Futaba®

WIRELESS DATA COMMUNICATION SYSTEMS

FRH-SD07TU Starter-Kit

Instruction Manual

Cattron-Theimeg Incorporated
Industrial Radio Control

FCC Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any unauthorized changes or modifications to this device not expressly approved by Cattron-Theimeg Incorporated ("CTI") could void the user's authority to operate the device and possibly result in damage to the equipment and/or cause serious or fatal injuries to the operator or nearby personnel.

This device is intended to be installed and used in accordance with the instructions contained in this manual. Failure to comply with these instructions could void the user's authority to operate the device and possibly result in damage to the equipment and/or cause serious or fatal injuries to the operator or nearby personnel.

Important Safety Information

The list of dangers, warnings and cautions in this section contain important information that will help ensure safe operation of the system. Please read carefully and understand all of these items. All installers, operators and maintenance personnel should read and understand this information before installation, use, or maintenance of the FRH system.

The FRH system by itself is not inherently dangerous. **HOWEVER, WHEN THE FRH SYSTEM IS CONNECTED TO OTHER EQUIPMENT FOR THE PURPOSE OF CONTROL, SAFETY AND ALL POSSIBLE ASSOCIATED DANGERS MUST ALWAYS BE GIVEN THE UTMOST CONSIDERATION DURING SYSTEM INTEGRATION, DESIGN, INSTALLATION, AND USE.**

The FRH system may be used in virtually unlimited applications. Many of these associated systems can, by themselves, pose a mechanical, electrical or other hazard to operators and other persons or equipment. To address all possible applications and associated safety hazards in this manual would be impossible. The warnings below and throughout this manual give you information that will allow you to install and use the FRH system safely in most applications. If you have questions regarding the safety of your specific application, please contact the appropriate people for help. Your CTI sales representative, representatives of the equipment you are controlling, and the technical support staff at CTI are among those who can give you assistance with your safety concerns.

The following warnings are included in the lists that follow but warrant repetition here:

In installations where the FRH system is used to control motion or operation of potentially dangerous equipment, it is imperative for safety that all operators and installers be thoroughly trained in the normal function of that equipment before attempting to control it remotely with the FRH system.

To help ensure safe operation of the equipment, the FRH system must be connected so that it will operate in a fail-safe way. In other words, the equipment being controlled should stop or return to its safest state in the absence of a control signal or total loss of RF transmission from the FRH modem. Our system uses one of the most reliable methods available to transmit data using radio signals. Many factors can affect a radio signal that may block it or interfere enough to disrupt regular transmission. Because of this, equipment motion or

dangerous electrical current, for example, that continues during a loss-of-signal condition could be very dangerous.

Four symbols are used in the margin of the following section and throughout the manual to indicate the level of hazard or information listed.

The symbols are defined as follows:

⚠ DANGER   Indicates a hazard that *will* cause severe personal injury, death, or substantial property damage if the warning is ignored.

⚠ WARNING   Indicates a hazard that *can* cause severe personal injury, death, or substantial property damage if the warning is ignored.

⚠ CAUTION   Indicates a hazard that will or can cause minor personal injury, or property damage if the warning is ignored.

NOTE   Indicates installation, operation, or maintenance information that is important but not hazard-related.

Please read the following safety information carefully. Some of these notices are duplicated throughout the manual, in areas of associated content, for your benefit.

General Safety Hazards and Notes

⚠ WARNING   Improper installation and/or operation of the FRH system can cause serious or fatal injuries to the operator or nearby persons and cause damage to the FRH system, and any equipment it is used to control. Please read and understand this manual completely and the manual of all equipment being controlled before attempting to operate or install this system.

⚠ WARNING   Always keep this manual at a location readily accessible to anyone operating the system and related equipment. Ensure that all operators have read and understood this manual, especially all safety and operation procedures contained in it. Please refer to the section in this manual titled *How to Obtain Help* for the contact that can supply you

with additional manuals or for questions not covered in this manual. If this product is passed on to a different user, be sure that this manual accompanies the product.

