY, TA, and PIN usage code sequence to Other Net.01

Fig. 3-31 shows the screen when the usage codes are entered.

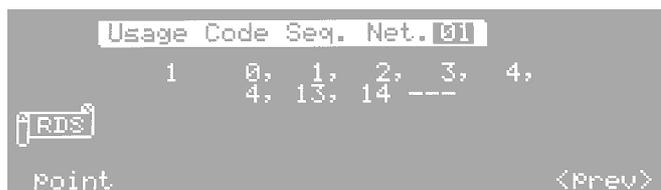


Fig. 3-31 Setup Screen of Example 1

Example 2

Output eight PS characters, AF (Tuning Freq: 88 MHz, Mapped Freq.1: 90 MHz, Mapped Freq.2: 103 MHz), PTY, TA, and PIN usage code sequence to Other Net.02

First, return to the Enhanced other Net.01 off screen and reserve the data area of Other Net.02. Fig. 3-32 shows the screen when the usage codes are entered.

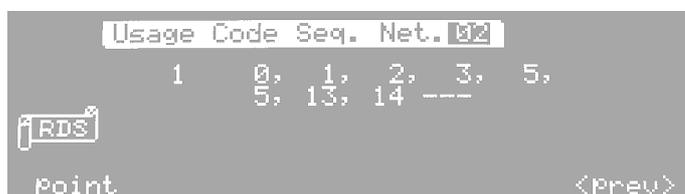


Fig. 3-32 Setup Screen of Example 2

Usage Code and Usage Code Sequence

The data of block 3 of type 14 A is output according to the usage code sequence (UCS). Therefore, when type 14A is set in the group sequence and EON information is sent, UCS must be entered for each Other Network. Enter a value from 0 to 15 for the usage code (UC).

Table 3-3 shows the usage codes and the corresponding EON data.

Table 3-3 Usage Codes and Corresponding EON Data

Usage Code	EON Data	Remarks
0 to 3	Eight PS (ON) characters	1
4	AF (ON) - Method A	2
5	Tuning freq. (TN) and Mapped FM freq.1 (ON)	
6	Tuning freq. (TN) and Mapped FM freq.2 (ON)	
7	Tuning freq. (TN) and Mapped FM freq.3 (ON)	
8	Tuning freq. (TN) and Mapped FM freq.4 (ON)	
9	Tuning freq. (TN) and Mapped LF/MF freq. (ON)	
*10	unallocated	3
*11	unallocated	3
12	Linking information	
13	PTY (ON), TA (ON), etc.	
14	PIN (ON)	4
15	Reserved for broadcasters use	

TN stands for Tuned Network; ON stands for Other Network.

NOTE

- 1.To output eight PS (ON) characters, all usage codes, 0, 1, 2, and 3, must be entered.
- 2.According to the conventions, either Method A or Mapped Frequency is used to set the EON AF frequency. Therefore, usage codes 4 and 5 to 9 should not be specified at the same time. However, if they are specified intentionally for checking the receiver program or other purposes, data of both Method A and Mapped Frequency is output.
- 3.Unlike normal data, usage codes 10 and 11 are not allocated. Since these usage codes should not be output in normal cases, an “*” mark is displayed to alert the user. The KSG3420/3421 outputs fixed data 0000h for convenience when *10 or *11 is specified.
- 4.If a usage code is not specified in the usage code sequence, the KSG3420/3421 assumes usage code 0 and outputs two PS (ON) characters.

3.1.13 Usage Code Seq. Net.n Screen (Continued)

1. Output of eight PS (ON) characters, PTY (ON), TA (ON), and PIN (ON)

To output eight PS (ON) characters, enter usage codes 0, 1, 2, and 3 consecutively in the UCS.

To output PTY (ON) and TA (ON), enter usage code 13 in the UCS.

To output PIN (ON), enter usage code 14 in the UCS.

2. Output of the AF list using Method A

To output the AF list using Method A, enter usage code 4 in the UCS. However, the number of entries is determined by the number of AFs and AF frequency attributes (FM band frequency without offset, FM band frequency with offset, and LF-MF frequency) in the list.

If a single usage code 4 is entered as shown below, two FM band frequencies without offset, an FM band frequency with offset, and an LF-MF frequency are output.

In addition, since the frequency at the top of the AF list forms a pair with the code indicating the total number of AF frequencies, it is limited to the FM band frequency without offset or filler code.

Usage Code	AF List (Contents of Block 3 of Type 14A)	
4	Total number of AFs	FM band frequency without offset
4	FM band frequency without offset	FM band frequency without offset
4	FM band frequency with offset	
4	LF-MF frequency	

Example 3

When 90 MHz, 91 MHz, 92 MHz, 93 MHz, and 153 kHz are set in the AF list

Usage Code	AF List	
4	Total number of AFs: 5	90 MHz
4	91 MHz	92 MHz
4	93 MHz	Filler Code
4	153 kHz	

To output the sequence above, enter four codes of usage code 4 consecutively in the UCS.

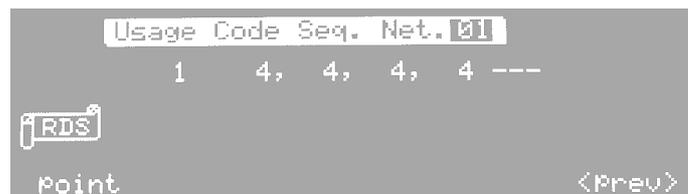


Fig. 3-33 Setup Screen of Example 3

3. Output of the AF frequency using Mapped Frequency

To output AF frequencies using Mapped Frequency, enter usage code 5 in the UCS. However, the number of entries is determined by the number of Mapped Frequencies contained in the AF list.

Example 4

Usage Code		Map Data Group 1		
5	Tuning Freq.1	95 MHz	89 MHz	Mapped Freq.1
6	Same as above	95 MHz	91 MHz	Mapped Freq.2
7	Same as above	95 MHz	92 MHz	Mapped Freq.3
8	Same as above	95 MHz	101 MHz	Mapped Freq.4
9	Same as above	95 MHz	153 kHz	Mapped LF Freq.

Usage Code		Map Data Group 2		
5	Tuning Freq.2	88 MHz	96 MHz	Mapped Freq.1

Usage Code		Map Data Group 3		
5	Tuning Freq.3	102 MHz	90 MHz	Mapped Freq.1
6	Same as above	102 MHz	100 MHz	Mapped Freq.2
9	Same as above	102 MHz	531 kHz	Mapped MF Freq.

When map data groups 1 to 3 above have already been input to the KSG3420/3421, enter the corresponding UCS. The total number of map data items for each Tuning Frequency is nine. Thus, enter nine codes of usage code 5 in the UCS.

NOTE

- Usage code 5 is used as a representative example of the map data group (usage codes 5 to 9)

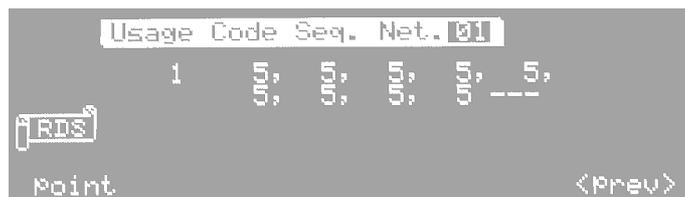


Fig. 3-34 Setup Screen 1 of Example 4

Obviously, the same output is achieved by entering usage codes 5 to 9 to match the map data as follows. (The KSG3420/3421 outputs map data in order as usage codes 5 to 9 appear in the UCS.)



Fig. 3-35 Setup Screen 2 of Example 4

3.1.13 Usage Code Seq. Net.n Screen (Continued)

Synchronized output of usage code sequence and AF data

Normally, the usage code sequence and AF data are out of synchronization. However, the AF data can be output from the top by storing the data at an arbitrary address of the KSG3420/3421 and recalling the data.

Suppose the following PS (ON) data and map data are set. Example 5 shows the case when the data is out of sync; example 6 shows the case when the data is in sync.

PS (ON) data: K I K U S U I

Map data:

Map Data Group 1			
Tuning Freq.1	88 MHz	90 MHz	Mapped Freq.1
Same as above	88 MHz	91 MHz	Mapped Freq.2
Map Data Group 2			
Tuning Freq.2	92 MHz	89 MHz	Mapped Freq.1
Same as above	92 MHz	95 MHz	Mapped Freq.2
Same as above	92 MHz	162 MHz	Mapped LF Freq.
Map Data Group 1			
Tuning Freq.3	103 MHz	97 MHz	Mapped Freq.1

Example 5

Output data when out of sync

Usage Code	Output Data		
0	K	I	
1	K	U	
2	S	U	
3	I		
9	92 MHz	162 kHz	Map Data Group 2
5	103 MHz	97 MHz	Map Data Group 3
5	88 MHz	90 MHz	Map Data Group 1
6	88 MHz	91 MHz	Map Data Group 1
5	92 MHz	89 MHz	Map Data Group 2
6	92 MHz	95 MHz	Map Data Group 2

Example 6

Output data when in sync

Usage Code	Output Data		
0	K	I	
1	K	U	
2	S	U	
3	I		
5	88 MHz	90 MHz	Map Data Group 1
6	88 MHz	91 MHz	Map Data Group 1
5	92 MHz	89 MHz	Map Data Group 2
6	92 MHz	95 MHz	Map Data Group 2
9	92 MHz	162 MHz	Map Data Group 2
5	103 MHz	97 MHz	Map Data Group 3

3.1.14 Modified MBS information Screen

You can enter this screen directly pressing the [2nd] key followed by the [RBDS] menu key. You can also press the [F4] (<MMBS>) key on the Radio Data System main RBDS Screen in section 3.1.1.

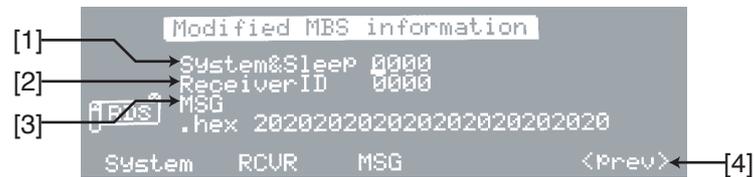


Fig. 3-36 Modified MBS information Screen

Screen Description

[1] System&Sleep

Enter a 4-digit hexadecimal value from 0000 to FFFF.
You can use the numeric keypad or rotary knob to enter the value.

[2] Receiver

Enter a 4-digit hexadecimal value from 0000 to FFFF.
You can use the numeric keypad or rotary knob to enter the value.

[3] MSG

Use the numeric keypad to enter a 2-digit hexadecimal value and the [ENTER] key to confirm. Up to 12 characters can be entered.

The 2-digit hexadecimal value entered is displayed at the bottom section; the corresponding character is displayed at the top section. Values that can be entered are 20 to FF. However, "." is displayed for values greater than or equal to 80.

[4] <prev>

Returns to the previous Radio Data System main RBDS screen.

3.1.15 Radio Data System SYS Screen

You can enter this screen directly pressing the [2nd] key followed by the [SYSTEM] menu key. You can also press the [2nd] key followed by the [F5] (<SYS>) key on the Radio Data System main screen in section 3.1.1.

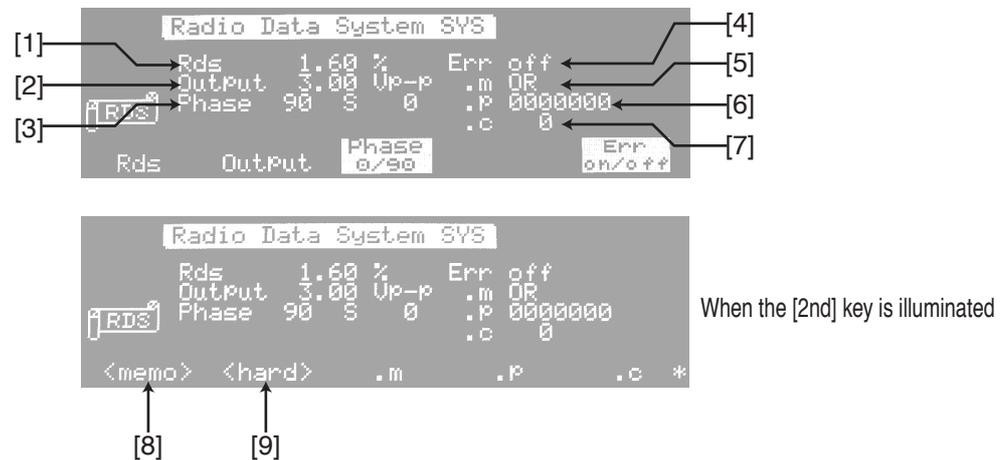


Fig. 3-37 Radio Data System SYS Screen

Screen Description

[1] Rds

Indicates the RDS/RBDS modulation level with respect to the 100 % composite signal.

Set the value in 0.01 % steps in the range of 0 % to 10 %. You can use the numeric keypad or rotary knob to enter the value.

The RDS/RBDS signal output level corresponds to the level when data consisting of continuous zeroes is output. When the modulation level is 10 %, 1/10th of the specified output level is output.

For example, if the modulation level is set to 3 % and the output is set to 3 Vp-p, $3 \% \times 3 \text{ Vp-p} / 100 \% = 0.09 \text{ Vp-p}$ is output.

[2] Output

Indicates the output level (peak-to-peak) from the KSG3420/3421 when the monaural/stereo modulation level is 100 %.

Set a voltage equal to the input voltage sensitivity that is required by the external modulation input of the SG that is being used together with the KSG3420/3421. Set the value in 0.01 Vp-p steps in the range of 1.50 V to 10.00 Vp-p. You can use the numeric keypad or rotary knob to enter the value.

The output level obtained by simultaneous modulation of the stereo signal, the RDS signal, and the TRI signal is equal to the vector sum of the stereo modulation level, the RDS/RBDS modulation level, and the TRI (=SK) modulation level.

3.1.15 Radio Data System SYS Screen (Continued)

[3] Phase

You can set the phase of the 57-kHz sub-carrier to in-phase (0°) or 90° with respect to the phase of the 3rd harmonic of the pilot signal.

Press the [F3] (Phase 0/90) key to toggle the phase between in-phase (0°) and 90° . In addition, you can use the [▶] key to move the cursor to the right of S (Shift) and vary the 0° or 90° phase setting in the range of -10° to $+10^\circ$ in 1° steps. You can use the numeric keypad or rotary knob to enter the value.

NOTE

- In normal operating condition, set the phase of the 57-kHz sub-carrier to $90^\circ \pm 0^\circ$.
-

The phase variation function of the 57-kHz RDS/RBDS sub-carrier is used to evaluate the operation margin of RDS/RBDS receivers against the phase offset of the 57-kHz sub-carrier (caused by multi-path effects).

[4] Err

Indicates the on/off state of error.

Press the [F5] (Err on/off) key to toggle between on and off. You can also use the rotary knob.

The error function is used to simulate the effects of bit errors in the Radio Data System (RDS) data (caused by multi-path effects) on the receiver operation.

Set the error pattern (.p) for one block and the logical operation type between this error pattern and the normal RDS/RBDS data through the error mode (.m). In the Err on condition, the result of the operation is output as RDS/RBDS data. In the Error off condition, the error pattern and error mode are disabled, and they are not applied to the RDS/RBDS data output.

Below is an example of a bit sequence of a single block of RDS/RBDS data that is output by the error mode and error pattern settings.

Example

Given the following settings:

Normal RDS/RBDS data: FE00 3CD

Error mode (.m): AND

Error pattern (.p): 1234 167

The output RDS/RBDS data is as follows:

When set to Err on: 1200 145

When set to Err of: FE00 3CD

[5] .m

Indicates the error mode.

Use the rotary knob to select “XOR”, “OR”, or “AND”.

[6] .p

Indicates the error pattern using 7-digit hexadecimal values.

You can use the numeric keypad or rotary knob to enter the value.

When set to Err on, the specified error pattern is enabled.

[7] .c

Indicates the error count setting, the block interval of output data by which an error block is generated.

When set to “0,” error blocks are generated on all blocks. You can check the block containing the error block on the Simulation Screen in section 3.1.5.

Set the value using the numeric keypad or rotary knob in the range of 0 to 255.

[8] <memo>

Switches to the Memory Manage Screen in section 3.1.16.

[9] <hard>

Switches to the Hard Set Information Screen in section 3.1.17.

3.1.16 Memory Manage Screen

Press the [2nd] [F1] (<memo>) key on the Radio Data System SYS Screen in section 3.1.15 to enter this screen.

This screen is used to display memory usage, set memory groups, and release unnecessary memory space.

NOTE • You cannot perform recall or store operation from this screen. See section 2.4, “Memory Operations.”

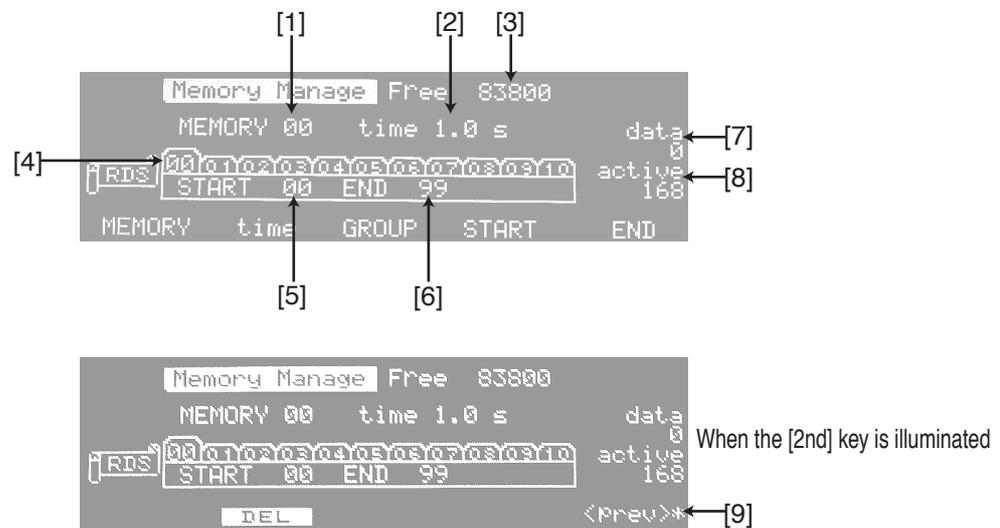


Fig. 3-38 Memory Manage Screen

Screen Description

[1] Memory

Indicates the memory address. The memory usage of this address is displayed in data [7].

You can use the numeric keypad or rotary knob to enter the value.

[2] time

Indicates the time for recalling from the address displayed in Memory [1] to the next address.

The selectable values are pass (no recall), 0.1 s to 9.9 s (in 0.1 s steps), stop (recall stop).

[3] Free

Indicates the amount of unused memory available.

[4] GROUP

Indicates the memory group.

Select a group from groups 00 to 10 (11 groups). The group number of the selected group is displayed larger on the screen.

To select the group, use the [◀] key, [▶] key, or rotary knob.

[5] START

Indicates the start address of the memory group specified by GROUP [4].

You can use the numeric keypad or rotary knob to enter the value.

[6] END

Indicates the end address of the memory group specified by GROUP [4].

You can use the numeric keypad or rotary knob to enter the value.

[7] data

Displays the memory usage of the memory address specified by MEMORY [1].

[8] active

Displays the amount of active memory.

[9] <prev>

Returns to the previous Radio Data System SYS screen.

Memory Group Setting

As an example, set start address 10 and end address 50 for memory group 05.

1. Press the [F3] (GROUP) key and select "05" using the [◀] key, [▶] key, or rotary knob.
"05" is displayed large.
2. Press the [F4] (START) key and enter "10" using the numeric keypad or rotary knob.
3. Press the [F5] (END) key and enter "50" using the numeric keypad or rotary knob.

NOTE

- The start address and end address of memory group 00 are fixed to 00 and 99, respectively. You cannot change these addresses.
 - The start address must be a smaller value than the end address.
-

Memory Clearing

You can clear the data that is stored at the specified memory.

Use the numeric keypad or rotary knob to specify the memory address you wish to clear in MEMORY [1] and press the [2nd] [F2] (DEL) key.

3.1.17 Hard Set Information Screen

Press the [2nd] [F2] (<hard>) key on the Radio Data System SYS Screen in section 3.1.15 to enter this screen.

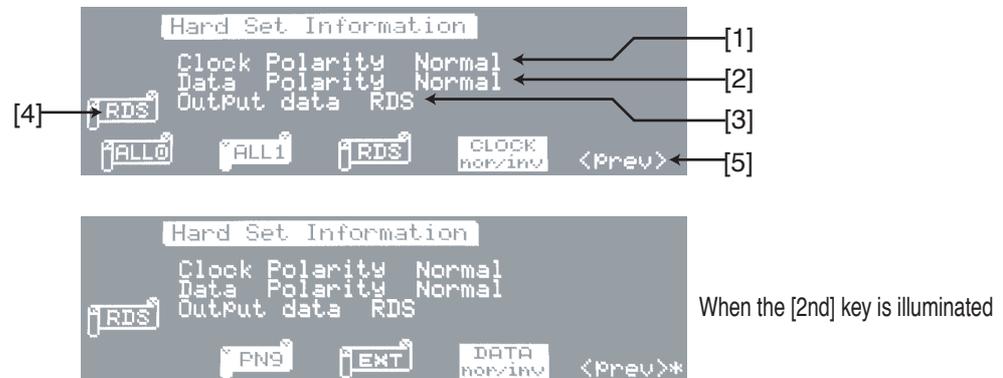


Fig. 3-39 Hard Set Information Screen

Screen Description

[1] Clock Polarity

Indicates whether to sample the data output from the DATA OUT connector [35] on the positive edge (Normal) or negative edge (Inverse) of the clock signal (CLOCK OUT connector [36]).

Press the [F4] (CLOCK nor/inv) key to toggle between Normal and Inverse. You can also use the rotary knob.

[2] Data Polarity

Indicates the polarity of the data output from the DATA OUT connector [35]. Normal setting outputs the same data as the source; Inverse setting outputs the inverse of the source.

Press the [2nd] [F4] (DATA nor/inv) key to toggle between Normal and Inverse. You can also use the rotary knob.

[3] Output data

Indicates the source of the RDS/RBDS data.

You can select from the following. (RDS is set initially.)

ALL 0: Outputs data consisting of continuous zeroes.

ALL 1: Outputs data consisting of continuous ones.

RDS: Outputs the contents of the active memory that has been created and edited.

PN9: Outputs the PN9 signal.

EXT: Outputs the RDS/RBDS data that is input to the DATA IN connector on the rear panel.

To select the source, press the corresponding function key. Pressing the key again sets the source back to the initial value (RDS).

[4] **Output data**

Displays the data source selected in Output data [3]. This is displayed on all setup screens.

[5] **<prev>**

Returns to the previous Radio Data System SYS screen.

3.2 TRI Signal Setting

You can enter the Traffic Radio Information screen directly using the [TRI] menu key.

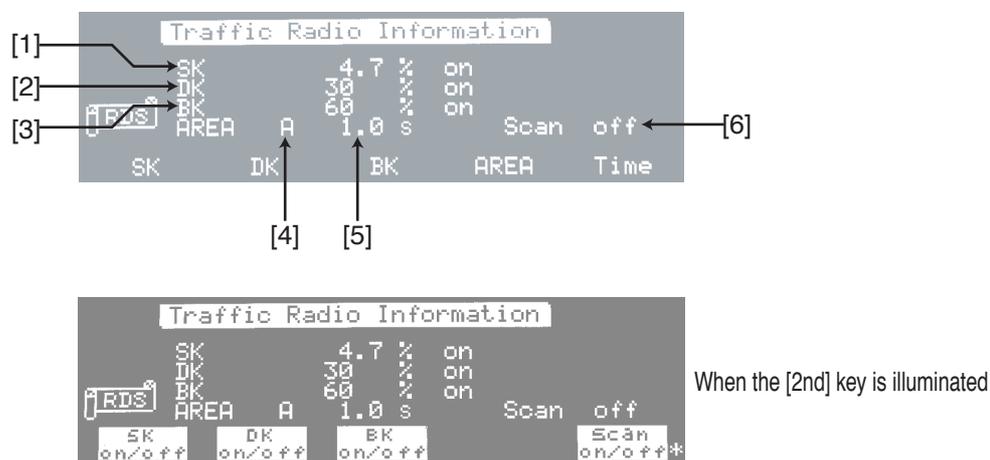


Fig. 3-40 Traffic Radio Information Screen

Screen Description

[1] SK

Indicates the SK modulation level with respect to the 100 % composite signal and the on/off state of SK.

The selectable range of modulation level is 0 % to 10 %. Set the value using the numeric keypad or rotary knob.

The output level of the TRI signal is based on the SK signal level when DK and BK are off. Therefore, if DK and BK are on, the output level increases.

When the modulation level is 10 %, 1/10th of the specified output level is output.

For example, if the modulation level is set to 5 % and the output is set to 3 V_{p-p}, 5 % × 3 V_{p-p}/100 % = 0.15 V_{p-p} is output.

The [2nd] [F1] (SK on/off) key or the rotary knob is used to switch the SK on and off.

[2] DK

Indicates the AM modulation factor setting through DK and the on/off state of DK.

The selectable range of modulation factor is 0 % to 40 %. The prescribed value is 30 %. Set the value using the numeric keypad or rotary knob.

The [2nd] [F2] (DK on/off) key or the rotary knob is used to switch the DK on and off.

[3] BK

Indicates the AM modulation factor setting through areas A to F and the on/off state of BK.

The selectable range of modulation factor is 0 % to 80 %. The prescribed value is 60 %. Set the value using the numeric keypad or rotary knob.

The [2nd] [F3] (BK on/off) key or the rotary knob is used to switch the BK on and off.

[4] AREA

Indicates areas A to F.

You can use the numeric keypad or rotary knob to enter the value.

[5] Scan time

Indicates the scan time between the currently displayed AREA and the next AREA.

You can use the numeric keypad or rotary knob to enter the value.

The selectable range is pass, 0.1 to 12.0 s in 0.1 steps.

If you wish to skip a certain area, set to pass. To cancel the skip area, use the rotary knob to select the area and set the time to a value other than pass.

[6] Scan

Indicates the start and stop of the scanning of the BK area.

Select Scan on using the [2nd] [F5] (Scan on/off) key to start scanning. To stop scanning, select Scan off by pressing the [2nd] [F5] (Scan on/off) key again. You can also use the rotary knob.

The modulation frequency of each area and the scan order are indicated below. Areas set to pass are skipped.

If the scan time of all areas A to F are set to pass, Scan on cannot be selected.

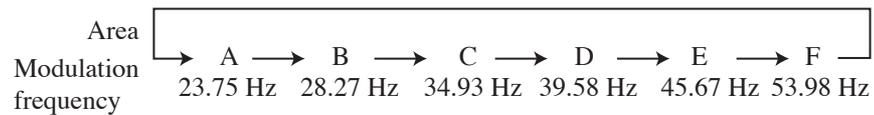


Fig. 3-41 Modulation Frequency of Each Area and Scan Order

3.3 Stereo Signal Setting (KSG3421 Only)

3.3.1 Stereo Screen

You can enter the Stereo screen directly using the [STEREO] menu key.

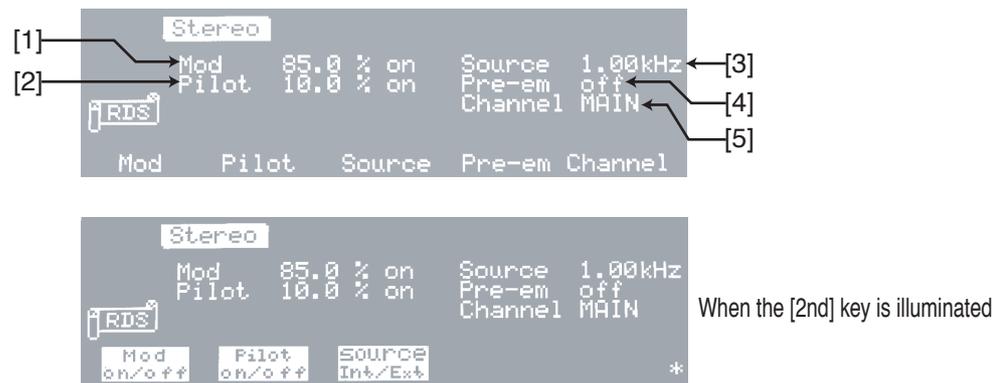


Fig. 3-42 Stereo Screen

Screen Description

[1] Mod

Indicates the monaural/stereo modulation level.

Set the level as a percentage of the output level specified by Output on the Radio Data System SYS Screen in section 3.1.15. For example, if the modulation level is set to 85 % and the output is set to 3 Vp-p, the output becomes $3 \text{ Vp-p} \times 0.85 = 2.55 \text{ Vp-p}$.

Set the monaural/stereo modulation level in the range of 0 % to 125 % in 0.1 % steps. However, the range is 0 % to 12.5 % if pre-emphasis is on.

Set the value using the numeric keypad or rotary knob.

NOTE

- The output level is different for monaural and stereo.

The above equation indicates an example of the output level for monaural.

The output level for stereo is 90 % of the output level for monaural excluding the prescribed pilot level (10 %). Therefore, the output is 0.9 times the above equation or $3 \text{ Vp-p} \times 0.85 \times 0.9 = 2.295 \text{ Vp-p}$.

[2] Pilot

Indicates the pilot level.

Set the pilot level in the range of 0 % to 15 % in 0.1 % steps.

Set the value using the numeric keypad or rotary knob.

[3] Source

Indicates the external modulation (EXT) and internal modulation frequency settings.

Set the internal modulation frequency in the range of 20 Hz to 20 kHz in 10 Hz steps. Set the value using the numeric keypad or rotary knob.

For details on external modulation, see section 3.3.2, “External Modulation.”

[4] Pre-em

Indicates the pre-emphasis setting.

Set the pre-emphasis using the rotary knob in the following order: off, 25 μ s, 50 μ s, and 75 μ s.

When pre-emphasis is used during internal modulation, the monaural/stereo modulation level drops by 20 dB. Therefore, the Mod display becomes 1/10th display.

For details, see section 3.3.3, “Pre-emphasis.”

[5] Channel

Indicates the modulation mode.

Use the rotary knob to select MONO, MAIN, LEFT, RIGHT, SUB, or EXT L/R.

If you select MONO, Pilot [2] cannot be turned on. If it is turned on, it is automatically turned off.

3.3.2 External Modulation

Connecting and Setting the External Modulation Signal Source

When you complete the following procedure, you can set the necessary modulation level by simply changing the Mod setting level. Therefore, you do not have to adjust the input level of the external modulation signal each time settings such as the modulation level and modulation mode are changed.

■ External Modulation Using a Single Signal

1. Switch Source to EXT.
2. Connect the external modulation signal source to the AF/L input connector on the front panel.
The input impedance is approximately 10 k Ω , and the appropriate input level is approximately 3 V_{p-p}.
3. Set the input level of the external modulation signal so that both the AF/L HIGH and LOW LEDs turn off.
When the output level of the external modulation signal source is too low, LOW illuminates; when the level is too high, HIGH illuminates.

■ External Modulation Using Two Signals

1. Switch Channel to EXT L/R.
The AF/L input connector becomes the L (left) stereo modulation signal input connector of the external signal source; R input connector becomes the R (right) stereo modulation input connector.
2. Connect the external modulation signal sources to the AF/L input connector and R input connector on the front panel.
The input impedance is approximately 10 k Ω , and the appropriate input level is approximately 3 V_{p-p}.
3. Set the input level of the external modulation signal so that the AF/L HIGH and LOW LEDs and the R HIGH and LOW LEDs turn off.

Input Level Setting of the External Modulation Signal

When the input level of the external modulation signal is set so that both the HIGH and LOW LEDs turn off, the setting error falls within $\pm 2\%$ range. The modulation level is set internally as a digital value based on the HIGH and LOW levels. In other words, once the input level of the external modulation signal is set, it does not have to be adjusted. The digital setting of the KSG3420/3421 is used to set the necessary modulation level.

Fig. 3-43 shows the relationship of the preset input level. In addition, the input level range moves linearly against the input level as shown in the figure.

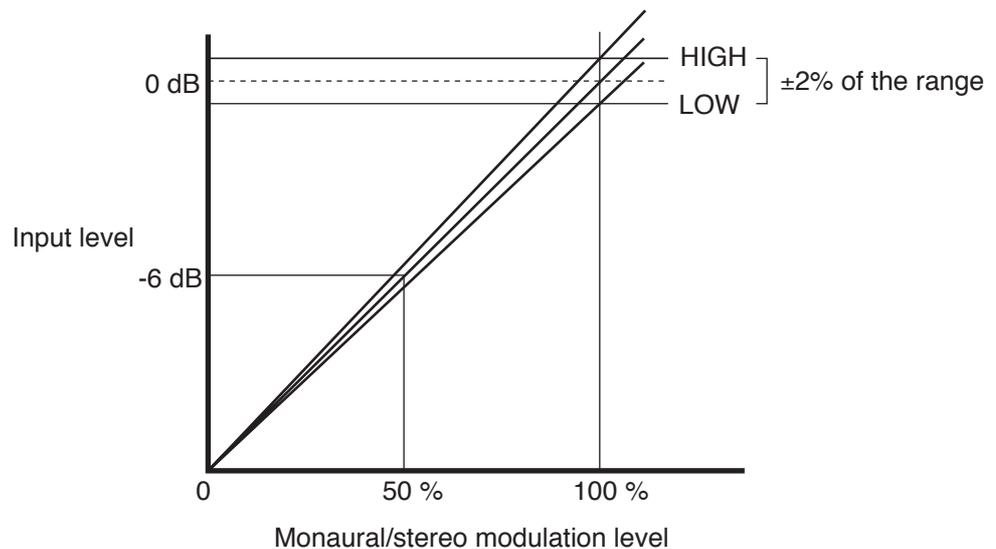


Fig. 3-43 Preset Input Level and Monaural/Stereo Modulation Level

For example, assume that the input level is set between HIGH and LOW and the modulation level is set to 100%. If the input level is attenuated by 6 dB, the modulation level is reduced to 50% with the display set at 100%. At this point, the LOW LED illuminated, but the correct modulation level of 50% is attained.

3.3.3 Pre-emphasis

Pre-emphasis operates in all modes of monaural, stereo, internal modulation, and external modulation.

Fig. 3-44 indicates the pre-emphasis characteristics. The 20 dB line in the figure indicates the condition when pre-emphasis is turned off. If pre-emphasis is set during internal modulation, the signal drops 20 dB in the low-frequency region below 400 Hz.

For example, 10 % is set for the monaural modulation level of 100 %. In addition, the total modulation level after setting pre-emphasis for stereo modulation level of 90 % and pilot level of 10 % is stereo modulation level 9 % + pilot level 10 % or 19 %.

The RDS/RBDS modulation level and TRI modulation level is simply added to the total modulation level in the same fashion as the pilot level in the equation above.

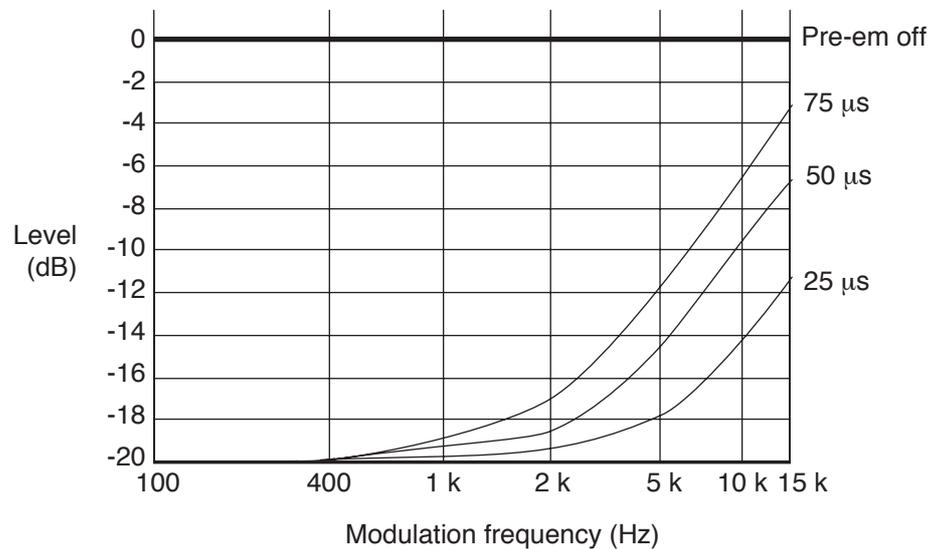


Fig. 3-44 Pre-emphasis Characteristics

4

Chapter 4 Remote Control

This chapter describes external remote control such as GPIB and RS-232C.

4.1 GPIB/RS-232C Control

4.1.1 Overview

This section describes the preparation required for remotely controlling the KSG3420/3421 using the GPIB or RS-232C interface.

By using the GPIB or RS-232C interface, you can control the KSG3420/3421 such as the panel settings through programs on an external controller (computer).

The electrical and mechanical specifications of the GPIB interface of the KSG3420/3421 conforms to IEEE std488.1-1987.

4.1.2 Before Using the GPIB

Preparation

■ Connecting the cable

1. Turn off the POWER switch on all devices constructing the GPIB system including the KSG3420/3421.
2. Connect a GPIB cable to the 24-pin GPIB connector on the rear panel of the KSG3420/3421.

■ Setting the GPIB address

The GPIB address is set to “11” when the KSG3420/3421 is shipped from the factory or after initialization. To change to another address, follow the procedure below.

1. Press the [2nd] [ADRS] key to enter the REMOTE Setup screen.
The cursor moves to ADDR where the address is specified.
2. Change the GPIB address using the numeric keypad or rotary knob.
Set the GPIB address between 0 and 30.
3. Press the [F5] (<AMAP>) key to switch to the Address Map of EON System screen. You can also power cycle the KSG3420/3421.
The GPIB address that was changed in step 2 is enabled by performing either of the operations above.

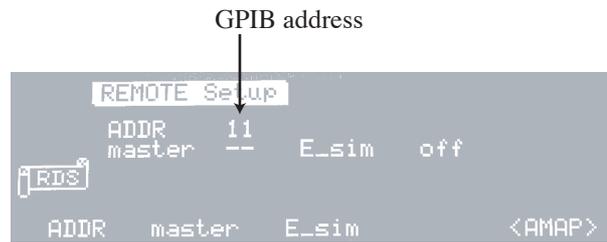


Fig. 4-1 REMOTE Setup Screen

Interface Functions

Table 4-1 shows the GPIB interface functions of the KSG3420/3421.

Table 4-1

Function	Subset	Description
Source handshaking	SH1	Full capability
Acceptor handshaking	AH1	Full capability
Talker	T4	Full capability excluding the talk-only capability
Listener	L2	Full capability excluding the listen-only capability
Service request	SR1	Full capability
Remote local	RL1	Full capability
Parallel polling	PP0	No capability
Device clear	DC1	Full capability
Device trigger	DT0	No capability
Controller	C0	No capability
Device driver	E1	Open collector driver

4.1.3 Before Using the RS-232C

Preparation

■ Connecting the cable

1. Turn off the POWER switch on the KSG3420/3421 and the controller.
2. Connect a straight RS-232C cable to the 9-pin RS-232C connector on the rear panel of the KSG3420/3421.

Fig. 4-2 shows the connector pin assignments.

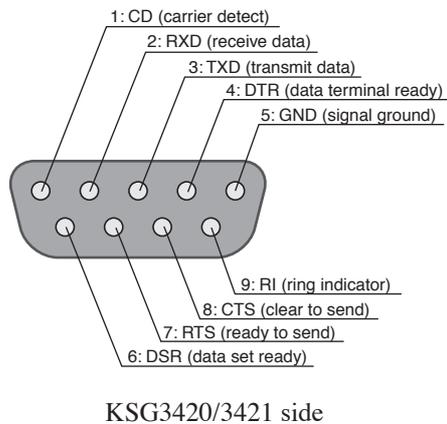


Fig. 4-2 9-pin AT Type Connector

■ Protocol

The RS-232C protocol is set as shown in Table 4-2 when the KSG3420/3421 is shipped from the factory or after initialization.