⚠WARNING   Be certain that the installer of this equipment reads and understands the instruction manual of *the equipment that you are connecting to* before attempting this installation.

⚠DANGER   The FRH system should **NOT** be used in a manner in which failure of the product or loss of the radio signal could cause damage to the equipment being controlled, or to anything in the area in which such equipment is located. All integrated control systems should be designed for "fail-safe" operation so that a temporary or permanent loss of signal will not endanger any person, critical process, or equipment (refer to the beginning of the safety section for further explanation). The system design should ensure that the equipment being controlled will default to its safest state in the event of signal loss.

⚠CAUTION   The FRH system contains no user serviceable parts. If the unit requires service, contact your sales representative or CTI for repair service. Contact information can be found in this manual under the section titled *How To Obtain Help*. Do not disassemble or attempt to repair the FRH yourself. Doing so could void your warranty and may void the user's authority to operate the device.

⚠WARNING   Contact CTI before using the FRH in safety critical applications such as medical equipment, aircraft, hazardous materials handling, etc.

Installation Safety Hazards and Notes

⚠WARNING   Be sure to wire the power and serial connections correctly. Incorrect wiring can damage the system, cause it to malfunction and/or create a shock and fire hazard.

⚠WARNING   Ensure that the FRH modem power and the power to the equipment to be controlled are turned off before connecting or disconnecting the cable between them. This will help prevent accidental damage to the system and unexpected operation and/or injury.

⚠WARNING   Be sure the FRH modem power, the power to the equipment that you are connecting to it, and the DC power source are all turned off before wiring and connecting the power cable.

⚠WARNING   Be sure that the supplied power is within the specified range (4.5 to 6.0 VDC). Voltages outside the specified range may damage the FRH modem.

Antenna Installation Hazards and Notes

⚠WARNING   Be sure to keep all systems and antennas clear of power lines. Permanent equipment damage and severe shock injury or death can occur if the system contacts power lines.

⚠WARNING   Contact CTI before connecting any antenna not provided by CTI specifically for the FRH system. Attaching any non-authorized antenna may be in violation of FCC regulations.

⚠CAUTION   Mount the antennas as far apart as possible (30 cm minimum) when using two pedestal antennas with a single FRH for diversity reception. If the antennas are too close, the diversity advantage will not be achieved.

⚠WARNING   Before each use, verify that the antenna (and antenna cable, if used) is securely attached and in good condition. A loose antenna or cable may severely reduce the operating range of the system.

| NOTE | When installing the FRH in a mobile unit such as an Automatic Guided Vehicle (AGV), Futaba recommends using the diversity reception feature as a remedy for multipath fading problems. For diversity reception, install the two antennas as far apart as possible in order to gain maximum benefit (30 mm minimum). |

⚠CAUTION The pedestal antenna is designed for indoor use. When using it outdoors, enclose it in a non-metallic, waterproof case or take other steps to protect it from humidity and other corrosive environments.

⚠CAUTION Though the outside of the pedestal antenna is made of silicone rubber, the inside is metallic. The metallic components can be bent or broken if enough force is applied. Mount the antenna in a location where it will be least likely to be damaged by contact with other objects or equipment.

⚠CAUTION The FRH-SD07TU operates at frequencies in the 2.4 GHz band. These frequencies are more directional than lower frequencies and are easily reflected. If there are metal structures nearby, the effective range may be shortened or the directional properties may be further narrowed. To help avoid this, mount the antenna as far away as possible from surrounding metallic structures.

⚠CAUTION Multipath problems occur easily at 2.4 GHz frequencies. When multipath problems are present, moving the antenna as little as 10 cm may result in improved communication or, conversely, a further diminished or total loss of communication. Futaba recommends that the mounting position of the antenna be determined *after* testing and verifying optimal communication conditions. Negative multi-path effects can also be overcome with antenna diversity.

⚠CAUTION When installing multiple FRH modem systems that will use different frequency groups in the same area, modem antennas of different

frequency groups must be mounted at least 6 feet (2 meters) apart. Failure to do so may severely reduce the FRH operating range.

NOTE	Please contact CTI before attempting to install any third party antenna equipment.

NOTE	Please contact CTI for information about antenna separation when using the FRH-SD07TU and other wireless products in the same area.

Environmental Safety Hazards and Notes

⚠WARNING	If the FRH system has been stored at a temperature beyond the specified operating temperature range for the system, it may not function properly. Allow it to return to normal temperatures before use.

⚠WARNING	The FRH modem is a precision electronic device. Its rugged design is intended for industrial applications. However, do not install it where it will encounter excessive vibrations. In some cases, isolation mounts may be used to isolate the FRH modem from the equipment vibration. Excessive vibration can permanently damage the FRH modem and/or cause it to malfunction.

⚠WARNING	Do not operate the FRH system in environments where it will be subjected to excessive moisture (such as rain or water spray), dust, oil, or other foreign matter (such as metal particles). Doing so may permanently damage the FRH modem and/or cause it to malfunction. If it does become wet or contaminated, correct the situation, verify proper operation and have any problems corrected before using it to control other equipment. If necessary, the modem can be mounted inside a protective or waterproof enclosure. If the enclosure is metallic, the antenna must be mounted externally or the effective operating range will be severely limited.

WARNING

The FRH system is designed for indoor use. When using it outdoors, the modem should be mounted in a waterproof enclosure and the ambient temperature range should be checked to insure that it is within the modem's specifications. Always use the FRH modem within its specified environmental ranges.

Operational Safety Hazards and Notes

WARNING

Before each use of the FRH system, ensure that the area where the equipment will be operated is clear of people or obstacles that may affect its safe operation.

WARNING

Before each use of the FRH system, verify that both the equipment being controlled and the FRH system are in proper operating condition.

CAUTION

Turn the FRH power off before changing the rotary switch setting. Failure to do so may cause the modem to malfunction.

CAUTION

Except when initializing the memory registers, always turn the FRH modem power off before changing any dipswitch settings.

CAUTION

When rewriting the FRH modem's memory registers, do not turn the FRH modem's power off until the FRH modem returns a P0. If the power is interrupted before a P0 is returned the memory contents may be lost or corrupted and the FRH operation will be unpredictable. If the memory contents are lost or corrupted, they may be restored to original default settings by reinitializing them.

CAUTION

When initializing the memory registers, do not turn the FRH modem's power off until the PW LED flashes green. If the power is interrupted before the LED flashes green, the registers will not be written correctly and the FRH operation will be unpredictable. If a power interruption does occur, restart the initialization procedure from the beginning.

⚠WARNING   Do not attempt to operate remotely controlled equipment outside the communication range of the FRH system. Doing so could cause loss of equipment control.

⚠WARNING   Without implementing proper flow control settings, the data rate between the FRH modem and its terminal (wired link) can exceed the wireless link data rate and cause the modem buffer to overflow. This can result in malfunction of the systems being controlled and/or data corruption. Ensure that you are using appropriate flow control settings for your application.

⚠WARNING   When mounting FRH-SD07TU on the Interface board, be sure to use the attached screws to mount it. Excessively long screws may cause damages to the wireless modem.

⚠WARNING   Since the Interface board is not physically shielded, conductive materials such as metal parts may cause a short-circuitry to result in malfunction or fatal damage. Before turning on the power, please make sure that there is no short-circuitry.

System Identification

For future reference, please take a moment to fill in the information below. This information will help us respond as quickly as possible should your FRH system ever need repair or replacement.