NOTE

- The protocol is fixed and you cannot change it.
-

Table 4-2 RS-232C Protocol

Item	Value
Data rate	9600 bps
Data length	8 bits
Parity bit	None
Stop bit	1 bit

4.1.4 Messages and Terminators

This section describes the terminology used in this operation manual concerning the communication between the controller and device. See Fig. 4-3.

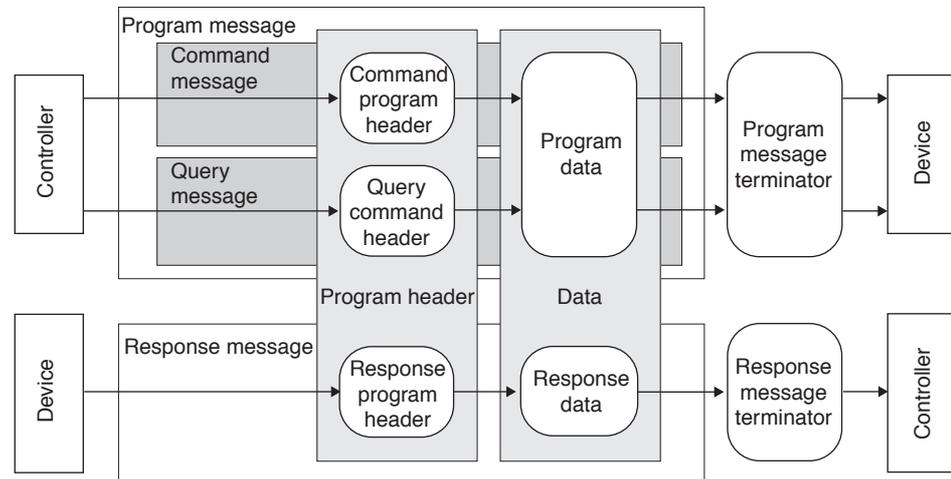


Fig. 4-3 Messages and Terminators

Message

Program message refers to the communication sent from the controller to the device. Response message refers to the communication sent from the device to the controller.

Each message consists of a program header section and a data section.

■ Program message

Program messages are divided into command messages and query messages.

Command messages execute a certain function of the device or modify the settings. Query messages inquire settings and status of the device.

■ Program message syntax

- Multiple program data can be concatenated using a comma “,” (ASCII: 2C H).

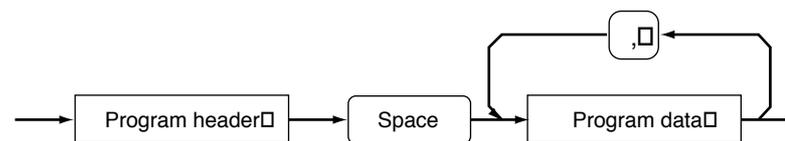


Fig. 4-4 Program Data Concatenation

4.1.4 Messages and Terminators (Continued)

- Program messages can be concatenated using a semicolon “;” (ASCII: 3B H). Program messages can be up to 128 characters long.

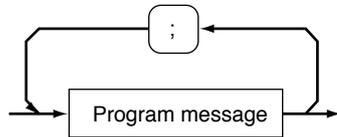


Fig. 4-5 Program Message Concatenation

Terminators

The program message terminator indicates the end of a program message. The response message terminator indicates the end of a response message.

Program message terminator

You can use any of the following terminators. You do not have to specify the terminator beforehand.

LF, LF+EOI, EOI

Response message terminator

Terminators that can be used are LF+EOI and CR+LF+EOI (GPIB control only).

4.1.5 Device Messages

Device messages refer to program messages and response messages that a device supports.

This section describes the device messages that the KSG3420/3421 supports one by one.

■ Special symbols and characters

Special symbols and characters used in this manual to describe program messages and response messages are defined as in Table 4-3.

Table 4-3 Definitions of Special Symbols and Characters

Symbol and Character	Description
< >	Characters and numbers enclosed by these symbols indicate program data.(*1)
[]	Characters and numbers enclosed by brackets indicate that they can be omitted.(*1)
{ }	Characters and numbers delimited by "!" in braces indicate that one of the items is to be selected.(*1)
–	Denotes a space.
c	Denotes a single alphanumeric character that is not a white character. (*2)
s	Denotes an alphanumeric character string that is not a white character. (*2)
n	Denotes an integer with arbitrary number of digits.
d	Denotes a single numeric character from 0 to 9.
h	Denotes a single hexadecimal digit expressed using a number from 0 to 9 or an alphabet from A to F.
...	Denotes that the previous program data or response data is to be repeated.
->	Response data is returned following this symbol.

NOTE

*1Do not include the enclosing characters in the actual program.

*2Indicates the ASCII characters less than or equal to a space (20 H).

Messages Related to the Radio Data System main Screen

For details on the setup items of the screen, see section 3.1.1, “Radio Data System main Screen.”

MODE

Program Message

Switches the mode to RDS or RBDS or queries the setting.

- Syntax

Command message:MODE<{RDS | RBDS}>

Query message:MODE?

- Program data

Value: RDS, RBDS

Initial value: RDS

Response Message

Returns the current mode setting in response to MODE?.

MODE? ->{RDS | RBDS}

PI

Program Message

Sets the program ID code or queries the setting.

- Syntax

Command message:PI<[hhh]h>

Query message:PI?

- Program data

Value: 0000 to FFFF

The highest 3 digits can be omitted. Set to 0 when omitted.

Initial value: 0000

(Example) Set the program ID code to 00FF.

PIFF

Response Message

Returns the program ID code in response to PI?.

PI? ->hhhh

(Example) When the program ID code is 0101

->0101

PIN

Program Message

Sets the program item number or queries the setting.

- Syntax

Command message: PIN<[d]d-[d]d-[d]d>

Query message: PIN?

- Program data

Value: <[d]d-[d]d-[d]d> denotes <day-hour-minute>.

The highest 1 digit can be omitted. Set to 0 when omitted.

Day: 00 to 31, hour: 00 to 31, minute: 00 to 63

Initial value: 00-00-00

(Example) Set the program item number to day 24, 9 hours 45 minutes.

PIN24-9-45

Response Message

Returns the current program item number in response to PIN?.

PIN? ->dd-dd-dd

(Example) When the program item number is day 1, 23 hours 4 minutes

->01-23-04

PS

Program Message

Sets the program service name or queries the setting.

- Syntax

Command message: PS<{ _ | d }c [ccccccc]>

Query message: PS?

- Program data

Code table assignment <{ _ | d }>

Value: Space: Specify no code table.

0: Specify the code table of Fig. E.1.

1: Specify the code table of Fig. E.2.

2: Specify the code table of Fig. E.3.

Initial value: Space

Program service name <c [ccccccc]>

Value: Eight ASCII characters from 20 to FF.

When omitted, 20 H (space) is entered.

Initial value: 20 H (space)

(Example) Set the program service name to the code table of Fig. E.1 and kikusui.

PS06B696B757369

Response Message

Returns the current program service name in response to PS?.

PS? ->{ _ | d }cccccccc

(Example) When the program service name is no code table assignment and

KSG3420

-> 4B534733343230

Messages Related to the Radio Data System main Screen (Continued)

PTY

Program Message

Sets the program type or queries the setting.

- Syntax
Command message: `PTY<n>`
Query message: `PTY?`
- Program data
Value: 0 to 31
Initial value: 0

Response Message

Returns the current program type in response to `PTY?`.

`PTY? ->n`

TA

Program Message

Sets the announce ID for traffic information or queries the setting.

- Syntax
Command message: `TA<{ON|OF|d}>`
Query message: `TA?`
- Program data
On/off setting of the [TA] panel key `<{ON|OF}>`
Value: ON: TA on, OF: TA off
Initial value: OF
The number of insertions of type-15B groups at the time of TA change `<d>`
Value: 0 to 9
Initial value: 0

Response Message

Returns the announce ID for traffic information in response to `TA?`.

`TA? ->{ON|OF}_d`

(Example) When the announce ID for traffic information is set to TA off and no automatic insertion

`->OF 0`

TP

Program Message

Sets the “TP” bit within the RDS/RBDS signal group data or queries the setting.

- Syntax

Command message: TP<{ON|OF}>

Query message: TP?

- Program data

On/off setting of the [TP] panel key

Value: ON: TP on, OF: TP off

Initial value: OF

Response Message

Returns the current “TP” bit setting in response to TP?.

TP? ->{ON|OF}

MS

Program Message

Sets the “M/S” bit within the RDS/RBDS signal group data or queries the setting.

- Syntax

Command message: MS<{ON|OF}>

Query message: MS?

- Program data

On/off setting of the [M/S] panel key

Value: ON: M/S on, OF: M/S off

Initial value: OF

Response Message

Returns the current “M/S” bit setting in response to MS?.

MS? ->{ON|OF}

Messages Related to the Radio Data System main Screen (Continued)

OT

Program Message

Turns on/off the RDS/RBDS signal or queries the setting.

- Syntax

Command message: OT<{ON|OF}>

Query message: OT?

- Program data

On/off setting of the [ON] panel key

Value: ON: RDS/RBDS signal on, OF: RDS/RBDS signal off

Initial value: OF

Response Message

Returns the current on/off setting of the RDS/RBDS signal in response to OT?.

OT? ->{ON|OF}

Messages Related to the Group Sequence Screen

For details on the setup items of the screen, see section 3.1.2, “Group Sequence Screen.”

CLGRP

Program Message

Deletes the group sequence data when the screen is other than the Enhanced Other Net.n on/off screen.

- Syntax

Command message: CLGRP

GRP

Program Message

Sets the group sequence or queries the setting.

- Syntax

Command message: GRP<n{A|B}[, ···]>

Query message: GRP?

- Program data

Value: $0 \leq n \leq 15$

A or B

(Example) Set the group sequence to 0A, 0B, 1A, 1B.

GRP0A, 0B, 1A, 1B

Response Message

Returns the current group sequence in response to GRP?.

GRP? ->n{A|B}[, . . .]

(Example) When the group sequence is 0A, 0B, 15B, 15B

->0A,0B,15B,15B

Messages Related to the Radiotext Screen

For details on the setup items of the screen, see section 3.1.3, "Radiotext Screen."

RT

Program Message

Enters the radio text or queries the setting.

- Syntax

Command message:RT<{A|B}s>

Query message:RT?

- Program data

Flag setting <{A|B}>

Value: A: flag A, B: flag B

Initial value: A

Text character <s>

Value: 0A, 0D or 20 to FF

Up to 64 characters

(Example) Set the radio text to flag A and kikusui.

RTA6B696B757369

Response Message

Returns the current flag (0: flag A, 1: flag B) and the radio text in response to RT?.

RT? ->{0|1}s

(Example) When the radio text is flag B and KSG3420

->14B534733343230

Messages Related to the Radio Data System sub Screen

For details on the setup items of the screen, see section 3.1.4, “Radio Data System sub Screen.”

MJD

Program Message

Sets the MJT or queries the setting.

- Syntax

Command message: `MJD<dddd-dd-dd_dd:dd: {_|-}dd.d>`

Query message: `MJD?`

- Program data

`<dddd-dd-dd_dd:dd: {_|-}dd.d>` denotes `<year-month-day_hour:minute:offset time>`.

Year-month-day

Value: 1900-03-01 to 2100-02-28

Initial value: 1900-03-01

Hour

Value: 00 to 31

Initial value: 00

Minute

Value: 00 to 63

Initial value: 00

Offset time

Value: ± 15.5

_ (space): positive offset, -: negative offset

Initial value: `_0.0`

(Example) Set the MJT to June 24th, 2001, 10 hours 1 minute and positive offset of 15.5.

`MJD2001-07-24 10:01: 15.5`

Response Message

Returns the current MJT in response to `MJD?`.

`MJD? ->dddd-dd-dd_dd:dd: {_|-}dd.d`

(Example) When the MJT is set to January 23rd, 2000, 4 hours 5 minutes, and negative offset of 15.5

`->2000-01-23 04:05:-15.5`

CT

Program Message

Sets the CT or queries the setting.

- Syntax
Command message: CT<{ON|OF}>
Query message: CT?
- Program data
Value: ON: CT on, OF: CT off
Initial value: OF

Response Message

Returns the current CT in response to CT?.

CT? ->{ON|OF}

DI

Program Message

Sets the decoder ID or queries the setting.

- Syntax
Command message: DI<d>
Query message: DI?
- Program data
Value: 0 to 7
Initial value: 0

Response Message

Returns the current decoder ID in response to CT?.

DI? ->d

Messages Related to the Simulation Screen

For details on the screen, see section 3.1.5, “Simulation Screen.”

SPS

Program Message

Sends a single group of data by reading.

- Syntax
Command message: SPS

SP0

Program Message

Returns from data transmission to the normal condition.

- Syntax
Command message: SP0

Messages Related to the AF.main Screen

For details on the setup items of the screen, see section 3.1.6, “AF.main Screen.”

CLAF

Program Message

Deletes the AF data.

NOTE

- This message can also be used to clear the AF data on the AF Method EO Net.n screen. To clear the AF data on the AF.main screen, send the CLAF message on a screen other than the EON screen (Enhanced Other Net.n on/off screen or screens of lower hierarchy). If the CLAF message is sent on the EON screen, the nth AF data of Enhanced Other Net.n on/off is deleted.
-

- Syntax

Command message:CLAF

AFM

Program Message

Sets the method or queries the setting.

- Syntax

Command message:AFM<{A|B}>

Query message:AFM?

- Program data

Value: A: Method A, B: Method B

Response Message

Returns the current method in response to AFM?.

AFM? ->{A|B}

AFA

Program Message

Sets the AF data of Method A or queries the setting.

- Syntax

Command message:AFA<{n.n|*n.n|n.n:|nK}[, ···]>

Query message:AFA?

- Program data

Value: n.n: Denotes the FM band frequency (87.5 MHz to 107.9 MHz).
“*”: Denotes the FM band frequency of Adjacent-Region.
“.”: Denotes the frequency of the main transmitter that is output in pairs with the Number of freq code.
nK: Denotes the MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.

Resolution: FM band: 0.1 MHz, MF band or LF band: 9 kHz

(Example) Set the AF data of Method A to 87.5 MHz and 531 kHz.

AFA87.5,531K

Response Message

Returns the current AF data setting of Method A in response to AFA?.

AFA? ->A{n.n|*n.n|n.n:|nK}[, ···]

(Example) When the AF data of Method A is an FM band frequency in the Adjacent-Region of 87.5 MHz

->A*87.5

AFB

Program Message

Sets the AF data of Method B or queries the setting.

- Syntax

Command message: AFB<{n.n|*n.n|n.n:|nK}[, ···]>

Query message: AFB?

- Program data

Value: n.n: Denotes the FM band frequency (87.5 MHz to 107.9 MHz).
“*”: Denotes the FM band frequency of Adjacent-Region.
“.”: Denotes the header frequency.
nK: Denotes the MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.

Resolution: FM band: 0.1 MHz, MF band or LF band: 9 kHz

(Example) Set the AF data of method B to 107.9 MHz header frequency.

AFB107.9:

Response Message

Returns the current AF data of Method B in response to AFB?.

AFB? ->B{n.n|*n.n|n.n:|nK}[, ···]

(Example) When the AF data of Method B is 153 kHz

->B153K

Messages Related to the Other Group.main Screen

For details on the setup items of the screen, see section 3.1.7, “Other Group.main Screen.”

CLOGP

Program Message

Deletes the Other Group.

- Syntax

Command message: CLOGP<{nA | nB | UD1 | UD2}>

- Program data

Value: nA: Other Group 1A, 3A, 4A to 13A, and 15A
nB: Other Group 1B, 3B, and 4B to 13B
UD1: User-defined group type UD1
UD2: User-defined group type UD2

OGP

Program Message

Sets the Other Group data or queries the setting.

- Syntax

Command message: OGP<{nA | nB | UD1 | UD2} [hhh] h [, ···]>

Query message: OGP<{nA | nB | UD1 | UD2} ?>

- Program data<{nA | nB | UD1 | UD2}>

Value: nA: Other Group 1A, 3A, 4A to 13A, and 15A
nB: Other Group 1B, 3B, and 4B to 13B
UD1: User-defined group type UD1
UD2: User-defined group type UD2

- Program data<[hhh] h [, ···]>

Value: Varies depending on the group type.
1A: hh, hhhh
1B: hh
4A: hh
3A, 5A to 13A, 15A: hh, hhhh, hhhh
3B to 13B: hh, hhhh
UD1, UD2: hhhh, hhh, hhhh, hhh, hhhh, hhh, hhhh, hhh

(Example) Set Other Group 1A to 00,1234 and 1B to FF.

OGP1A00,1234

OGP1BFF

Response Message

Returns the Other Group data setting in response to OGP {nA | nB | UD1 | UD2} ?.

OGP {nA | nB | UD1 | UD2} ? -> {nA | nB | UD1 | UD2} [hhh] h [, ···]

(Example) When the Other Group data 3B is FF,5678

->3BFF,5678

Messages Related to the Program Type Name Screen

For details on the setup items of the screen, see section 3.1.8, “Program Type Name Screen.”

PTYF

Program Message

Sets the PTYN flag or queries the setting.

- Syntax

Command message: PTYF<{A|B}>

Query message: PTYF?

- Program data

Value: A: flag A, B: flag B

Response Message

Returns the PTYN flag setting in response to PTYF?.

PTYF? ->{A|B}

PTYN

Program Message

Sets the Program Type Name or queries the setting.

- Syntax

Command message: PTYN<C[CCCCCCC]>

Query message: PTYN?

- Program data

Value: Eight ASCII characters from 20 to FF.

When omitted, 20 H (space) is entered.

Initial value: See Table 3-2, “Initial Values of PTYN (for flag A)” in chapter 3.

(Example) Set the Program Type Name to SPORT.

PTYN53504F5254

Response Message

Returns the Program Type Name setting in response to PTYN?.

PTYN? ->CCCCCCC

(Example) When the Program Type Name is NEWS

->4E455753

Messages Related to the Enhanced Other Net. xx xxx Screen

For details on the setup items of the screen, see section 3.1.9, “Enhanced Other Net. xx xxx Screen.”

MAIN

Program Message

Switches the screen to the Radio Data System main screen.

- Syntax

Command message: MAIN

EON

Program Message

Turns on/off the EON network number or queries the setting.

- Syntax

Command message: EON<{n | nON | nOF | MAX | ADD | nINS}>

Query message: EON?

EON<MAX?>

- Program data

Value: n: Switches to the screen of the Other Network number specified by n.

nON: Turns on the Other Network specified by n.

nOF: Turns off the Other Network specified by n.

MAX: Switches to the screen of the maximum Other Network number.

ADD: Adds an Other Network data area at the end of the Other Network number.

nINS: Inserts an Other Network data area before the Other Network number specified by n.

Response Message

Returns the on/off setting of the currently selected Other Network number n in response to EON?.

EON? ->{ON | OF_n}

Returns the total number n of the current Other Networks in response to EON<MAX?>.

EON<MAX?>->nmax

CLEON

Program Message

Deletes the Other Network data area.

- Syntax

Command message: `CLEON<[n]>`

- Program data

Value: n: Deletes the screen of the Other Network number specified by n.
When n is omitted, all Other Network screens are deleted.

PI

NOTE

- This program header is common with the Radio Data System main screen. When using this header against the Enhanced Other Net.n on/off screen, the target Other Network number must be specified.
-

Program Message

Sets the program ID code of EON or queries the setting.

- Syntax

Command message: `PI<[hhh]h>`

Query message: `PI?`

- Program data

Value: 0000 to FFFF

When omitted, 0 is set.

Initial value: 0000

(Example) Set the program ID code of EON to 00FF.

`PIFF`

Response Message

Returns the current program ID code of EON in response to PI?.

`PI? ->hhh`

(Example) When the program ID code of EON is 0101

`->0101`

Messages Related to the Enhanced Other Net. xx xxx Screen (Continued)

PIN

-
- NOTE** • This program header is common with the Radio Data System main screen. When using this header against the Enhanced Other Net.n on/off screen, the target Other Network number must be specified.
-

Program Message

Sets the program item number of EON or queries the setting.

- Syntax

Command message: PIN<[d]d-[d]d-[d]d>

Query message: PIN?

- Program data

Value: <[d]d-[d]d-[d]d> denotes <day-hour-minute>.

The highest 1 digit can be omitted. Set to 0 when omitted.

Day: 00 to 31, hour: 00 to 31, minute: 00 to 63

Initial value: 00-00-00

(Example) Set the program item number of EON to day 24, 9 hour 45 minutes.

PIN24-9-45

Response Message

Returns the current program item number of EON in response to PIN?.

PIN? ->dd-dd-dd

(Example) When the program item number of EON is day 1, 23 hours 4 minutes

->01-23-04

PS

-
- NOTE** • This program header is common with the Radio Data System main screen. When using this header against the Enhanced Other Net.n on/off screen, the target Other Network number must be specified.
-

Program Message

Sets the program service name of EON or queries the setting.

- Syntax

Command message: PS<c[ccccccc]>

Query message: PS?

- Program data

Program service name <c[ccccccc]>

Value: Eight ASCII characters from 20 to FF.

When omitted, 20 H (space) is entered.

Initial value: 20 H (space)

(Example) Set the program service name of EON to kikusui.
PS6B696B757369

Response Message

Returns the current program service name of EON in response to PS?.

PS? ->cccccccc

(Example) When the program service name of EON is KSG3420
->4B534733343230

PTY

NOTE

- This program header is common with the Radio Data System main screen. When using this header against the Enhanced Other Net.n on/off screen, the target Other Network number must be specified.

Program Message

Sets the program type of EON or queries the setting.

- Syntax

Command message:PTY<{n|Cd}>

Query message:PTY?, PTYC?

- Program data

Value: <{n|Cd}> denotes <{program typenumber of insertions}>.
n: 0 to 31, d: 0 to 9

Initial value: 0

Response Message

Returns the current program type of EON in response to PTY?.

PTY? ->dd

Returns the number of insertions in response to PTYC?.

PTYC? ->d

Messages Related to the Enhanced Other Net. xx xxx Screen (Continued)

TA

NOTE

- This program header is common with the Radio Data System main screen. When using this header against the Enhanced Other Net.n on/off screen, the target Other Network number must be specified.
-

Program Message

Sets the announce ID for traffic information of EON or queries the setting.

- Syntax

Command message: TA<{ON|OF|Cd|Dd.d}>

Query message: TA?, TAC?, TAD?

- Program data

Value: <{ON|OF|Cd|Dd.d}> denotes <{TA on|TA off|number of insertions|delay}>.

ON: TA on, OF: TA off, d: 0 to 9, d.d: 0.0 to 9.9

Initial value: off_0_0.0

Response Message

Returns the announce ID for traffic information of EON in response to TA?.

TA? ->{ON|OF}_d

Returns the number of insertions in response to TAC?.

TAC? ->d

Returns the delay in response to TAD?.

TAD? ->d.d

TP

NOTE

- This program header is common with the Radio Data System main screen. When using this header against the Enhanced Other Net.n on/off screen, the target Other Network number must be specified.
-

Program Message

Sets the “TP” bit of EON or queries the setting.

- Syntax

Command message: TP<{ON|OF}>

Query message: TP?

- Program data
Value: ON: TP on, OF: TP off
Initial value: OF

Response Message

Returns the current “TP” bit setting of EON in response to TP?.

TP? ->{ON|OF}

Messages Related to the Enhanced Other Net.n sub Screen

For details on the setup items of the screen, see section 3.1.10, “Enhanced Other Net.n sub Screen.”

UC12

Program Message

Sets the data of information block 3 corresponding to usage code 12 of type 14A or queries the setting.

- Syntax

Command message:UC12<[hhh]h>

Query message:UC12?

- Program data

Value: 0000 to FFFF

When omitted, 0 is set.

Initial value: 0000

(Example) Set information block 3 corresponding to usage code 12 to 00FF.

UC12FF

Response Message

Returns the data of usage code 12 in response to UC12?.

UC12? ->hhhh

(Example) When information block 3 corresponding to usage code 12 is 0101

->0101

Messages Related to the Enhanced Other Net.n sub Screen (Continued)

UC13

Program Message

Sets the data of information block 3 corresponding to usage code 13 of type 14A or queries the setting.

- Syntax

Command message: UC13<[hh]h>

Query message: UC13?

- Program data

Value: 000 to 7FE

When omitted, 0 is set.

Initial value: 000

Response Message

Returns the data of usage code 13 in response to UC13?.

UC13? ->hhh

UC15

Program Message

Sets the data of information block 3 corresponding to usage code 15 of type 14A or queries the setting.

- Syntax

Command message: UC15<[hhh]h>

Query message: UC15?

- Program data

Value: 0000 to FFFF

When omitted, 0 is set.

Initial value: 0000

Response Message

Returns the data of usage code 15 in response to UC15?.

UC15? ->hhhh

Messages Related to the AF Method A. EO Net.n Screen

For details on the setup items of the screen, see section 3.1.11, “AF Method A. EO Net.n Screen.”

CLAF

-
- NOTE**
- This program header is common with the AF.main screen. When using this header against the AF Method A. EO Net.n screen, the target Other Network number must be specified.
-

Program Message

Deletes the AF data of EON.

- Syntax
Command message:CLAF

AFA

-
- NOTE**
- This program header is common with the AF.main screen. When using this header against the AF Method A. EO Net.n screen, the target Other Network number must be specified.
-

Program Message

Sets the AF data of EON or queries the setting.

- Syntax
Command message:AFA<{n.n|nK}[, ···]>
Query message:AFA?
- Program data<{n.n|nK}>
Value: n.n: Denotes the FM band frequency (87.5 MHz to 107.9 MHz).
nK: Denotes the MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.
Resolution: FM band: 0.1 MHz, MF band or LF band: 9 kHz
(Example) Set the AF data of EON to 87.5 MHz and 531 kHz.
AFA87.5,531K

Response Message

Returns the current AF data of EON in response to AFA?.

- AFA? ->A{n.n|nK}[, ···]
(Example) When the AF data of EON is 107.9 MHz
->A107.9

Messages Related to the Mapped Freq. EO Net.n Screen

For details on the setup items of the screen, see section 3.1.12, “Mapped Freq. EO Net.n Screen.”

CLMAP

Program Message

Deletes the mapped frequency data of the specified Other Network number.

- Syntax

Command message:CLMAP

MAP

Program Message

Sets the mapped frequency data of the specified Other Network number or queries the setting.

- Syntax

Command message:MAP<{n.n|t:n.n|nK}[, ···]>

Query message:MAP?

- Program data<{n.n|t:n.n|nK}>

Value: n.n: Denotes the FM band frequency (87.5 MHz to 107.9 MHz).

“t.”: Specifies the Tuning Frequency.

nK: Denotes the MF band (531 kHz to 1 602 kHz) or the LF band (153 kHz to 279 kHz) frequency.

Resolution: FM band: 0.1 MHz, MF band or LF band: 9 kHz

(Example) Set the mapped frequency data to 87.5 MHz and 531 kHz.

MAP87.5,531K

Response Message

Returns the mapped frequency data setting in response to MAP?.

MAP? ->{n.n|t:n.n|nK}[, ···]

(Example) When the mapped frequency data is 107.9 MHz and is a Tuning Frequency

->t:107.9

Messages Related to the Usage Code Seq. Net.n Screen

For details on the setup items of the screen, see section 3.1.13, “Usage Code Seq. Net.n Screen.”

CLUCS

Program Message

Deletes the sequence data of the specified Other Network number.

- Syntax

Command message: CLUCS

UCS

Program Message

Sets the sequence data of the specified Other Network number or queries the setting.

- Syntax

Command message: UCS<n[, ···]>

Query message: UCS?

- Program data

Value: 0 to 15

(Example) Set the sequence data to 0, 1, 2, 3, 4, 4, 13, 14.

UCS0,1,2,3,4,4,13,14

Response Message

Returns the sequence data in response to UCS?.

UCS? ->n[, ···]

(Example) When the sequence data is 0, 1, 2, 3, 5, 5, 13, 14

->0,1,2,3,5,5,13,14

Messages Related to the Modified MBS information Screen

For details on the setup items of the screen, see section 3.1.14, “Modified MBS information Screen.”

SCODE

Program Message

Sets the System & Sleep code or queries the setting.

- Syntax

Command message: SCODE<[hhh]h>

Query message: SCODE?

- Program data

Value: 0000 to FFFF

When omitted, 0 is set.

Initial value: 0000

(Example) Set the System & Sleep code to 00FF.

SCODEFF

Response Message

Returns the current System & Sleep code in response to SCODE?.

SCODE?->hhh

(Example) When the System & Sleep code is 0101

->0101

RCVR

Program Message

Sets the Receiver code or queries the setting.

- Syntax

Command message: RCVR<[hhh]h>

Query message: RCVR?

- Program data

Value: 0000 to FFFF

When omitted, 0 is set.

Initial value: 0000

(Example) Set the Receiver code to 00FF.

RCVRFF

Response Message

Returns the current Receiver code in response to RCVR?.

RCVR? ->hhh

(Example) When the Receiver code is 0101

->0101

MSG

Program Message

Sets the MSG code or queries the setting.

- Syntax

Command message:MSG<c[cccccccccc]>

Query message:MSG?

- Program data

Value: 20 to FF

When omitted, 0 is set.

Initial value: 20

(Example) Set the MSG code to kikusui.

MSG6B696B757369

Response Message

Returns the current MSG code in response to MSG?.

MSG? ->cccccccccc

(Example) When the MSG code is KSG3420

->4B534733343230

Messages Related to the Radio Data System SYS Screen

For details on the setup items of the screen, see section 3.1.15, "Radio Data System SYS Screen."

AF

Program Message

Sets the RDS/RBDS modulation level or queries the setting.

- Syntax

Command message:AF<n.n{PC|%}>

Query message:AF?

- Program data

Value: 0 to 10.00

Resolution: 0.01

Initial value: 1.60

(Example) Set the RDS/RBDS modulation level to 1.60 %.

AF1.60PC

Response Message

Returns the current RDS/RBDS modulation level in response to AF?.

AF? ->dd.dd

(Example) When the RDS/RBDS modulation level is 10.00 %

->10.00

Messages Related to the Radio Data System SYS Screen (Continued)

AP

Program Message

Sets the output level or queries the setting.

- Syntax

Command message: AP<n.nV>

Query message: AP?

- Program data

Value: 1.50 to 10.00

Resolution: 0.01

Initial value: 3.00

(Example) Set the output level to 3.00 V.

AP3.00V

Response Message

Returns the current output level in response to AP?.

AP? ->dd.dd

(Example) When the output level is 10.00 V

->10.00

PH

Program Message

Sets the phase of the 57-kHz sub-carrier or queries the setting.

- Syntax

Command message: PH<{0 | 90 | Sn}>

Query message: PH?

- Program data

Value: 0: 0° (in-phase), 90: 90°, Sn: -10° to 10° (1° steps)

Initial value: 90 S 0

(Example) Set the phase of the 57-kHz sub-carrier to 90°.

PH90

Response Message

Returns the phase setting of the 57-kHz sub-carrier in response to PH?.

PH? ->{0 | 90}{_ | -}dd

(Example) When the phase of the 57-kHz sub-carrier is 90° and the phase offset is 10°.

->90 10

ER

Program Message

Sets the error or queries the setting.

- Syntax

Command message: ER<{ON | OF | XOR | OR | AND | P [hhhhhh] h | n}>

Query message: ER?

- Program data

Error on/off setting <{ON | OF}>

Value: ON: Error on, OF: Error off

Initial value: OF

Error mode setting <{XOR | OR | AND}>

Initial value: OR

Error pattern setting <P [hhhhhh] h>

Value: 0000000 to FFFFFFFF

When omitted, 0 is set.

Initial value: 0000000

Error count setting <n>

Value: 0 to 255

Initial value: 0

Response Message

Returns the error setting in response to ER?

ER? ->{ON | OF}_ {XOR | OR | AND}_ Phhhhhhddd

(Example) When the error setting is on, the mode is OR, the error pattern is 0101010, and the error count is 50

->ON OR P0101010050

Messages Related to the Memory Manage Screen

For details on the setup items of the screen, see section 3.1.16, “Memory Manage Screen.”

CLRDS

Program Message

Deletes the data that is stored at the specified memory.

- Syntax
Command message: CLRDS<n>
- Program data
Value: 0 to 99

RC

Program Message

Recalls the specified memory or queries the memory status.

- Syntax
Command message: RC<n>
Query message: RC<[n]>?
- Program data
Value: 0 to 99

Response Message

Returns the memory status in response to RC?

RC? ->0: Cannot recall memory.
->1: Can recall memory.
->2: No RDS data.

ST

Program Message

Stores to the specified memory or queries the memory status.

- Syntax
Command message: ST<n>
Query message: ST<n>?
- Program data
Value: 0 to 99

Response Message

Returns the memory status in response to ST?

ST? ->0: Cannot store to the active area.
->1: Can store to the active area.

Messages Related to the Hard Set Information Screen

For details on the setup items of the screen, see section 3.1.17, “Hard Set Information Screen.”

RDS

Program Message

Sets the RDS/RBDS data source or queries the setting.

- Syntax

Command message: `RDS{N|0|1|PN9|EXT}>`

Query message: `RDS?`

- Program data

Value: N: Outputs the contents of the active memory that has been created and edited. (RDS)
 0: Outputs data consisting of continuous zeroes. (ALL 0)
 1: Outputs data consisting of continuous ones. (ALL 1)
 PN9: Outputs the PN9 signal.
 EXT: Outputs the RDS/RBDS data that is input to the DATA IN connector on the rear panel.

Response Message

Returns the RDS/RBDS data source in response to `RDS?`.

`RDS? -> {N|0|1|PN9|EXT}`

Messages Related to the Traffic Radio Information Screen

For details on the setup items of the screen, see section 3.2, “Traffic Radio Information Screen.”

SK

Program Message

Sets SK or queries the setting.

- Syntax

Command message: SK<{ON|OF|n.n{PC|%}}>

Query message: SK?

- Program data

SK on/off setting <{ON|OF}>

Value: ON: SK on, OF: SK off

Initial value: ON

SK modulation level setting <n.n{PC|%}>

Value: 0.0 to 10.0

Resolution: 0.1

Initial value: 4.7

Response Message

Returns the SK setting in response to SK?

SK? ->{ON|OF}_dd.d

(Example) When SK is on and the modulation level is 4.7 %

->ON 4.7

DK

Program Message

Sets DK or queries the setting.

- Syntax

Command message: DK<{ON|OF|n.n{PC|%}}>

Query message: DK?

- Program data

DK on/off setting <{ON|OF}>

Value: ON: DK on, OF: DK off

Initial value: ON

AM modulation level through DK <n.n{PC|%}>

Value: 0 to 40

Resolution: 1

Initial value: 30

Response Message

Returns the DK setting in response to DK?

DK? ->{ON|OF}_dd

BK

Program Message

Sets BK or queries the setting.

- Syntax

Command message:DK<{ON|OF|n.n{PC|%}}>

Query message:DK?

- Program data

BK on/off setting <{ON|OF}>

Value: ON: BK on, OF: BK off

Initial value: ON

AM modulation level through areas A to F <n.n{PC|%}>

Value: 0 to 80

Resolution: 1

Initial value: 60

Response Message

Returns the BK setting in response to BK?

BK? ->{ON|OF}_dd

AREA

Program Message

Sets area or queries the setting.

- Syntax

Command message:AREA<c>

Query message:AREA<?>

- Program data

Value: A/B/C/D/E/F

Initial value: A

Response Message

Returns the area setting in response to AREA?

AREA? ->c

Messages Related to the Stereo Screen (KSG3421 Only)

For details on the setup items of the screen, see section 3.3.1, “Stereo Screen.”

MOD

Program Message

Sets the monaural/stereo modulation level or queries the setting.

- Syntax

Command message: MOD<{ON | OF | n.n{PC | %}}>

Query message: MOD?

- Program data

Monaural/stereo on/off setting <{ON | OF}>

Value: ON: Modulation on, OF: Modulation off

Initial value: ON

SK modulation level setting <n.n{PC | %}>

Value: 0.0 to 125.0

Resolution: 0.1

Initial value: 85.0

Response Message

Returns the monaural/stereo modulation level in response to MOD?.

MOD? ->{ON | OF}_ddd.d

(Example) When the monaural/stereo modulation is on and the modulation level is

85 %

->ON 85.0

PL

Program Message

Sets pilot level or queries the setting.

- Syntax

Command message: PL<{ON | OF | n.n{PC | %}}>

Query message: PL?

- Program data

Pilot level on/off setting <{ON | OF}>

Value: ON: Pilot on, OF: Pilot off

Initial value: ON

Pilot level setting <n.n{PC | %}>

Value: 0.0 to 15.0

Resolution: 0.1

Initial value: 10.0

Response Message

Returns the current pilot level setting in response to PL?.

MOD? ->{ON|OF}_dd.d

(Example) When the pilot is on and the modulation level is 10 %

->ON 10.0

PRE

Program Message

Sets the pre-emphasis or queries the setting.

- Syntax

Command message: PRE<{ {OF|0} | {25|1} | {50|2} | {75|3} }>

Query message: PRE?

- Program data

Value: OF|0: Pre-emphasis off, 25|1: 25 μ s, 50|2: 50 μ s
75|3: 75 μ s

Initial value: 0

(Example) Set the pre-emphasis to 50 μ s.

PRE2

Response Message

Returns the pre-emphasis setting in response to PRE?.

PRE? ->{0|25|50|75}

(Example) When the pre-emphasis is off

->0

Messages Related to the Stereo Screen (KSG3421 Only) (Continued)

M

Program Message

Sets modulation mode or queries the setting.

- Syntax

Command message: M<d>

Query message: M?

- Program data

Value: 0 to 7

0 and 7: STEREO off, 1: MAIN, 2: LEFT, 3: RIGHT, 4: SUB, 5: EXT L/R, 6: MONO

Initial value: MAIN

(Example) Set the modulation mode to LEFT.

M2

Response Message

Returns the modulation mode setting in response to M?.

M? ->d

(Example) When the modulation mode is MAIN

->1

NOTE

- Command messages M0 and M7 only turns off the monaural/stereo modulation. The modulation mode setting is retained. For example, if the modulation mode is RIGHT and you send the M0 messages followed by the M? message, the response message is 3.
-

S

Program Message

Sets modulation source or queries the setting.

- Syntax

Command message: S<d>

Query message: S?

- Program data

Value: 0 to 8

0: Enables internal modulation frequency setting.

1: External modulation (EXT)

2: Internal modulation 30 Hz

3: Internal modulation 100 Hz

4: Internal modulation 400 Hz

5: Internal modulation 1 kHz

6: Internal modulation 6.3 kHz

7: Internal modulation 10 kHz

8: Internal modulation 15 kHz

Resolution: 1
Initial value: 5
(Example) Set the external modulation to the internal modulation frequency.
S0
SOUR1000

Response Message

Returns the modulation source setting in response to S?.
SOUR? ->n

NOTE

- Command message S0 enables only the setting of arbitrary internal modulation frequency. It does not change the modulation as command messages S1 to S8. After you use the S0 message, set the internal modulation frequency with the SOUR message.
 - When the modulation frequency is set with S1 to S8 messages, 1 to 8 is returned in response to S?. When other internal modulation frequency is set, the set frequency is returned.
-

SOUR

Program Message

Sets the internal modulation frequency or queries the setting.

- Syntax
Command message: SOUR<n>
Query message: SOUR?
- Program data
Value: 20 to 20 000
Resolution: 10
Initial value: 1 000

Response Message

Returns the internal modulation frequency in response to SOUR?.
SOUR? ->n

NOTE

- After you change the external modulation (EXT) to the internal modulation, set the internal modulation frequency with the SOUR message. If the internal modulation is already selected, you can change the internal modulation frequency with the SOUR message only.
-

Messages Related to the Utility 2 Screen

For details on the setup items of the screen, see section 4.2.4, “Data Input/Output.”

PORT1?

Program Message

Queries the High/Low signal applied to PI0 to PI7 of the EXT I/O connector.

- Syntax

Query message:PORT1?

Response Message

Returns the High/Low signal in hexadecimal value in response to PORT1?.

PORT1?->hh

(Example) When the input data is 01

->01

PORT2

Program Message

Sets the output data from PO0 to PO7 of the EXT I/O connector or queries the setting.