Model Name and Number: FRH-SD07TU Starter-Kit

Serial Number:

ID Code:

Date of Purchase:

Distributor Name:

Distributor Address:

Distributor Phone Number:

Limited Warranty

CTI WARRANTS ONLY THAT THE INDUSTRIAL RADIO CONTROL SYSTEM GOODS OR PRODUCTS FURNISHED HEREWITH SHALL BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL CONDITIONS OF USE AND SERVICE FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF SALE TO THE PURCHASER WHO IS THE FIRST BUYER OF THE GOODS FOR USE OR CONSUMPTION AND NOT FOR RESALE OTHER THAN AS A COMPONENT OF ANOTHER PRODUCT MANUFACTURED FOR SALE BY SUCH PURCHASER ("CONSUMER"). CTI'S LIABILITY, WHETHER BASED ON BREACH OF WARRANTY OR NEGLIGENCE, SHALL BE LIMITED, AT CTI'S ELECTION, TO REPLACEMENT OR REPAIR OF ANY SUCH NONCONFORMING GOODS, F.O.B. CTI'S PLANT, OR, AT CTI'S ELECTION, CREDIT FOR THE NET PURCHASE PRICE OF SUCH GOODS. ALL CLAIMS HEREUNDER MUST BE MADE IN WRITING DURING THE WARRANTY PERIOD, AND CTI SHALL HAVE THE RIGHT PRIOR TO ANY RETURN OF GOODS TO INSPECT ANY GOODS CLAIMED TO BE NONCONFORMING, AND IN ANY EVENT RESERVES THE RIGHT TO REJECT CLAIMS NOT COVERED BY WARRANTY. THIS LIMITED WARRANTY CONSTITUTES CTI'S SOLE WARRANTY. **CTI MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, AND EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** CTI'S WARRANTY SHALL NOT APPLY IF, AMONG OTHER LIMITATIONS CONTAINED HEREIN OR FURNISHED WITH THE PRODUCT, BUYER, OR CONSUMER, OR ANY USER OF THE PRODUCT (A) ALTERS SUCH PRODUCT, OR (B) REPLACES ANY PART OF SUCH PRODUCT WITH ANY PART OR PARTS NOT FURNISHED BY CTI FOR THAT PURPOSE, OR IF, AMONG SUCH OTHER LIMITATIONS, PRODUCT FAILS TO OPERATE PROPERLY OR IS DAMAGED DUE TO ATTACHMENTS OR COMPONENTS THAT ARE NOT FURNISHED BY CTI FOR USE WITH OR REPAIR OF THE PRODUCT UNLESS SUCH USE IS AUTHORIZED IN WRITING IN ADVANCE BY CTI.

THIS LIMITED WARRANTY EXTENDS ONLY TO THE CONSUMER AND IS NOT ASSIGNABLE OR TRANSFERABLE. This limited warranty shall not apply to fuses, lamps, batteries, or other items that are expendable by nature, unless otherwise expressly provided.

This limited warranty does not cover any defect or damage to any of the goods caused by or attributable to force, accident, misuse, abuse, faulty installation, improper maintenance, improper electrical current, failure to install or operate in accordance with Futaba's written instructions, repair or alteration by unauthorized persons, or leaking batteries. **THE GOODS ARE SENSITIVE ELECTRONIC DEVICES REQUIRING SPECIAL HANDLING, AND THIS LIMITED WARRANTY DOES NOT APPLY TO PRODUCTS NOT HANDLED IN ACCORDANCE WITH INSTRUCTIONS SET FORTH IN THE MANUAL.**

THIS LIMITED WARRANTY DOES NOT COVER INDUSTRIAL RADIO CONTROL PRODUCTS

PURCHASED OR USED OUTSIDE OF THE UNITED STATES WITHOUT CTI'S PRIOR APPROVAL.

Returns

CTI's authorization must be obtained prior to return of any item for warranty or other repair or replacement or credit and will reflect CTI's warranty service procedure. Consumer's warranty rights are governed by the terms of CTI's Limited Warranty, as above described. Products returned for warranty repair or replacement or credit must be carefully and securely packed for return, preferably in the original carton or equivalent. The Consumer must also include in the carton a legible copy of the bill of sale or invoice which shows the date of sale and the original Buyer's and Consumer's names, and also a letter which gives the Consumer's return address and contact telephone number, the model and serial numbers of the product(s) returned, and a brief explanation of the problem or claimed defect. Any returned products that are replaced by CTI shall become the property of CTI. If after inspection CTI determines the defect is not covered by its limited warranty, CTI will notify Consumer of its determination and will not undertake any repairs or product replacement until Consumer agrees to pay for all necessary parts and materials, labor (to be charged at CTI's standard repair rate then in effect), and other expenses including all shipping charges and insurance. CTI reserves the right to retain possession of any product returned by Consumer because of defects not covered by CTI's warranty until CTI receives Consumer's agreement as above noted or, if Consumer wants the product returned without repair or replacement, Consumer reimburses CTI for all shipping and handling charges incurred by CTI. Issuance of credit for returned items shall be made at CTI's unfettered discretion. Consumer will not be entitled to return defective goods for cash refunds. Consumer must inspect goods immediately and no rejection or revocation of acceptance shall be permitted more than ten (10) days after delivery to, or first use by, Consumer of the goods, whichever occurs first.

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If this product was manufactured according to designs or processes specified by Consumer, Consumer shall indemnify and save CTI, its affiliates, officers, agents, and employees, harmless from any expense, loss, attorneys' fees, costs, damages, or liability which may be incurred as a result of actual or alleged infringement of patent, copyright, or trademark rights. Furnishing of these products does not convey a license, implied or otherwise, under any patent, copyright, or trademark right in which CTI has an interest, nor does it convey rights to trade secrets or any other proprietary information of CTI.

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affirmative action by CTI toward performance following receipt of any purchase order, shipping order, or other form containing provisions, terms, or conditions in addition to or in conflict or inconsistent with any such provisions.

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INTRODUCTION

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1.1   Introduction of FRH-SD07TU Starter-Kit

FRH-SD07TU is designed to be installed in equipment, with featuring its very compact size and low power consumption. Some people who have no experience of using FRH-series may find it difficult to operate the modem because of its unique designs of interface and antenna connections.

The FRH-SD07TU Starter-Kit contains an interface board, a board-type antenna, cables and tools. The Starter-Kit is very effective for beginners to have communication trial by connecting it to a PC.

The Starter-Kit is designed not for permanent usage, but only for learning how to operate FRH-SD07TU and to learn functions of FRH-SD07TU.

As there may be some modifications without notice on kit including circuitry, parts and cables, please use the Starter-Kit for study purpose only.

1.2   How to Obtain Help

Please contact your local sales representative or CTI at the address shown below for help with the following:

- Application information regarding the FRH-SD07TU Starter-Kit or other Futaba products

- Technical assistance or training

- Safety questions and issues

- Additional manuals or other documentation

- Repair or service for your Futaba products

- Comments regarding the product or this manual

Cattron-Theimeg Incorporated
58 West Shenango Street, Sharpville, PA 16150
Telephone: (724)962-3571, Fax: (724)962-4310, E-mail: mail@cattron.com

When requesting repairs, please provide as much detail as possible regarding the failure and its cause or symptoms. Doing so will help our service department find the problem quickly, resulting in a shorter repair time.

⚠ CAUTION   The FRH-SD07TU Starter-Kit contains no user serviceable parts. If the unit requires service, contact your sales representative or CTI for repair service. Contact information can be found in this manual under the section titled *How to Obtain Help*. Do not disassemble or attempt to repair the FRH yourself. Doing so could void your warranty and may void the user's authority to operate the device.