- Syntax

Command message:PORT2<hh>

Query message:PORT2?

- Program data

Value: 00 to FF

Initial value: 00

(Example) Set the output data to FF.

PORTFF

Response Message

Returns the output data in hexadecimal value in response to PORT2?.

PORT2?->hh

(Example) When the output data is 01

->01

Other Messages

PLAN

Program Message

Switches the screen of queries the screen name.

- Syntax

Command message: PLAN<s>

Query message: PLAN?

- Program data

Value: MAIN: Radio Data System main screen
 GSEQ: Group Sequence screen
 RTX: Radiotext screen
 MSUB: Radio Data System sub screen
 SIMU: Simulation screen
 AFMA: AF.main screen
 OGRP: Other Group.main screen
 PTYN: Program Type Name screen
 EON: Enhanced Other Net.n on/off screen
 ESUB: Enhanced Other Net.n sub Screen
 AFEO: AF Method A. EO Net.n screen
 MFEO: Mapped Freq. EO Net.n screen
 USAG: Usage Code Seq. EO Net.n screen
 MMBS: Modified MBS information screen
 SYS: Radio Data System SYS screen
 MMA: Memory Manage screen
 HARD: Hard Set Information screen
 TRI: Traffic Radio Information screen
 STER: Stereo screen

NOTE

- If the Other Network data area is not specified on the Enhanced Other Net.n on/off screen, messages that switch the screen to a screen of a hierarchy lower than the Enhanced Other Net.n on/off screen (ESUB, AFEO, MFEO, and USAG) cause the screen to switch to the Enhanced Other Net.n on/off screen.
-

Response Message

Returns the screen name in response to PLAN?.

PLAN? ->s

Other Messages (Continued)

*IDN

Program Message

Queries the model name of the unit.

- Syntax

Query message: *IDN?

Response Message

In response to *IDN?, the model name is returned as follows.

*IDN? ->

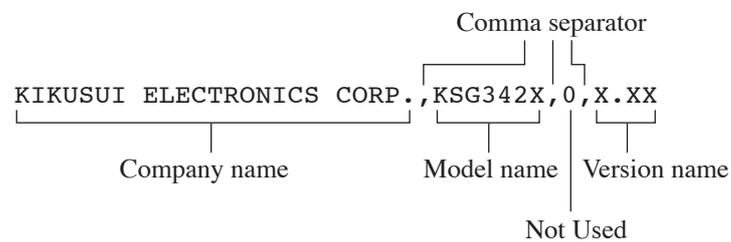


Fig. 4-6 Response Message of *IDN

4.2 Control Using the EXT I/O Connector

4.2.1 Overview

The KSG3420/3421 employs an external control interface for the following three functions.

External control is performed using the EXT I/O connector on the rear panel.

Panel Memory Recall

The address stored in the panel memory can be recalled through external control.

Addresses are recalled using the increment pin and decrement pin of the EXT I/O connector.

8-bit Input Port

The 8-bit data applied to PI0 to PI7 of the EXT I/O connector can be read through panel key operation or GPIB.

8-bit Output Port

8-bit data can be output from PO0 to PO7 of the EXT I/O connector through panel key operation or GPIB.

4.2.2 Description of the EXT I/O Connector Pins

The EXT I/O connector is a 25-pin D-SUB connector (male).

The signal level is TTL.

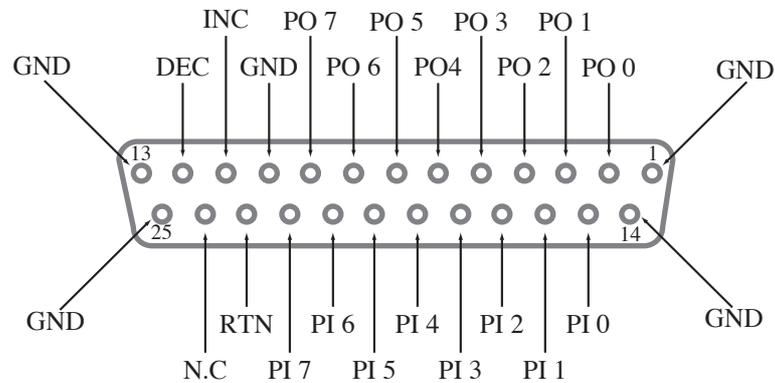


Fig. 4-7 EXT I/O Connector

Table 4-4 EXT I/O Pin Assignments

Pin No.	Name	Direction	Function
1	GND	–	Ground
2 to 9	PO0 to PO7	OUT	8-bit output port
10	GND	–	Signal ground
11	INC	IN	Memory address increment
12	DEC	IN	Memory address decrement
13	GND	–	Ground
14	GND	–	Ground
15 to 22	PI0 to PI7	IN	8-bit input port
23	RTN	IN	Memory address return
24	N.C	–	Reserved pin. Do not connect anything to this pin.
25	GND	–	Ground

NOTE

- Use a shielded 25-pin D-SUB connector and cable to prevent erroneous operation due to noise.
- The input port is pulled up through a 10-kΩ resistor.

4.2.3 Panel Memory Recall

You can recall the memory by modifying the memory address by connecting the increment pin, decrement pin, or return pin of the EXT I/O connector to the GND pin.

NOTE

- The increment, decrement, and return pins modify the address of the currently active memory group.
- Do not connect the INC, DEC, and RTN pins simultaneously to the GND pin.
- Allow at least 0.2 s of interval between recall operations.

Incrementing the Address

Connect the INC pin (pin 11) to the GND pin (pins 1, 13, 14, and 25) to set the INC pin to low. The address is incremented by setting the INC pin to low for at least 1 ms.

Decrementing the Address

Connect the DEC pin (pin 12) to the GND pin (pins 1, 13, 14, and 25) to set the DEC pin to low. The address is decremented by setting the DEC pin to low for at least 1 ms.

Returning the Address

Connect the RTN pin (pin 23) to the GND pin (pins 1, 13, 14, and 25) to set the RTN pin to low. The start address of the currently active memory group is recalled by setting the RTN pin to low for at least 1 ms.

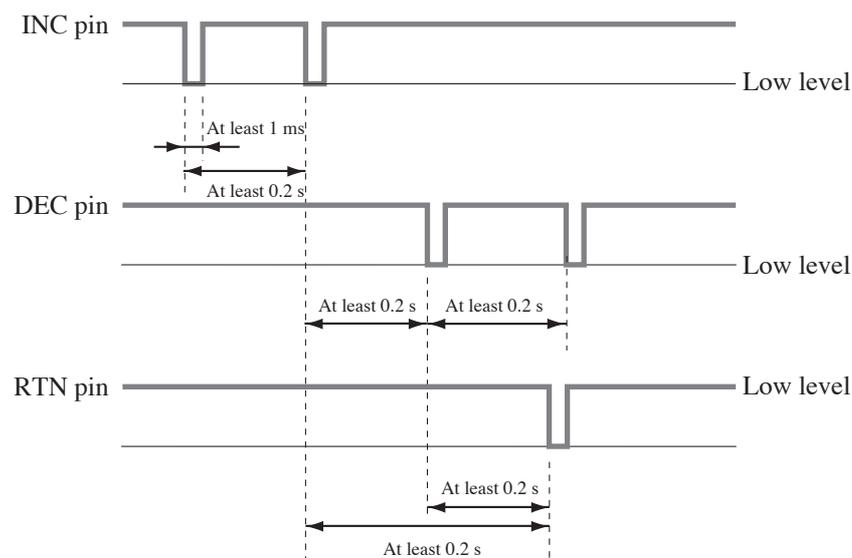


Fig. 4-8 Timing Chart

4.2.4 Data Input/Output

Data Input

The High/Low signal applied to PI0 to PI7 of the EXT I/O connector can be displayed on the LCD monitor.

1. Apply an 8-bit (TTL level) signal to pin PI0 to PI7 of the EXT I/O connector.
2. Press the [2nd] [UTIL] key.
The Utility screen appears.
3. Press the [F3] (<UTL2>) key.
The Utility screen changes as shown in Fig. 4-9.
The applied 8-bit signal is displayed using 2-digit hexadecimal value by I/O In on the screen.

Data Output

The specified 8-bit data can be output to pins PO0 to PO7 of the EXT I/O connector.

1. Press the [2nd] [UTIL] key.
The Utility screen appears.
2. Press the [F3] (<UTL2>) key.
The Utility screen changes as shown in Fig. 4-9.
3. Press the [F1] (I/O Out) key to move the cursor to I/O Out.
4. Enter a 2-digit hexadecimal value using the numeric keypad or rotary knob.
The High/Low signal is output to pins PO0 to PO7 of the EXT I/O connector using positive logic.
The 8-bit data can also be entered beforehand to the panel memory address.



Fig. 4-9 Utility 2 Screen

5

Chapter 5 EON Network Operation

This chapter describes the EON network operation using the GPIB interface.

5.1 Overview

Given a system consisting of multiple KSG3420/3421s and FM-AM Standard Signal Generators (KSG4310/4300) connected via the GPIB interface, EON network operation enables memory operations of other KSG3420/3421s and FM-AM Standard Signal Generators to synchronize to the memory operation of an arbitrary KSG3420/3421.

In addition, tests such as the simulation test of receiver's EON traffic information can be performed simply through the on/off operation of the [TA] panel key. Furthermore, by executing the TA on/off operation using the TA delay function on the Enhanced Other Net.n on/off screen, the TA of the local station can be turned on/off with an arbitrary delay between 0.0 s to 9.9 s. This enables easy operation check of the receiver in a condition similar to the actual field.

5.2 Setting the EON Network Operation

The EON network operation is set using the REMOTE Setup screen and the Address Map of EON System screen, which is under the REMOTE setup screen.

5.2.1 REMOTE Setup Screen

Press the [2nd] key followed by the [ADRS] key to enter the REMOTE Setup screen.

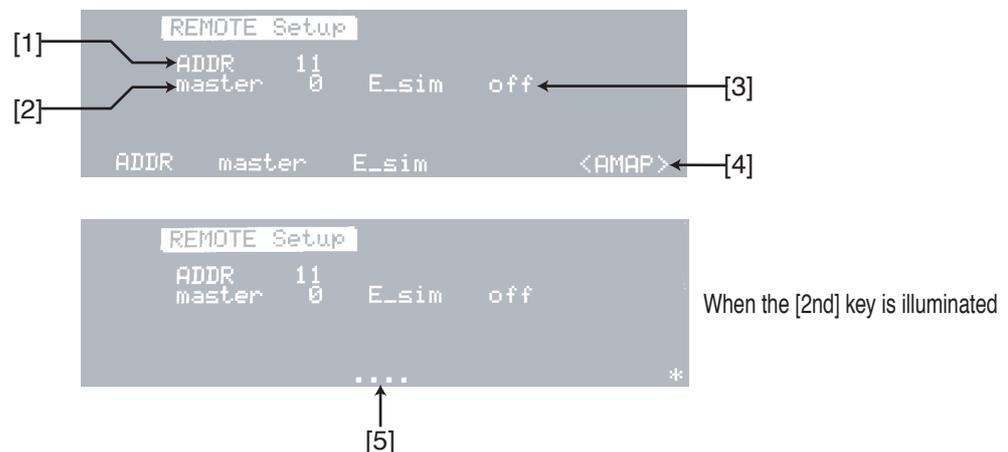


Fig. 5-1 REMOTE Setup Screen

Screen Description

[1] ADDR

Indicates the GPIB address (my address) of this KSG3420/3421.

You can change my address from 0 to 30 using the numeric keypad or rotary knob.

NOTE

- If you change the GPIB address (my address), carry out either of the following operations to activate the new address.
 - Press the [F5] (<AMAP>) key to switch to the Address Map of EON System screen.
 - Power cycle the KSG3420/3421.
-

[2] master

Indicates the GPIB address (master address) of the KSG3420/3421 that is to be the master controller of the EON network operation.

Master controller refers to the KSG3420/3421 that has all my addresses of other KSG3420/3421s in EON01, EON02, and so on on the Address Map of EON System screen.

The master controller address on the REMOTE Setup screen of each KSG3420/3421 must be set to the same address.

You can easily set the master address of all KSG3420/3421s by using the Setup function.

[3] E_sim

Indicates the on/off state of the EON simulation of the network operation.

To perform network operation, set this to “on.” Press the [F3] (E_sim) key to toggle between on and off. You can also use the rotary knob.

You can easily turn on E_sim of all KSG3420/3421s by using the Setup function.

[4] <AMAP>

Switches to the Address Map of EON System Screen in section 5.2.2.

[5] (Setup)

Used to set the master address and E_sim at once from the master controller KSG3420/3421 to all other KSG3420/3421s constructing the network, after setting the Address Map of EON System screen.

After turning on E_sim, press the [2nd] [F3] (Setup) key.

NOTE

- “Setup” appears when the KSG3420/3421 is a master controller (GPIB set to “master”) and E_sim is “on.” In all other cases, “. . . .” is displayed.
-

5.2.2 Address Map of EON System Screen

Press the [F5] (<AMAP>) key on the REMOTE Setup Screen in section 5.2.1 to enter this screen.

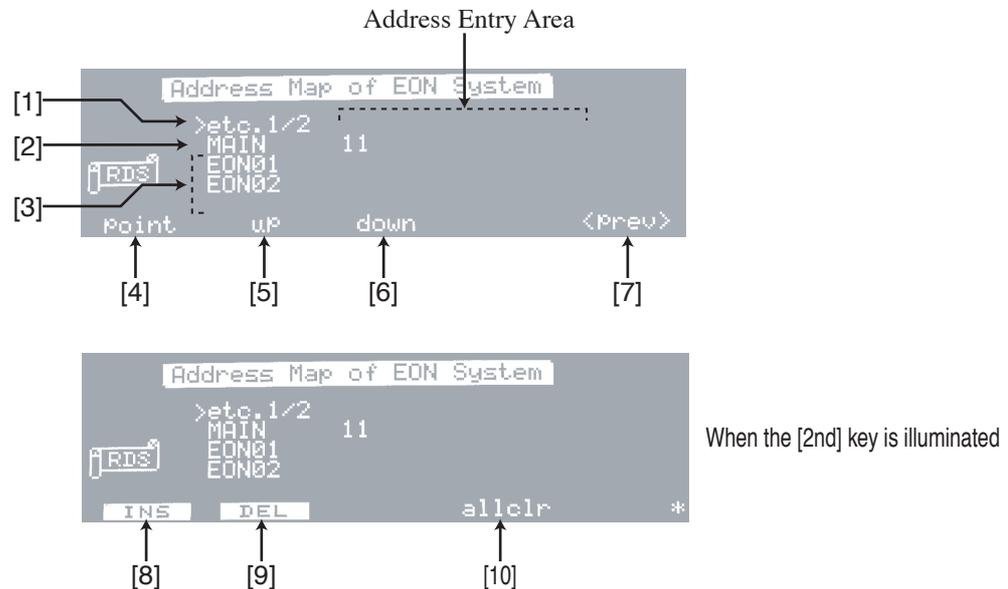


Fig. 5-2 Address Map of EON System Screen

Screen Description

[1] etc.1/2

Indicates the GPIB address of the FM-AM Standard Signal Generators (KSG4310/KSG4300) constructing the network.

You can enter the GPIB address of six units using the numeric keypad or rotary knob.

If the number of FM-AM Standard Signal Generators constructing the network exceeds six units, you can enter the GPIB address of another six units in the entry area of "etc.2/2."

"etc.2/2" is displayed by pressing the [F2] (up) key and scrolling the screen upward.

[2] MAIN

My address is automatically entered.

When the GPIB address of another KSG3420/3421 is entered, the RDS data concerning the TN (Tuned network) of the own unit and the RDS data concerning the TN (Tuned network) of the remote unit are networked.

[3] EONn

If the Other Network data area is already set, EON01, EON02, and so on are displayed for the number of data.

If the Other Network data area is not set such as after an initialization, this is not displayed. For the procedure for setting the Other Network area, see section 3.1.9, “Enhanced Other Net. xx xxx Screen.”

EON01: Enter the GPIB address of other KSG3420/3421s that are to share the EON01 information.

EON02: Enter the GPIB address of other KSG3420/3421s that are to share the EON02 information.

Set other GPIB address in the same fashion.

You can use the numeric keypad or rotary knob to enter the value.

[4] point

Moves the cursor to “>” at the upper-left corner of the screen.

Turning the rotary knob counter-clockwise when the cursor is at “>” scrolls the screen upward; turn the rotary knob clockwise scrolls the screen downward.

[5] up

Scrolls the screen upward.

[6] down

Scrolls the screen downward.

[7] <prev>

Returns to the previous REMOTE Setup screen.

[8] INS

Inserts the GPIB address to the entry area where the cursor is.

The address is inserted from the smallest unused addresses on the Address Map of EON System screen.

You can change to another address using the numeric keypad or rotary knob.

[9] DEL

Deletes the GPIB address at the position where the cursor is.

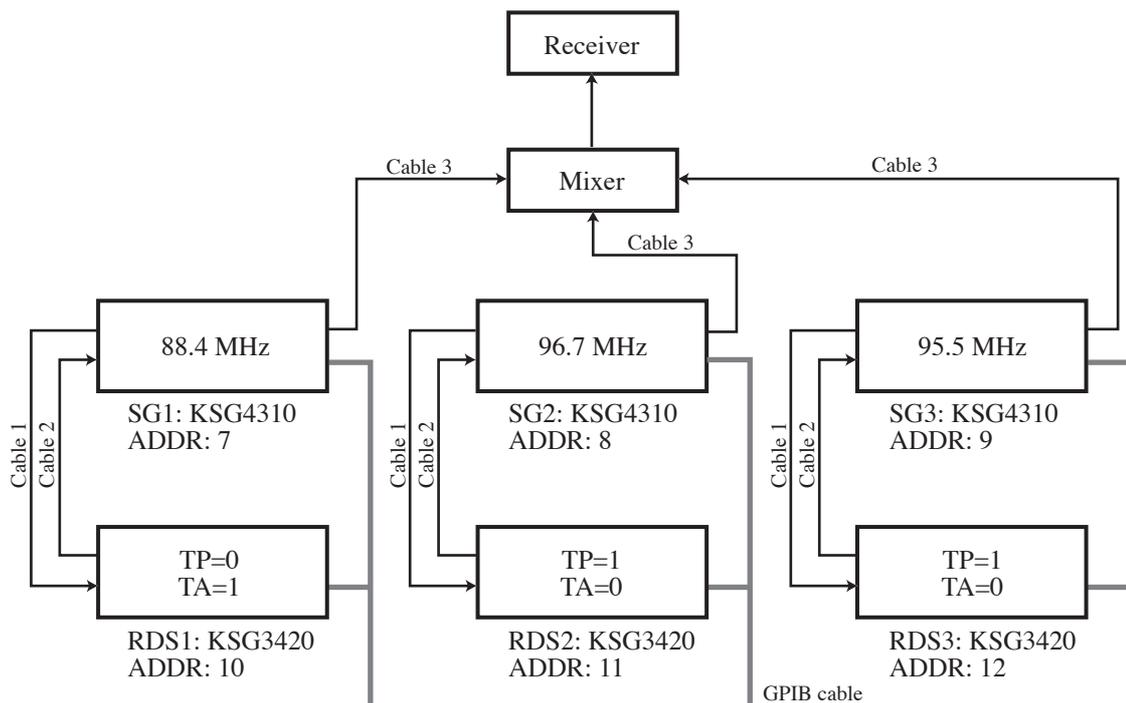
[10] allclr

Deletes all GPIB addresses on the Address Map of EON System screen excluding my address of MAIN [2].

5.3 Simulation Test Example of Receiver's EON Traffic Information

5.3.1 System Configuration Example

The system configuration of Fig. 5-3 assumes the three networks of England, BBC-R2, BBC-Kent, and BBC-Beds. In this example, three sets of KSG3420 and KSG3410 pairs are used.