1.3   Parts List of the FRH-SD07TU Starter-Kit

A list of parts that are included in your system is shown below. Please check the contents of your shipment with this list. If you believe that you are missing any of these parts, or other options that you may have ordered, please contact CTI or the distributor from whom you purchased the system.

Part Description	Quantity
FRH-SD07TU	1
Interface board	1
Communication cable	1
Board antenna	1
SMA antenna cable	1
DC cable	1
Screws	4
Floppy disc	1
Written Guarantee	1

SECTION

2

SYSTEM INSTALLATION

CONTENTS
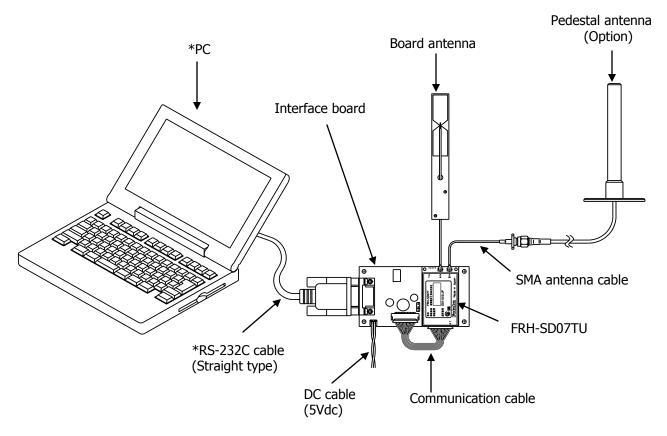
2.1   Connecting FRH-SD07TU Starter-Kit

Fig.1 Configuration of connecting FRH-SD07TU Starter-Kit
（ Asterisked *PC and *RS-232C cable are not included in a Starter-Kit.）

- Be sure to use straight cable for RS-232C when connecting the interface board to PC.

- FRH-SD07TU can be directly mounted on the interface board like fig.1.

- When using a single antenna, connect it to antenna terminal A and do not use antenna terminal B which should be used only for the second antenna for diversity reception.

- The power source voltage is 5Vdc (4.5Vdc to 6.0Vdc). Connect the red wire to the positive terminal and the black wire to the negative terminal.

- Please be sure to use regulated power source. Switching regulator may induce switching noises and cause deterioration in performance of FRH-SD07TU.

⚠WARNING   • When mounting FRH-SD07TU on the interface board, be sure to
                  use the attached screws to mount it. Excessively long screws may
                  cause damages to the wireless modem.

• Since the interface board is not physically shielded, conductive
  materials such as metal parts may cause a short-circuitry to result in
  malfunction or serious damage. Before turning on the power, please
  make sure that there is no short-circuitry.

2.2   Terminal Software

It is necessary for PC to have terminal software for communicating with FRH-SD07TU
through RS-232C. It is recommended to use "HyperTerminal" which is one of the
standard software included in "Windows" or user's any favorite terminal software.

SECTION 3

SYSTEM OPERATION

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3.1 Communication through RS-232C

Start the terminal soft and check the status of RS-232C. You'll find the following default values,

Port	COM1
Data rate	9600bps
Data length	8 bits
Stop bit	1 bit
Parity	none
Data flow control	none
Transmission CR	CR/LF
Local echo	yes

The above settings are exactly same as the default values of the FRH-SD07TU. Nothing is required to change for the first use. If the settings of the FRH-SD07TU are changed, apply the same settings to the terminal software.

After confirming that the connections are correctly completed, turn on the FRH-SD07TU Starter-Kit. Then enter "@ARG (enter)" from the keyboard in order to check whether or not the communication is established through RS-232C. If you can receive all parameters of all the memory registers of FRH-SD07TU, the communication has been established. If there is no response or there are illegible characters on the screen, there is a high possibility of wrong connections or wrong settings of RS-232C. In this case, please check from the beginning.