RDS1 data
 PS: BBC-R2
 PI: C202
 AF: 88.4 MHz, 89.7 MHz

EON1 (RDS2)
 PS: BBC-Kent
 PI: C611
 AF: 96.7 MHz, 104.2 MHz
 TP: 1
 *TA: 0→1→0

EON2 (RDS3)
 PS: BBC-Beds
 PI: C711
 AF: 95.5 MHz, 103.8 MHz

RDS2 data
 PS: BBC-Kent
 PI: C611
 TP: 1
 *TA: 0→1→0

RDS3 data
 PS: BBC-Bets
 PI: C711
 TP: 1
 TA: 0

*: Traffic information flow

Fig. 5-3 System Configuration and Setup Data

■ Connection

Connect the units by referring to Table 5-1 and Fig. 5-3.

Table 5-1 Cables and Connectors

Cable No.	KSG4310	KSG3420	Mixer
Cable 1 (BNC-BNC)	Rear panel PILOT OUT connector	Rear panel PILOT IN connector	—
Cable 2 (BNC-BNC)	Rear panel WIDE BAND INPUT connector	Rear panel COMPOSITE OUT connector	—
Cable 3 (BNC-)	Front panel OUTPUT connector	—	RF input connector
GPIB cable	Rear panel GPIB connector	Rear panel GPIB connector	—

5.3.2 Network Configuration Setup

1. Set parameters such as the FM modulation level, carrier frequency, and output level of each KSG4310.
2. Input RDS data such as PI, PS, AF, and EON to each KSG3420.
RDS1 data BBC-R2 is not a traffic information station (TP=0). RDS2 data BBC-Kent and RDS3 data BBC-Beds are traffic information stations (TP=1).
RDS1 data BBC-R2 is set to TA=1 to indicated that other network information is to be referred.

Next, set the network configuration for network operation.

3. Set the REMOTE Setup screen and Address Map of EON System screen of each KSG3420.
Fig. 5-4 to Fig. 5-6 show the REMOTE Setup screens and Address Map of EON System screens of KSG3420s (RDS1 to RDS3) corresponding to the system configuration example of Fig. 5-3
Set RDS1 to master controller.
4. Turn on E_sim of master controller RDS1 and press the [2nd] [F3] (Setup) key.
The master address of RDS2 and RDS3 are set and E_sim is turned on.

5.3.2 Network Configuration Setup (Continued)

```
REMOTE Setup
ADDR 10
master 10 E_sim off
RDS
ADDR master E_sim <AMAP>
```

```
Address Map of EON System
>etc.1/2 7 8 9
MAIN 10:
RDS EON01 11
EON02 12
Point uP down <Prev>
```

Fig. 5-4 RDS1 (ADDR 10) Screen

NOTE

- A colon (:) is appended to the master address on the Address Map of EON System screen.
 - RDS1 is a master controller, because the Address Map of EON System screen contains my addresses (addresses 7 to 12) of all other KSG3420s (RDS2 and RDS3).
-

```
REMOTE Setup
ADDR 11
master -- E_sim off
RDS
ADDR master E_sim <AMAP>
```

```
Address Map of EON System
>etc.1/2 7 8 9
MAIN 11
RDS
Point uP down <Prev>
```

Fig. 5-5 RDS2 (ADDR 11) Screen

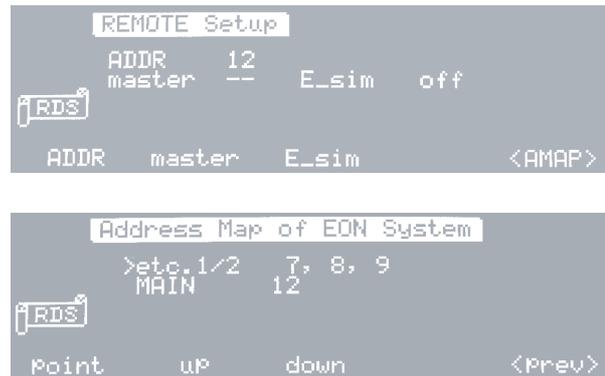


Fig. 5-6 RDS3 (ADDR 12) Screen

5.3.3 Traffic Information Simulation Test

We assume that the receiver is receiving 88.4 MHz of RDS1 data BBC-R2.

Press the [TA] key of RDS2 data BBC-Kent and turn the traffic information on (=1). The [TA] of the EON1 data of BBC-R2 that is currently received is set to "1," and the receiver detects the start of traffic information on BBC-Kent. Since EON1 AF is set to 96.7 MHz and 104.2 MHz, the receiver tunes to the AF with the strongest signal. In the system of Fig. 5-3, the receiver tunes to 96.7 MHz. When the [TA] key of BBC-Kent is turned off (=0), the receiver returns to BBC-R2.

If you press the [TA] key of RDS3 data BBC-Beds and turn on the traffic information, the receiver operates in a similar fashion and tunes to 95.5 MHz. When the [TA] key is turned off, the receiver returns to BBC-R2.

As described above, simulation tests can be performed by simply pressing the [TA] key of the traffic information station.

5.3.4 Network Operation of RDS Data Other than TA

In addition to the TA of section 5.3.3, "Traffic Information Simulation Test" changes, other RDS data in the network configuration also changes. For example, if you change PI of RDS2 data BBC-Kent from C611 to C725, PI of the EON2 data related to BBC-Kent of RDS1 data BBC-R2 is automatically changed to C725.

This hold true for TP, PTY, PIN, and PS.

5.4 Synchronization of Memory Operation

If you perform a store or recall operation on any KSG3420/3421 in the system, store or recall operation is performed on all other KSG3420/3421s and FM-AM Standard Signal Generators in sync.

For example, if you perform a store or recall operation on RDS2 (KSG3420) in the system shown in Fig. 5-3, store or recall operation is also performed on RDS1, RDS3, SG1, SG2, and SG3.

6

Chapter 6 Names and Functions of Parts

This chapter describes the names and functions of switches, displays, connectors, and other parts of the front panel and rear panel.

Read this chapter to learn about the details of the  (alert) marks indicated on the panel.

6.1 Front Panel

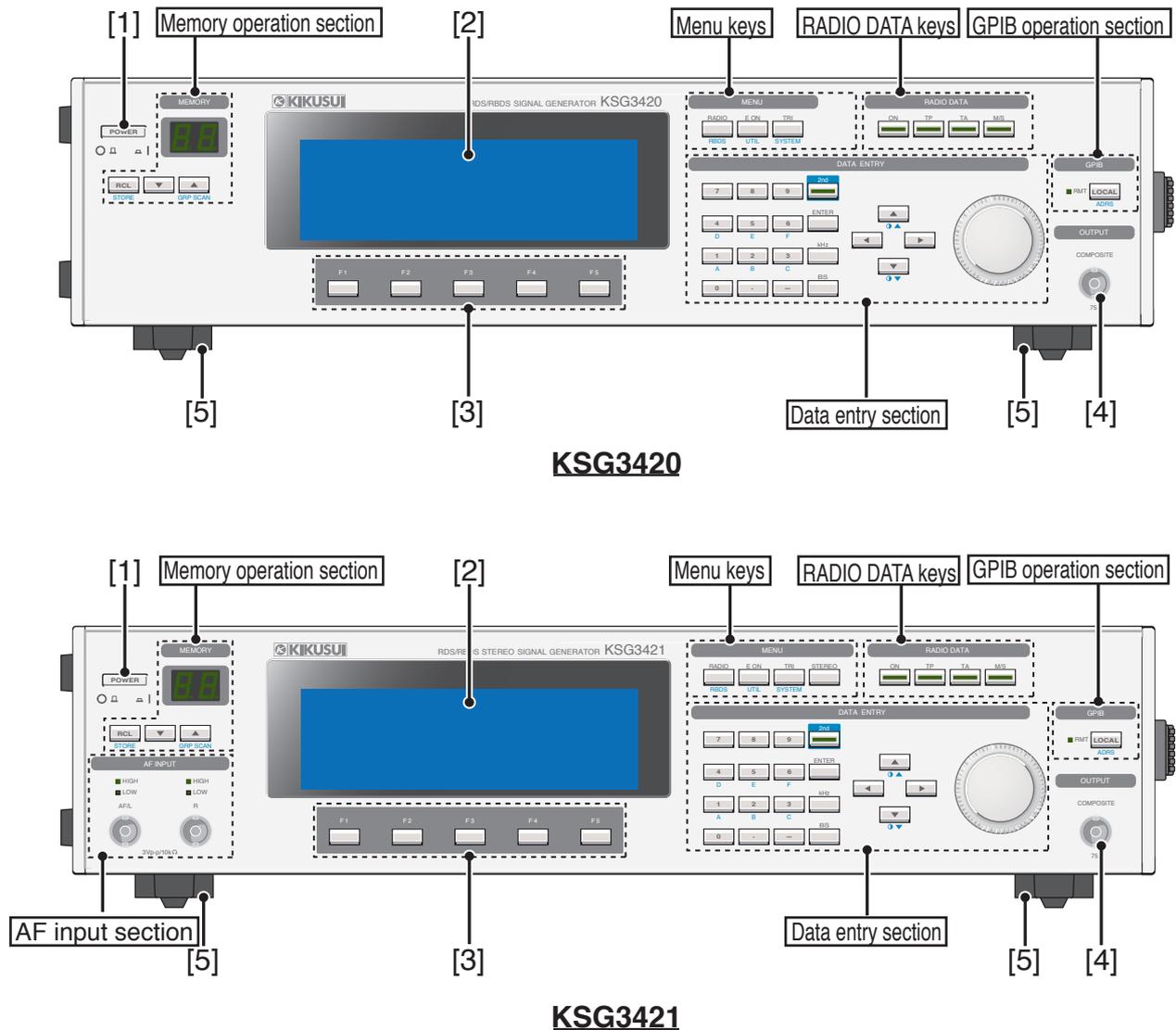


Fig. 6-1 Front Panel

[1] POWER switch

This is the power switch to the KSG3420/3421. When the switch is depressed (I), the power is on; when switch is out (O), the power is off.

When the power is turned on, all LEDs on the front panel illuminate, and the LCD displays the condition that existed immediately before the power was turned off. However, the HIGH/LOW LED of the AF input section does not illuminate.

[2] LCD

Displays various preset values for generating the signal.

[3] F1 to F5 keys (function keys)

Used to move the cursor on the LCD and to switch between screens.

[4] COMPOSITE output connector

Output connector for the composite signal consisting of the stereo signal (KSG3421 only), RDS/RBDS signal, and TRI signal.

Since the output impedance is approximately 75Ω , the signal can be supplied to standard FM signal generators and transmitters with high or low input impedance.

The output level ranges from 1.5 Vp-p to 10 Vp-p.

[5] Stand

The stand is used to tilt the front panel for easier viewing of the screen and improving the operability of the keys.

Memory Operation Section

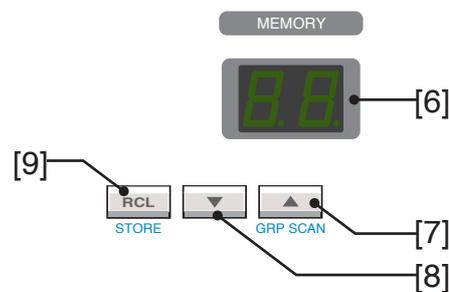


Fig. 6-2 Memory Operation Section

[6] Memory address indicator

Displays the row and column of the memory address arranged in a matrix. The left value indicate the row; the right value indicate the column.

Data can be stored continuously to 100 points (00 to 99) or as 10 blocks of 10 points each. The preset values of signal data and panel key settings can be stored to memory.

[7] ▲ /GRP SCAN key

Moves the memory address column one step forward.

When the [2nd] key of the data entry section is illuminated, this key is used to sequentially recall the specified memory group.

[8] ▼ key

Moves the memory address column one step back.

[9] RCL/STORE key

This key is used to recall data stored in the memory.

When the [2nd] key of the data entry section is illuminated, this key is used to store data to the memory.

AF Input Section (KSG3421 only)

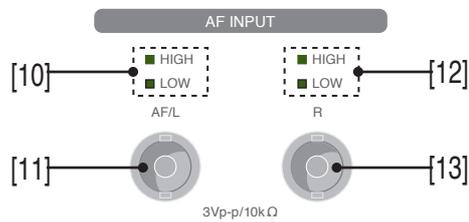


Fig. 6-3 AF Input Section

[10] AF/L HIGH/LOW LED

Checks the appropriate input level (approx. 3 V_{p-p}) of the external modulation signal that is connected to the AF/L input connector.

When the level of the external modulation signal source is too low, the LOW LED illuminates; when the level is too high, the HIGH LED illuminates.

[11] AF/L input connector

This connector has two purposes depending on the mode.

1. External modulation signal input connector (AF)

When “Source” is set to EXT on the Stereo screen, this connector becomes an input connector for the case when modulation is performed using a single external modulation signal.

2. External stereo modulation signal input connector

When “Channel” is set to EXT L/R on the Stereo screen, this connector becomes the left stereo modulation signal input connector in the case when modulation is performed using two external modulation signals L and R.

[12] R HIGH/LOW LED

Checks the appropriate input level (approx. 3 V_{p-p}) of the external modulation signal that is connected to the R input connector.

When the level of the external modulation signal source is too low, the LOW LED illuminates; when the level is too high, the HIGH LED illuminates.

[13] R input connector

When “Source” is set to EXT L/R on the Stereo screen, this connector becomes the right stereo modulation signal input connector in the case when modulation is performed using two external modulation signals L and R.

Menu Keys

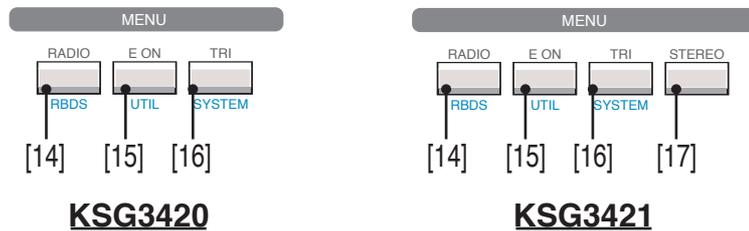


Fig. 6-4 Menu Keys

[14] RADIO/RBDS key

Displays the Radio Data System main screen.

Each time this key is pressed, the Radio Data System main RDS screen and the Radio Data System main RBDS screen toggle.

If you press this key when the [2nd] key of the data entry section is illuminated, the Modified MBS information screen appears.

[15] EON/UTIL key

Displays the Enhanced Other Net. xx xxx screen.

If you press this key when the [2nd] key of the data entry section is illuminated, the Utility screen appears.

[16] TRI/SYSTEM key

Displays the Traffic Radio Information screen.

If you press this key when the [2nd] key of the data entry section is illuminated, the Radio Data System SYS screen appears.

[17] STEREO key (KSG3421 only)

Displays the Stereo screen.

RADIO DATA Keys

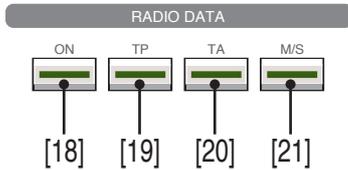


Fig. 6-5 RADIO DATA Keys

[18] ON key

Switch used to turn on/off the RDS/RBDS signal (57-kHz carrier suppression DSB signal). When illuminated, it is on.

[19] TP key

Switch used to change the “TP” bit within the RDS/RBDS signal group data.

[20] TA key

Switch used to change the “TA” bit within the RDS/RBDS signal group data.

[21] M/S key

Switch used to change the “M/S” bit within the RDS/RBDS signal group data.

Data entry section

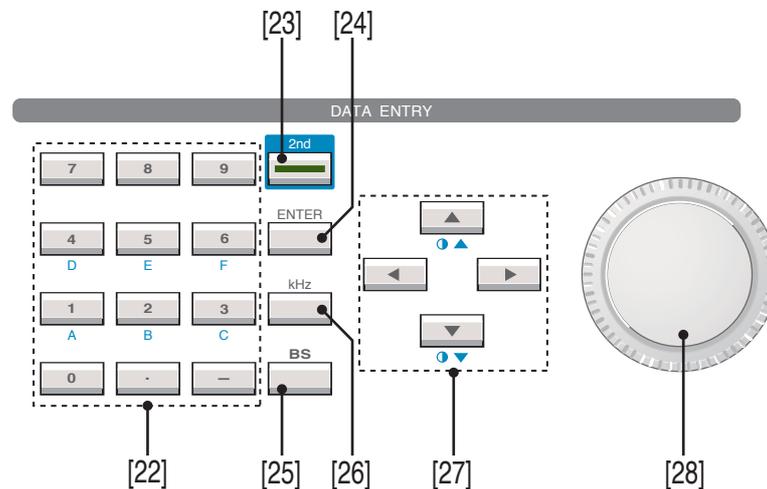


Fig. 6-6 Data Entry Section

[22] Numeric keypad

Keys used to enter values (0 to 9) and symbols (*, -).

[23] 2nd key

If you press this key followed by a key with a blue indication on the panel, the function indicated in blue is executed.

[24] ENTER key

Confirms the entered value. However, this key is not required when setting MEMORY or when using the rotary knob to set values.

If a value outside the range is entered, pressing this key does not confirm it, and the value returns to the original value.

[25] BS key

This is the backspace (BS) key. This key is used to correct the data when entering values.

If this key is pressed when the [2nd] key of the data entry section is illuminated, the data entry area is cleared if data is being entered. In other cases, the LCD backlight is turned off.

[26] kHz key

Confirms the entered value as kHz. This key is valid when setting a frequency.

[27] Direction/contrast key

Used to move the cursor on the LCD.

If you press this key when the [2nd] key of the data entry section is illuminated, the LCD contrast is adjusted by a single step. To adjust the LCD contrast continuously, press the [2nd] key and the [◂] or [▸] key at the same time.

[28] Rotary knob

Used when changing the setting at the cursor position.

GPIB Operation Section

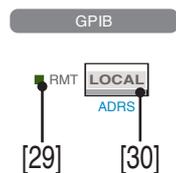


Fig. 6-7 GPIB Operation Section

[29] RMT LED

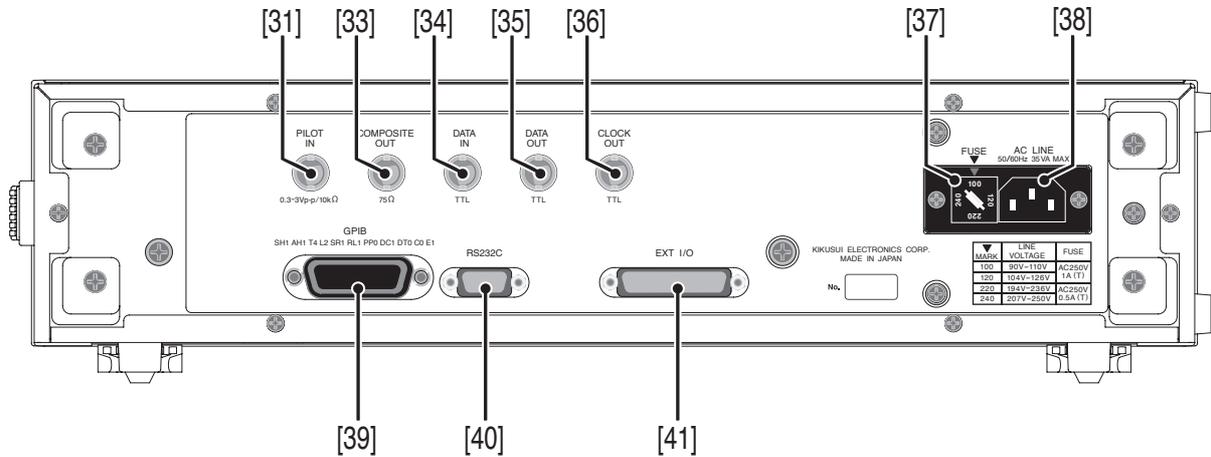
Illuminates in remote control mode, turns off in local mode.

[30] LOCAL/ADRS key

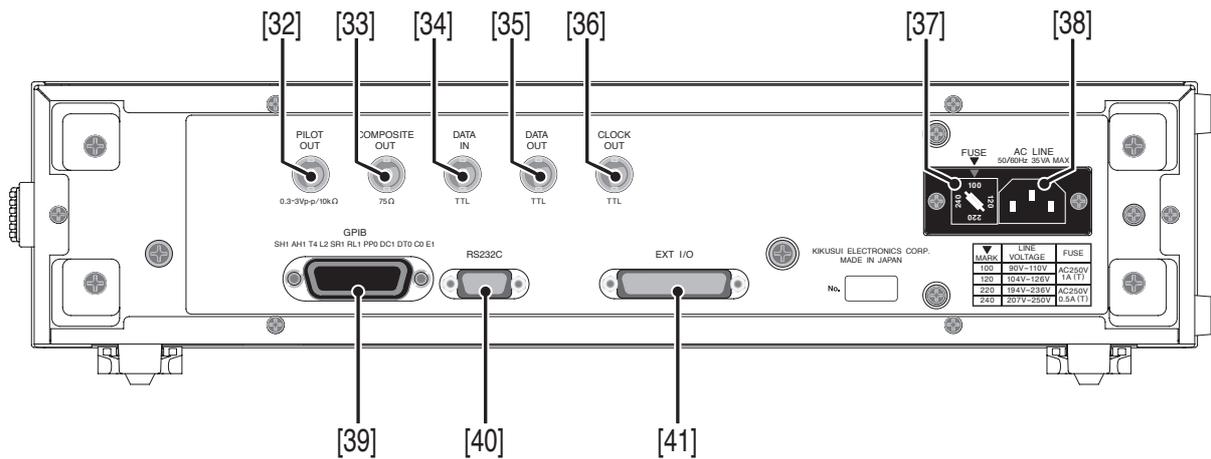
Sets the remote control mode back to local control mode. However, this key does not operate in the local lockout condition.

If you press this key when the [2nd] key of the data entry section is illuminated, the REMOTE Setup screen appears.

6.2 Rear Panel



KSG3420



KSG3421

Fig. 6-8 Rear Panel

[31] PILOT IN connector (KSG3420 only)

19-kHz pilot signal input connector.

The RDS/RBDS signal is generated from the 57-kHz subcarrier synchronized to the pilot signal.

“Unlock Pilot” appears at the upper left corner of the LCD when the 57-kHz subcarrier cannot be synchronized such as when there is no pilot signal input or when the frequency is off from 19 kHz.

[32] PILOT OUT connector (KSG3421 only)

19-kHz pilot signal output connector.

The stereo signal and RDS/RBDS signal are generated from the sub-carrier synchronized to the pilot signal.

[33] COMPOSITE OUT connector

Outputs the same signal as the COMPOSITE output connector on the front panel.

When using Kikusui's KSG4310 as a FM modulation signal generator, this connector on the rear panel can be connected to each other.

[34] DATA IN connector

Data input connector when applying RDS/RBDS data externally.

[35] DATA OUT connector

BNC connector that outputs RDS/RBDS data at TTL levels.

[36] CLOCK OUT connector

Clock output connector for synchronization when applying RDS/RBDS data externally.

When applying RDS/RBDS data to the DATA IN connector, enter the data by synchronizing to this signal.

[37] Fuse holder

Fuse holder for input power. It also functions as a selector for input voltage range.

Use a fuse that match the input power voltage. The applicable fuses are inscribed in the LINE VOLTAGE table on the rear panel.

[38] AC LINE connector ⚠

Used to connect the input power cord.

-
- ⚠ WARNING**
- Improper handling can lead electric shock. When connecting the input power connector, be sure to read section 1.5, "Connecting the Power Cord."
 - For your safety, be sure to ground the unit. For details, see section 1.6, "Grounding."
-

[39] GPIB connector

Connector used for GPIB control.

[40] RS-232C connector

Connector used for RS-232C control.

[41] EXT I/O connector

Connector used to remotely control the panel operations.



7

Chapter 7 Maintenance

This chapter describes maintenance and calibration of the KSG3420/3421. It also describes troubleshooting measures when you suspect that malfunction has occurred while using the KSG3420/3421.

-
- ⚠ WARNING** • Some parts inside the product may cause physical hazards. Do not remove the external cover.
-

7.1 Cleaning

-
- ⚠ WARNING** • Make sure to turn off the POWER switch and unplug the power cord.
-

Cleaning the Panels

If the panel needs cleaning, gently wipe using a soft cloth with water-diluted neutral detergent.

-
- ⚠ CAUTION** • Do not use volatile solvents such as thinner or benzine. Using such solvents can cause discoloration of the panel surface, erasure of printed letters, and clouding of the LCD.
-

7.2 Inspection

Power Cord

Check that the insulation coating is not broken and that the plug is not cracked or falling apart.

-
- ⚠ WARNING** • Make sure to turn off the POWER switch and unplug the power cord.
- Breaks in the insulation coating may cause electric shock. If a break is found, stop using it immediately.
-

To purchase accessories, contact your Kikusui agent or distributor.

7.3 Calibration

The unit is calibrated at the factory before shipment. However, periodic calibration is necessary due to changes that occur after extended use.

For calibration, contact your Kikusui agent or distributor.

7.4 Backup Battery

The KSG3420/3421 employs a lithium battery for memory backup.

The battery life depends on the operating conditions. Three years after purchase is a good estimation. If the panel settings are different at the time the power is turned off and at the time the power is turned on again, the battery is already dead.

To replace the battery, contact your Kikusui agent or distributor.

7.5 Malfunctions and Causes

This section describes remedies for malfunctions encountered during the use of the unit.

Representative symptoms and their possible check items are indicated. Look for the item that corresponds to your case. In some cases, the problem can be solved quite easily.

If you find an item that corresponds to your case, follow the remedy for the item. If the remedy does not solve the problem or if your case does not match any of the items, contact your Kikusui agent.

Symptom 1: Nothing appears on the LCD.

Check Item	Cause and Remedy
<input type="checkbox"/> The fuse is blown.	<ul style="list-style-type: none">• See section 1.4, “Checking the Input Power and Fuse,” and replace the fuse with a new one.
<input type="checkbox"/> The input line voltage range setting is incorrect	<ul style="list-style-type: none">• See section 1.4, “Checking the Input Power and Fuse,” and select the correct voltage range.
<input type="checkbox"/> The LCD backlight is turned off.	<ul style="list-style-type: none">• Press one of the panel keys or turn the rotary knob. The LCD backlight turns back on.

Symptom 2: When an external AF signal is input, the composite output clips. (KSG3421 only)

Check Item	Cause and Remedy
<input type="checkbox"/> The HIGH/LOW LED is on.	<ul style="list-style-type: none">• The external AF input is not at the appropriate level. Set the external AF input level to 3 V_{p-p}.
<input type="checkbox"/> Pre-emphasis is on.	<ul style="list-style-type: none">• If pre-emphasis is on and a frequency higher than 400 Hz is input, the composite output may clip. Turn off the pre-emphasis.



8

Chapter 8 Specifications

This chapter describes the electrical and mechanical specifications of the KSG3420/3421 and accessories.

8.1 Specifications

RDS/RBDS Signal Generation Block

Sub-carrier	Frequency	57 kHz	
	Frequency accuracy	±0.01 %	
	Suppression ratio	50 dB or more	
	Phase	Setting	0° or 90° with respect to the 3rd harmonic of the pilot signal
		Variable range	±10°
		Resolution	1°
Switching function		ON/OFF of the TP, TA, MS, and RDS signals	
Data output	Group type	0A to 15B and user-defined groups	
	Connector	BNC connector on the rear panel, TTL level*1	
	Pattern	All0, All1, and PN9	
	Polarity	Positive or negative	
Clock output	Connector	BNC connector on the rear panel, TTL level*1	
	Frequency	1.1875 kHz	
	Frequency accuracy	±0.01 %	
	Polarity	Positive or negative	
Data input	Connector	BNC connector on the rear panel, TTL level*1	
	Polarity	Positive or negative	
RDS signal output	Level	0.00 % to 10.00 % of the prescribed output level	
	Level resolution	0.01 %	
	Setting accuracy	±5 % (prescribed output level 10 Vp-p, when level is 10.00 %)	
Pilot signal input*2	Center frequency	19 kHz	
	Frequency range	±0.02 % from the center frequency	
	Connector	BNC connector on the rear panel	
	Level range	0.3 V to 3 Vp-p	
	Impedance	10 kΩ ±1 kΩ	
Pilot signal output*3	Center frequency	19 kHz	
	Frequency accuracy	±0.01 %	
	Connector	BNC connector on the rear panel	
	Level	3 Vp-p	
	Level accuracy	±10 %	
	Impedance	600 Ω	
	Impedance accuracy	±10 %	

*1 TTL level is 0 V to 1 V for low and 3.5 V to 5 V for high.

*2 KSG3420 only

*3 KSG3421 only

Composite signal output	Connector	BNC connectors on the front and rear panels
	Prescribed output level	1.5 V to 10 V _{p-p} , EMF, 10-mV steps
	Impedance	75 Ω
	Impedance accuracy	±10 %

TRI Signal Generation Block

SK Transmitter identification signal	Frequency		57 kHz
	Frequency accuracy		±0.01 %
	Modulation level	Range	0 % to 10 %
		Resolution	0.1 %
Accuracy		±2 % (prescribed output level 10 V _{p-p} , when level is 10.00 %)	
DK Announce identification signal	Modulation frequency		125 Hz (pilot signal frequency × 3/456)
	Modulation level	Range	0 % to 40 %
		Resolution	1 %
		Accuracy	±5 % (at 40 % modulation)
Distortion factor		0.8 % or less (demodulation bandwidth of 15 Hz to 15 kHz)	
BK Area identification signal	Modulation frequency	A	23.75 Hz (pilot signal frequency/800)
		B	28.27 Hz (pilot signal frequency/672)
		C	34.93 Hz (pilot signal frequency/544)
		D	39.58 Hz (pilot signal frequency/480)
		E	45.67 Hz (pilot signal frequency/416)
		F	53.98 Hz (pilot signal frequency/352)
	Modulation level	Range	0 % to 80 %
		Resolution	1 %
		Accuracy	±5 % (at 80 % modulation)
	Distortion factor		0.8 % or less (demodulation bandwidth of 15 Hz to 15 kHz)
Area selection		Numeric keypad and rotary knob	
Area scan function	Interval setting		0.1 s to 12.0 s
	Resolution		0.1 s
	Skip		Able to set pass on each area

FM Stereo Modulation Block (KSG3421 only)

Pre-emphasis		OFF, 25 μ s, 50 μ s, and 75 μ s
Mono, Main, L, R, and Sub signals	Modulation factor	0 % to 125 % of the prescribed output level
	Resolution setting	0.1 %
	Accuracy setting	\pm 5 % (prescribed output level 10 V _{p-p} , when level is 100 %)
Pilot signal	Frequency	19 kHz
	Frequency accuracy	\pm 0.01 %
	Amplitude range	0 % to 15 % of the prescribed output level
	Resolution setting	0.1 %
	Accuracy setting	\pm 5 % (prescribed output level 10 V _{p-p} , when level is 10 %)
Distortion factor		0.01 % or less (for INT signal from 20 Hz to 20 kHz) 0.02 % or less (for EXT signal from 20 Hz to 15 kHz)
S/N ratio		86 dB or more, at bandwidth of 20 Hz to 30 kHz
Separation		66 dB or more (AF = 400 Hz or 1 kHz) 60 dB or more (AF = 20 Hz to 15 kHz)
External modulation signal	Input connector	BNC connector on the front panel
	Frequency characteristics	20 Hz to 15 kHz Within \pm 0.5 dB (1 kHz reference)
	Rated input voltage	3 V _{p-p}
	HIGH/LOW monitor	Turns off within \pm 2 % of the rated input voltage
	Input impedance	10 k Ω
	Input impedance accuracy	\pm 10 %
Internal modulation signal	Frequency	20 Hz to 20 kHz sine wave
	Resolution setting	10 Hz
	Frequency accuracy	\pm 0.01 %

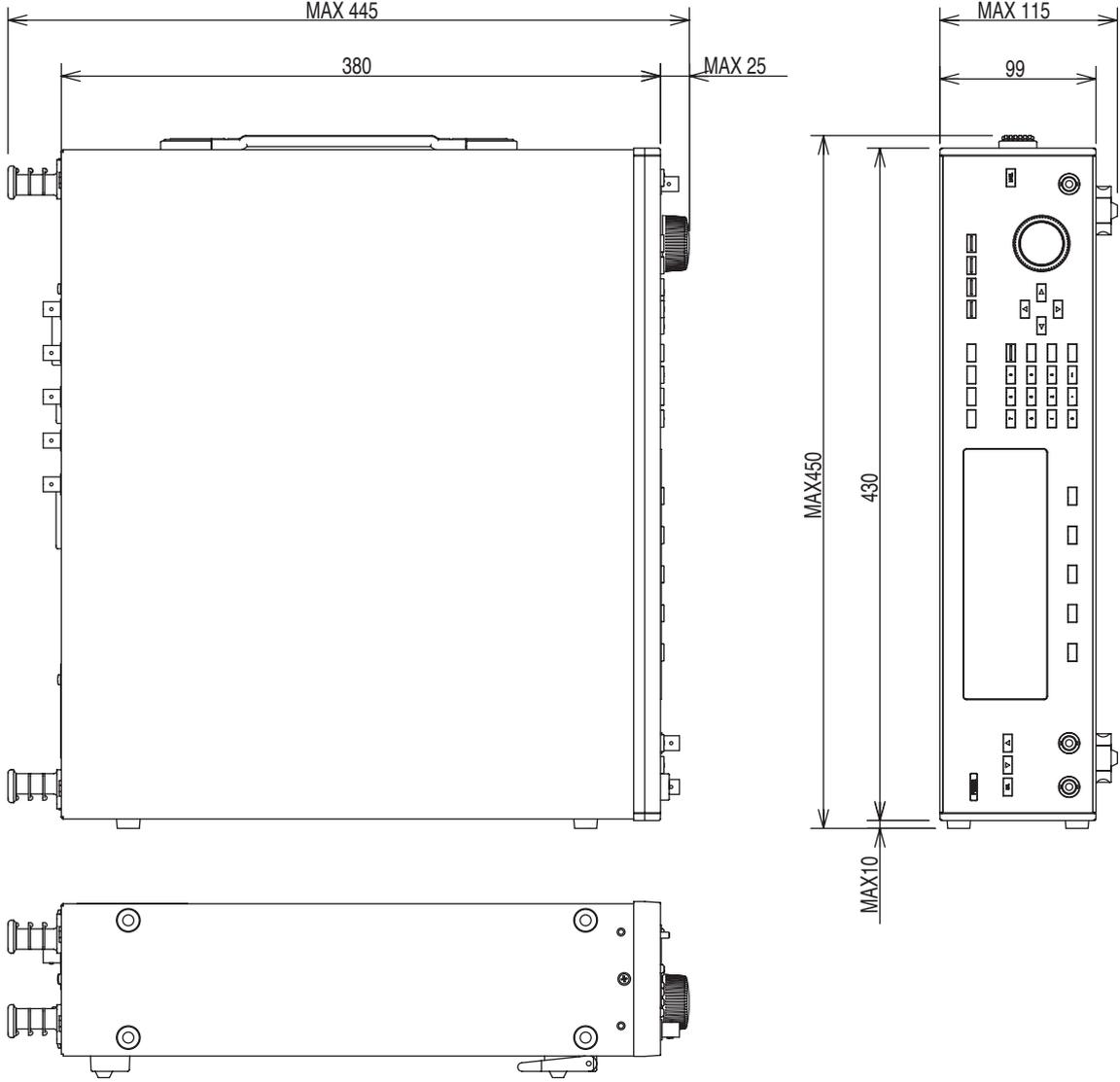
External Interface and Memory

GPIB		IEEE std. 488-1978 SH1, AH1, T4, L2, SR1, RL1, PP0, DC1, DT0, C0, E1
RS-232C	Baud rate	9 600 bps
	Data length	8 bits
	Stop bit	1 bit
	Parity	None
External control	Connector	25-pin D-SUB connector on the rear panel
	Signal level	TTL level I/O
	Control items	8-bit input/output Memory UP/DOWN Return
Memory function		Stores and recalls 10 points ×10 or 100 continuous points of setup status

General Specifications

Spec guarantee temperature/humidity range	Temperature	15 °C to 35 °C	
	Humidity	20 % to 85 % RH (no condensation)	
Operating temperature/humidity range	Temperature	0 °C to 40 °C	
	Humidity	20 % to 85 % RH (no condensation)	
Storage temperature/humidity range	Temperature	-10 °C to 60 °C	
	Humidity	Less than or equal to 90 % RH (no condensation)	
Warm-up period		At least 30 minutes	
Allowable line voltage range		90 V to 110 V, 104 V to 126 V 194 V to 236 V, 207 V to 250 V	
Allowable line frequency range		45 Hz to 65 Hz	
Maximum power consumption		35 VA maximum	
Dimensions		See outline drawing.	
Weight		Approx. 6.5 kg	
Battery backup		Backs up setup information	
Safety		Complies with the following standard. IEC61010-1:1990-09 / A2:1995-07 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use Designed as a Class I instrument connected to a power supply classified as Overvoltage Category I or II under Pollution Degree 2 environment.	
Accessories		Power cord	×1
		Operation manual	×1
		Users manual	×1
		CD	×1
		Fuse	1 A(T), AC250 V
	0.5 A(T), AC250 V	×2	

8.2 Outline Drawing



Unit: mm

Appendix

Device Messages

■ Special symbols and characters

Special symbols and characters used in this manual to describe program messages and response messages are defined as in Table A-1.

Table A-1 Definitions of special symbols and characters

Symbol and Character	Description
<>	Characters and numbers enclosed by these symbols indicate program data.(*1)
[]	Characters and numbers enclosed by brackets indicate that they can be omitted.(*1)
{ }	Characters and numbers delimited by " " in braces indicate that one of the items is to be selected.(*1)
–	Denotes a space.
c	Denotes a single alphanumeric character that is not a white character. (*2)
s	Denotes an alphanumeric character string that is not a white character. (*2)
n	Denotes an integer with arbitrary number of digits.
d	Denotes a single numeric character from 0 to 9.
h	Denotes a single hexadecimal digit expressed using a number from 0 to 9 or an alphabet from A to F.
...	Denotes that the previous program data or response data is to be repeated.
->	Response data is returned following this symbol.

NOTE

*1 Do not include the enclosing characters in the actual program.

*2 Indicates the ASCII characters less than or equal to a space (20 H).

Messages Related to the Radio Data System main Screen

Table A-2

MODE		Switches the mode to RDS or RBDS or queries the setting.
MODE<{RDS RBDS}>		
MODE?	->{RDS RBDS}	
PI		Sets the program ID code or queries the setting.
PI<[hhh]h>		0000 to FFFF. 0 if omitted.
PI?	->hhhh	
PIN		Sets the program ID number or queries the setting.
PIN<[d]d-[d]d-[d]d>		Day: 00 to 31, hour: 00 to 31, minute: 00 to 63. 0 if omitted.
PIN?	->dd-dd-dd	
PS		Sets the program service name or queries the setting.
PS<{ _ d }c [ccccccc]>		
	{ _ d }	Space, 0 to 2
	c [ccccccc]	Eight ASCII characters from 20 to FF. 20 H if omitted.
PS?	->{ _ d }cccccccc	
PTY		Sets the program type or queries the setting.
PTY<n>		0 to 31
PTY?	->n	
TA		Sets the announce ID for traffic information or queries the setting.
TA<{ ON OF d }>		
	{ ON OF }	On/off setting of the TA panel key
	d	0 to 9
TA?	->{ ON OF }_d	
TP		Sets the "TP" bit within the RDS/RBDS signal group data or queries the setting.
TP<{ ON OF }>		On/off setting of the TP panel key
TP?	->{ ON OF }	
MS		Sets the "M/S" bit within the RDS/RBDS signal group data or queries the setting.
MS<{ ON OF }>		On/off setting of the M/S panel key
MS?	->{ ON OF }	
OT		Turns on/off the RDS/RBDS signal or queries the setting.
OT<{ ON OF }>		On/off setting of the ON panel key
OT?	->{ ON OF }	

Messages Related to the Group Sequence Screen

Table A-3

CLGRP	Deletes the group sequence data when the screen is other than the Enhanced Other Net.n on/off screen.	
GRP	Sets the group sequence or queries the setting.	
	GRP<n{A B}[, ···]>	0 ≤ n ≤ 15, A or B
	GRP? ->n{A B}[, ···]	

Messages Related to the Radiotext Screen

Table A-4

RT	Enters the radio text or queries the setting.	
	RT<{A B}s>	
	{A B}	A: flag A, B: flag B
	s	0A, 0D or 20 to FF, up to 64 characters.
	RT? ->{0 1}s	

Messages Related to the Radio Data System sub Screen

Table A-5

MJD	Sets the MJD or queries the setting.	
	MJD<dddd-dd-dd_dd:dd: {_ -}dd.d>	
		Year-month-day_hour:minutes:offset time
	dddd-dd-dd	1900-03-01 to 2100-02-28
	_dd:dd	00 to 31, 00 to 63
	: {_ -}dd.d>	±15.5, _ (space): positive offset, -: negative offset
	MJD? ->dddd-dd-dd_dd:dd: {_ -}dd.d	
CT	Sets the CT or queries the setting.	
	CT<{ON OF}>	
	CT? ->{ON OF}	ON: CT on, OF: CT off
DI	Sets the decoder ID or queries the setting.	
	DI<d>	
	DI? ->d	0 to 7

Messages Related to the Simulation Screen

Table A-6

SPS	Sends a single group of data by reading.
SP0	Returns from data transmission to the normal condition.