⚠CAUTION

If you forgot the parameters of the memory register (REG20) in the FRH-SD07TU, you may not be able to communicate. To recover from such a situation, initializing FRH-SD07TU by the following steps is helpful,

① Remove the jumper which connects No.1 and No.2 pin-headers, then put the jumper so that No.2 and No.3 pin-headers are connected.

② Turn on and then turn off the power supply slowly.

③ Remove the jumper which connects No.2 and No.3 pin-headers, then put the jumper so that No.1 and No.2 pin-headers are connected. (The jumper is now back to the original point.)

3.2 Wireless Communication

Two sets of Starter-Kits are required for wireless communication.

If FRH-SD07TUs are set to default values, there is no need of changing parameters. Follow the next procedures,
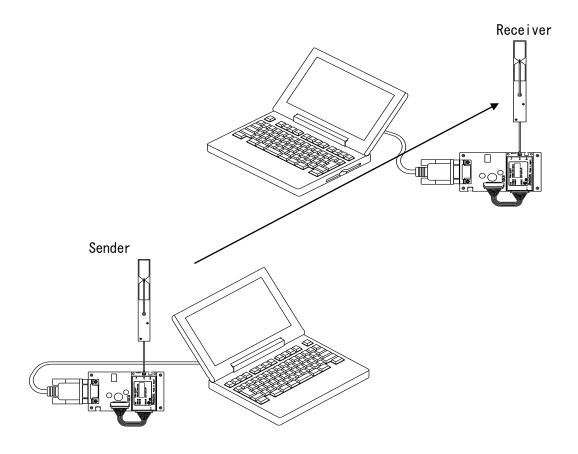

Fig.2: Wireless Communication

① Input "@TXT000HELLO (Enter)" at the sender's PC.
② If the message of "RXT000HELLO" is shown on the screen of the receiver's PC, then the wireless communication is established.

If you cannot succeed in communication, please check the following points,

① Initialize the memory register of FRH-SD07TU if you don't mind losing the current parameters of the memory register.

② Confirm that the two FRH-SD07TU modems have the same frequency group in REG06 prior to any change.

③ In case of 1:1 communication, the default value "8CH" is valid for REG18. In case of 1: N communication, the value "8DH" (address check) should be used for REG18.

After having confirmed the successful communication, refer to the FRH-SD07TU instruction manual and try more sophisticated functions such as 1: N communication, Repeater-using communication, Header-less Packet communication mode and Direct communication mode.

SECTION

4

TROUBLESHOOTING

CONTENTS

4.1 Troubles that users often encounter

Followings are the troubles that users often encounter in their first experience.

(1) Which cable should user use, straight cable or crossover cable?

There are 2 kinds of pin configurations for RS-232C which are called DTE mode and DCE mode. FRH-SD-07TU Starter-Kit uses DTE mode. In general, DTE mode is used for PCs, and DCE mode is used for peripheral equipment to PCs.
Straight cable is used for connecting DCE and DTE. Crossover cable is used for connecting the same DCEs. If wrong cables are chosen to for connection, communication will never be established.
When it is difficult for you to find out whether your equipment uses DTE or DCE, it is recommended that you judge based on whether your equipment is used by connecting to a PC.

(2) Why can't I get "CR+LF" after clicking "Enter" key?

Most sets of terminal software including "HyperTerminal" which is installed for "Windows" as a standard part return only "CR" after clicking "Enter" key. Users need to change the setting so that you can get "CR+LF".

(3) Why retransmission number is required in the Frequency group mode?

The Frequency group mode is set to the FRH-SD07TU modems as a standard mode. It is not always true that every communication modem has the same frequency in the Frequency group mode. Consequently there may be some failures in signal transmission. If the retransmission number is set to a certain number larger than zero, signal transmission will be repeated to establish communication. However if the retransmission number is set to zero, signal transmission will not be repeated even after the failure of signal transmission. So please be sure to set retransmission number.