Messages Related to the AF.main Screen

Table A-7

CLAF	Deletes AF data.	
AFM	Sets the method or queries the setting.	
	AFM<{A B}>	A: Method A, B: Method B
	AFM?	->{A B}
AFA	Sets the AF data of Method A or queries the setting.	
	AFA<{n.n *n.n n.n: nK} [, ···]>	
	n.n	FM band frequency (87.5 MHz to 107.9 MHz).
	" * "	FM band frequency in the Adjacent-Region
	" : "	Denotes the frequency of the main transmitter that is output in pairs with the Number of freq code.
	nK	MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.
		Resolution FM band: 0.1 MHz, MF band or LF band: 9 kHz
	AFA?	->A{n.n *n.n n.n: nK} [, ···]
AFB	Sets the AF data of Method B or queries the setting.	
	AFB<{n.n *n.n n.n: nK} [, ···]>	
	n.n	FM band frequency (87.5 MHz to 107.9 MHz).
	" * "	FM band frequency in the Adjacent-Region
	" : "	Header frequency
	nK	MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.
		Resolution FM band: 0.1 MHz, MF band or LF band: 9 kHz
	AFB?	->B{n.n *n.n n.n: nK} [, ···]

Messages Related to the Other Group.main Screen

Table A-8

CLOGP	Deletes the Other Group.	
	CLOGP<{nA nB UD1 UD2}>	
	nA	Other Group 1A, 3A, 4A to 13A, and 15A
	nB	Other Group 1B, 3B, and 4B to 13B
	UD1	User-defined group type UD1
	UD2	User-defined group type UD2
OGP	Sets the Other Group data or queries the setting.	
	OGP<{nA nB UD1 UD2} [hhh] h[, ...]>	
	{nA nB UD1 UD2}	
	nA	Other Group 1A, 3A, 4A to 13A, and 15A
	nB	Other Group 1B, 3B, and 4B to 13B
	UD1	User-defined group type UD1
	UD2	User-defined group type UD2
	[hhh] h[, ...]	Varies depending on the group type.
		1A: hh,hhhh
		1B: hh
		4A: hh
		3A, 5A to 13A, 15A: hh,hhhh,hhhh
		3B to 13B: hh,hhhh
		UD1, UD2: hhhh,hhh,hhhh,hhh,hhhh,hhh,hhhh,hhh
	OGP {nA nB UD1 UD2} ?	
	->{nA nB UD1 UD2} [hhh] h[, ...]	

Messages Related to the Program Type Name Screen

Table A-9

PTYF	Sets the PTYN flag or queries the setting.	
	PTYF<{A B}>	
	PTYF?	->{A B}
PTYN	Sets the Program Type Name or queries the setting.	
	PTYN<C [CCCCCCC]>	
	Eight ASCII characters from 20 to FF. 20H if omitted.	
	PTYN?	->CCCCCCCC

Messages Related to the Enhanced Other Net. xx xxx Screen

Table A-10

MAIN		Switches the screen to the Radio Data System main screen.
EON		Turns on/off the EON network number or queries the setting.
	EON<{n nON nOF MAX ADD nINS}>	
	n	Switches to the screen of the Other Network number specified by n.
	nON	Turns on the Other Network specified by n.
	nOF	Turns off the Other Network specified by n.
	MAX	Switches to the screen of the maximum Other Network number.
	ADD	Adds an Other Network data area at the end of the Other Network
	nINS	Inserts an Other Network data area before the Other Network number specified by n.
	EON?	->{ON OF_n}
	EON<MAX?>	->nmax
CLEON		Deletes the Other Network Data Area
	CLEON<[n]>	Deletes the screen of the Other Network number specified by n. When n is omitted, all Other Network screens are deleted.
PI		Sets the program ID code of EON or queries the setting.
	PI<[hhh]h>	0000 to FFFF. 0 if omitted.
	PI?	->hhhh
PIN		Sets the program ID number of EON or queries the setting.
	PIN<[d]d-[d]d-[d]d>	Day: 00 to 31, hour: 00 to 31, minute: 00 to 63
	PIN?	->dd-dd-dd
PS		Sets the program service name of EON or queries the setting.
	PS<c [ccccccc]>	
	c [ccccccc]	Eight ASCII characters from 20 to FF. 20 H if omitted.
	PS?	->cccccccc
PTY		Sets the program type of EON or queries the setting.
	PTY<{n Cd}>	{program typenumber of insertions} n: 0 to 31, d: 0 to 9
	PTY?	->dd
	PTYC?	->d
TA		Sets the announce ID for traffic information of EON or queries the setting.
	TA<{ON OF Cd Dd.d}>	{TA on TA off number of insertions delay} ON: TA on, OF: TA off, d: 0 to 9, d.d: 0.0 to 9.9
	TA?	->{ON OF}_d
	TAC?	->d
	TAD?	->d.d
TP		Sets the "TP" bit of EON or queries the setting
	TP<{ON OF}>	ON: TP on, OF: TP off
	TP?	->{ON OF}

Messages Related to the Enhanced Other Net.n sub Screen

Table A-11

UC12		Sets the data of information block 3 corresponding to usage code 12 of type 14A or queries the setting.
UC12<[hhh]h>		0000 to FFFF. 0 if omitted.
UC12?	->hhhh	
UC13		Sets the data of information block 3 corresponding to usage code 13 of type 14A or queries the setting.
UC13<[hh]h>		000 to 7FE. 0 if omitted.
UC13?	->hhh	
UC15		Sets the data of information block 3 corresponding to usage code 15 of type 14A or queries the setting.
UC15<[hhh]h>		0000 to FFFF. 0 if omitted.
UC15?	->hhhh	

Messages Related to the AF Method A. EO Net.n Screen

Table A-12

CLAF		Deletes the AF data of EON.
AFA		Sets the AF data of EON or queries the setting.
AFA<{n.n nK}[, ···]>		
	n.n	FM band frequency (87.5 MHz to 107.9 MHz).
	nK	MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.
		Resolution FM band: 0.1 MHz, MF band or LF band: 9 kHz
AFA?	->A{n.n nK}[, ···]	

Messages Related to the Mapped Freq. EO Net.n Screen

Table A-13

CLMAP		Deletes the mapped frequency data of the specified Other Network number.
MAP		Sets the mapped frequency data of the specified Other Network number or queries the setting.
MAP<{n.n t:n.n nK}[, ···]>		
	n.n	FM band frequency (87.5 MHz to 107.9 MHz).
	"t"	Tuning Frequency Assignment
	nK	MF band (531 kHz to 1602 kHz) or the LF band (153 kHz to 279 kHz) frequency.
		Resolution FM band: 0.1 MHz, MF band or LF band: 9 kHz
MAP?	->{n.n t:n.n nK}[, ···]	

Messages Related to the Usage Code Seq. Net.n Screen

Table A-14

CLUCS	Deletes the sequence data of the specified Other Network number.	
UCS	Sets the sequence data of the specified Other Network number or queries the setting.	
UCS<n[, ···]>	0 to 15	
UCS?	->n[, ···]	

Messages Related to the Modified MBS information Screen

Table A-15

SCODE	Sets the System & Sleep code or queries the setting.	
SCODE<[hhh]h>	0000 to FFFF. 0 if omitted.	
SCODE?	->hhhh	
RCVR	Sets the Receiver code or queries the setting	
RCVR<[hhh]h>	0000 to FFFF. 0 if omitted.	
RCVR?	->hhhh	
MSG	Sets the MSG code or queries the setting.	
MSG<c[ccccccccccc]>	20 to FF. 0 if omitted.	
MSG?	->cccccccccccc	

Messages Related to the Radio Data System SYS Screen

Table A-16

AF	Sets the RDS/RBDS modulation level or queries the setting.	
AF<n . n {PC %}>	0 to 10.00, resolution: 0.01	
AF?	->dd . dd	
AP	Sets the output level or queries the setting.	
AP<n . nV>	1.50 to 10.00, resolution: 0.01	
AP?	->dd . dd	
PH	Sets the phase of the 57-kHz sub-carrier or queries the setting.	
PH<{ 0 90 Sn }>	0: 0° (in-phase), 90: 90°, Sn: -10° to 10° (1° steps)	
PH?	->{ 0 90 } { _ - } dd	
ER	Sets the error or queries the setting.	
ER<{ ON OF XOR OR AND P [hhhhhh] h n }>		
{ ON OF }	ON: Error on, OF: Error off	
{ XOR OR AND }	Error mode	
P [hhhhhh] h	Error pattern. 0000000 to FFFFFFFF. 0 if omitted.	
n	Error count. 0 to 255.	
ER?	->{ ON OF } _ { XOR OR AND } _ Phhhhhhhddd	

Messages Related to the Memory Manage Screen

Table A-17

CLRDS		Deletes the data that is stored at the specified memory.
	CLRDS<n>	0 to 99
RC		Recalls the specified memory or queries the memory status.
	RC<n>	0 to 99
RC?	->0	Cannot recall memory.
	->1	Can recall memory.
	->2	No RDS data.
ST		Stores to the specified memory or queries the memory status.
	ST<n>	0 to 99
ST?	->0	Cannot store to the active area.
	->1	Can store to the active area.

Messages Related to the Hard Set Information Screen

Table A-18

RDS		Sets the RDS/RBDS data source or queries the setting.
	RDS<{N 0 1 PN9 EXT}>	
	N	Outputs the contents of the active memory that has been created and edited. (RDS)
	0	Outputs data consisting of continuous zeroes. (ALL 0)
	1	Outputs data consisting of continuous ones. (ALL 1)
	PN9	Outputs the PN9 signal.
	EXT	Outputs the RDS/RBDS data that is input to the DATA IN connector on the rear panel.
RDS?	->{N 0 1 PN9 EXT}	

Messages Related to the Traffic Radio Information Screen

Table A-19

SK		Sets SK or queries the setting.
SK<{ON OF n.n{PC %}}>		
	{ON OF}	ON: SK on, OF: SK off
	n.n{PC %}	SK modulation level: 0.0 to 10.0. Resolution: 0.1.
SK?	->{ON OF}_dd.d	
DK		Sets DK or queries the setting.
DK<{ON OF n.n{PC %}}>		
	{ON OF}	ON: DK on, OF: DK off
	n.n{PC %}	AM modulation factor through DK: 0.0 to 40.0. Resolution: 1.
DK?	->{ON OF}_dd	
BK		Sets BK or queries the setting.
BK<{ON OF n.n{PC %}}>		
	{ON OF}	ON: BK on, OF: BK off
	n.n{PC %}	AM modulation factor through area A to F: 0.0 to 80.0. Resolution: 1.
BK?	->{ON OF}_dd	
AREA		Sets area or queries the setting.
AREA<c>		A/B/C/D/E/F
AREA?	->c	

Messages Related to the Stereo Screen (KSG3421 Only)

Table A-20

MOD		Sets the monaural/stereo modulation level or queries the setting.
MOD<{ON OF n.n{PC %}}>		
	{ON OF}	ON: Modulation on, OF: Modulation off
	n.n{PC %}	SK modulation level: 0.0 to 125.0. Resolution: 0.1.
MOD?	->{ON OF}_ddd.d	
PL		Sets pilot level or queries the setting.
PL<{ON OF n.n{PC %}}>		
	{ON OF}	ON: Pilot on, OF: Pilot off
	n.n{PC %}	Pilot: 0.0 to 15.0. Resolution: 0.1.
MOD?	->{ON OF}_dd.d	
PRE		Sets the pre-emphasis or queries the setting.
PRE<{{OF 0} {25 1} {50 2} {75 3}}>		
	OF 0	Pre-emphasis off
	25 1	25 μ s
	50 2	50 μ s
	75 3	75 μ s
PRE?	->{0 25 50 75}	
M		Sets modulation mode or queries the setting.
M<d>		
	0 to 7 0 and 7: STEREO off, 1: MAIN, 2: LEFT, 3: RIGHT, 4: SUB, 5: EXT L/R, 6: MONO	
M?	->d	
S		Sets modulation source or queries the setting.
S<d>		
	0	Enables internal modulation frequency setting.
	1	External modulation (EXT)
	2	Internal modulation 30 Hz
	3	Internal modulation 100 Hz
	4	Internal modulation 400 Hz
	5	Internal modulation 1 kHz
	6	Internal modulation 6.3 kHz
	7	Internal modulation 10 kHz
	8	Internal modulation 15 kHz
S?	->{1 2 3 4 5 6 7 8 n}	
SOUR		Sets the internal modulation frequency or queries the setting.
SOUR<n>		
	20 to 20000. resolution: 10	
SOUR?	->n	

Messages Related to the Utility 2 Screen

Table A-21

PORT1?		Queries the High/Low signal applied to PI0 to PI7 of the EXT I/O connector.
	PORT1? ->hh	
PORT2		Sets the output data from PO0 to PO7 of the EXT I/O connector or queries the setting.
	PORT2<hh>	00 to FF
	PORT2? ->hh	

Other Messages

Table A-22

PLAN		Switches the screen of queries the screen name.
	PLAN<s>	
	MAIN	Radio Data System main screen
	GSEQ	Group Sequence screen
	RTX	Radiotext screen
	MSUB	Radio Data System sub screen
	SIMU	Simulation screen
	AFMA	AF.main screen
	OGRP	Other Group.main screen
	PTYN	Program Type Name screen
	EON	Enhanced Other Net.n on/off screen
	ESUB	Enhanced Other Net.n sub screen
	AFEO	AF Method A. EO Net.n screen
	MFEO	Mapped Freq. EO Net.n screen
	USAG	Usage Code Seq. Net.n screen
	MMBS	Modified MBS information screen
	SYS	Radio Data System SYS screen
	MMA	Memory Manage screen
	HARD	Hard Set Information screen
	TRI	Traffic Radio Information screen
	STER	Stereo screen
	PLAN?	->s
*IDN		Queries the model name of the unit.
	*IDN?	->KIKUSUI ELECTRONICS CORP.,KSG342X,0,X.XX

Index

Symbols

.c 3-45
.m 3-45
.p 3-45

Numerics

2nd key 6-6

A

AC LINE connector 6-9
accessories 1-2
active 3-47
ADDR 5-2
Address Map of EON System Screen 5-4
AF Method A. EO Net.n Screen 3-30
 messages related to 4-27, A-7
AF.main Screen 3-15
 messages related to 4-16, A-4
AF/L HIGH/LOW LED 6-4
AF/L input connector 6-4
AREA 3-51
ARI P-2

B

backlight 2-4
BK 3-50
BS key 6-7

C

c+o 3-14
calibration 7-2
CFI 3-10
Channel 3-53
cleaning 7-2
CLOCK OUT connector 6-9
Clock Polarity 3-48
COMPOSITE OUT connector 6-9
COMPOSITE output connector 6-3
CT 3-13

D

data 3-47
DATA IN connector 6-9
DATA OUT connector 6-9
Data Polarity 3-48
device messages 4-7
DI 3-13
direction/contrast key 6-7
DK 3-50

E

e 3-14
END 3-47
Enhanced Other Net. xx xxx Screen 3-23
 messages related to 4-20, A-6
Enhanced Other Net.n sub Screen 3-28
 messages related to 4-25, A-7
ENTER key 6-7
EON network operation 5-2
EON simulation 5-3
EON/UTIL key 6-5
EONn 5-4
Err 3-44
E_sim 5-3
etc.1/2 5-4
EXT I/O connector 4-45, 6-9
external modulation 3-54

F

firmware version 2-11
flag 3-10
Free 3-46
function keys 6-3
fuse 1-5
fuse holder 6-9

G

GPIB 4-2
GPIB address 4-2
GPIB connector 6-9
GPIB interface functions 4-3

grounding 1-7
GROUP 3-47
Group 3-14
group sequence 3-6
Group Sequence Screen 3-6
 messages related to 4-12, A-3
group type 3-18
GRP SCAN key 6-3

H

Hard Set Information Screen 3-48
 messages related to 4-35, A-9

I

i 3-14
Index Screen 2-12
initialization 2-3
input line voltage range 1-5
inspection 7-2
installation location 1-3

K

kHz key 6-7

L

LCD 6-2
LCD, adjustment of 2-4
LOCAL/ADRS key 6-7

M

M/S key 6-6
MAIN 5-4
malfunctions 7-3
map data groups 3-34
Mapped Freq. EO Net.n Screen 3-32
 messages related to 4-28, A-7
master 5-3
Memory 3-46
memory address indicator 6-3
memory groups 2-10, 3-46
Memory Manage Screen 3-46
 messages related to 4-34, A-9
memory operation 2-9

messages 4-5
messages, list of A-1
Meth 3-15
MJD 3-12
Mod 3-52
Modified MBS information Screen 3-42
 messages related to 4-30, A-8
MSG 3-42

N

Net.n 3-29, 3-30, 3-32
Net.n on/off 3-25
numeric keypad 6-6

O

ON key 6-6
Other Group 3-18
Other Group.main Screen 3-18
 messages related to 4-18, A-5
other messages 4-43, A-12
Other Network data 3-23
Output 3-43
Output data 3-48

P

Phase 3-44
PI 3-4, 3-25
Pilot 3-52
PILOT IN connector 6-8
PILOT OUT connector 6-9
PIN 3-4, 3-25
Plane Selection Screen 2-11
power cord, connection of 1-6
POWER switch 6-2
power up 2-2
Pre-em 3-53
pre-emphasis 3-56
program message 4-5
Program Type Name Screen 3-21
 messages related to 4-19, A-5
protocol 4-4
PS 3-4, 3-25
PTY 3-5
PTY N n 3-26

PTYI 3-13

R

R HIGH/LOW LED 6-4

R input connector 6-4

Radio Data System main Screen 3-3

 messages related to 4-8, A-2

Radio Data System sub Screen 3-12

 messages related to 4-14, A-3

Radio Data System SYS Screen 3-43

 messages related to 4-31, 4-32, A-8

radio text 3-10

RADIO/RBDS key 6-5

Radiotext Screen 3-10

 messages related to 4-13, A-3

RCL/STORE key 6-3

Rds 3-43

Receiver 3-42

REMOTE Setup Screen 5-2

REMOTE Setup screen 4-2

RMT LED 6-7

Rotary knob 6-7

RS-232C 4-2

RS-232C connector 6-9

S

Scan 3-51

Simulation Screen 3-14

 messages related to 4-15, A-4

SK 3-50

Source 3-53

special symbols and characters 4-7, A-1

stand 6-3

START 3-47

STEREO key 6-5

Stereo Screen 3-52

 messages related to 4-38, 4-40, A-11

System&Sleep 3-42

T

TA 3-5

TA key 6-6

TA on/off n T 3-26

terminators 4-6

time 3-46

TP key 6-6

TP on/off 3-27

Traffic Radio Information Screen 3-50

 messages related to 4-36, A-10

TRI signal 3-50

TRI/SYSTEM key 6-5

Tuning Frequency 3-34

Type 3-18, 3-21

U

Uc12 3-28

Uc13 3-28

Uc15 3-29

UD1 3-8

UD2 3-9

Unlock Pilot indication 2-5

usage code 3-37

Usage Code Seq. Net.n Screen 3-35

 messages related to 4-29, A-8

user-defined groups 3-8

Utility 2 Screen 2-12, 4-48

 messages related to 4-42, A-12

utility menu 2-11

Utility Screen 2-11