HEADERLESS STREAM MODE (MODE 7)

Headerless stream mode has a different protocol that of headerless packet transmission normal mode use. The mode has a similar protocol that of FDA type wireless modem which FUTABA sells in the market (FDA type modem is provided for Japanese domestic market, the FDA type modem can not be available outside of Japan.). Even similar protocol is employed, communication between FRH-SD07TU and FDA can not be done. Trigger to start the radio transmission are defined as:

1) Pre defined duration timeout
2) Pre-defined terminator (character)
3) Defined number of characters (Byte).

This mode is almost same usage of FRH-SD03TU modem 'transparent communication mode' Mode1 and Mode2. On the other hand, when transmission count excesses the retransmission count because the radio channel condition is bad, the data does not transferred to the destination, i.e. data packet will be invalidated. Therefore, 100% transparency of the data is not guaranteed.

1 Data consistency of the Headerless Stream mode

The headerless stream mode does not contain any transmission command or received header component. Hence transmittion data can be output to the receiver's terminal as a transmitted data stream itself. Therefore, almost same usage of FRH-SD03TU modem transparent communication mode Mode1 and Mode2 can be made. Since data stream can be fed to the transmitter side modem continuously, file transmission can be done when radio channel condition is good.

However, as the characteristics of the packet transmission mode, after finishing number of retransmission where communication could not be established for the packet (since radio channel condition is bad), its data packet will be invalidated. So 100% data transparency (consistency), which obtained in FRH-SD03TU Mode1 and Mode2, can not be expected. Futaba recommends to use the headerless stream mode in 1 to N non-procedural communication topology, where to enhance the feature of the original packet transmission mode

2 Transmission Trigger

Transmission trigger type of the headerless stream mode can be selected by below two conditions.

1. Terminator Mode
   Predefined special character (Terminator) is input.
   Or data is stored to transmission buffer more than 255 bytes
2. Timeout Mode
   Predefined time duration elapsed after the ending of data stream input.
   Or data is stored to transmission buffer more than 255 bytes

Terminator can be set any character of one or two byte. For details, refer Memory Register section, REG16, 17 and 18.

Selection of the Terminator Mode and the Timeout Mode is set by memory register REG24. Refer REG24 details in section "Memory Register Description". When bit 6 of REG24 is set to 1, the trigger function becomes Terminator mode.

Transmission serial data can be fed to FRH-SD07TU/TB continuously. But next packet does not transmit until the modem transmits the current packet and receives its ACK (or until reaches retransmission count). In this case, serial data is stored to transmission buffer. And

when its stored character excesses 255 bytes, the data will be transmitted in the separation of 255 bytes without having a relation with terminator.

When radio channel condition is bad and retransmission continues, transmission buffer may overflow if without performing serial flow control. Please set bit 1 of REG21 to '1', makes it enable FRH-SD07TU/TB to enable the flow control function.

Both transmission and reception buffer size are set by the bit 7 and 6 of REG21.

3 Memory registers for the Headerless Stream Mode

REG03: Special Setting [default value: F0H]

- Set the operation mode to the *headerless packet transmission mode* (FFH).

REG13: Repeater Address [default value: 1EH]

- When a *repeater* is used, set the *repeater address* to pass through.

REG16: Terminator Setup 1 [default value: 32H]

- Set an arbitrary 1 byte terminator. In case of a 2-byte terminator, set the first byte character of the terminator.
- The command input timeout is fixed to 5 sec.

REG17: Terminator Setup 2 [default value: 32H]

- Set another arbitrary 1 byte terminator. In case of a 2-byte terminator, set the last character of the terminator.

REG18: Communication Setting 1 [default value: 8CH]

Bits 7 – 6: Reserved

- The FRH-SD07TU/TB does not use this register. Keep the default value as it is.

Bit 5: Transmission path select

0	transmit directly to destination (default value)
1	transmit indirectly via repeater

Table 7–?: Transmission path selection

- To transmit a packet data through the *repeater*, set the *repeater address* to REG13.

Bit 4 Transmission format

0	transmit in the test form (default value)
1	transmit in the binary form

Table 7–? Transmission format

- Selects the *transmission format*. When data are transmitted to the *destination station* which is set to the normal *packet transmission mode*, output text format (RXT, RBN) from the receiver modem (*destination station*) differs depend on this setting.
- This setting does not effect in the receiver modem set as the *headerless packet transmission mode*.

Bits 3 – 2 Terminator Setting

bit 3	bit 2	Setting
0	0	Two kinds of arbitrary 1 byte code (REG16, REG17)
0	1	arbitrary 1 byte code (REG16) ＋ a wild card (any character)
1	0	arbitrary 2 byte code (REG16 + REG17)
1	1	carriage return (CR) ＋ line feed (LF) (default value)

Table 7–? Terminator setting

- Sets the *terminator* to identify the breakpoint of a packet. The modem transmits data considering this character as the breakpoint of a packet.
- In case of using an arbitrary terminator, set it to REG16 and 17.

Bit 1: Source address check

- The same function as the basic function.

Bit 0: Destination address check

- The same function as the basic function.

REG21: RS-232C Setting 2 [default value: 09H]

Bits 7 – 6: Transmission and Reception buffer

bit 7	bit 6	Setting
0	0	Tx:Rx = 1.5k bytes: 1.5k bytes (default value)
0	1	Tx:Rx = 2k bytes: 1k bytes
1	0	Tx:Rx = 1k bytes: 2k bytes
1	1	Tx:Rx = 128 bytes: 3k bytes

Table 7–? Transmission and Reception buffer setting

- Set the buffer size of the *headerless stream mode* both transmission and reception data buffers.
- Total buffer size is 3k bytes and can be assigned its area to both transmission and reception buffers.

- On Mode 3 and Mode 5, buffer size is fixed, transmission buffer is 256 bytes and reception buffer is 2.5k bytes. On Mode 4 and 6, this buffer does not used.

Bits 5 – 2: Reserved

- The FRH-SD07TU/TB does not use this register. Keep the default value as it is [0010].

Bit 1: Flow control

0	No flow control (default value)
1	Hardware flow control

Table 7–? Communication flow control

- Select serial communication flow control. Be sure to use *hardware flow control*, it means that this bit should be set to '1'.
- In *hardware flow control*, the flow control is performed by using control lines, RTS and CTS. Make sure to wire these RTS and CTS lines.

Bit 0: Reserved

- The FRH-SD07TU/TB does not use this register. Keep the default value as it is.

REG23: Interface Setting 4 [default value: 00H]

The same function as the basic function, except bit 4.

Bit 4 : CR/LF addition/deletion

0	does not add CR/LF code to the received data (default value)
1	adds CR/LF code to the received data

Table 7–?: Addition of CR/LF code
(setting at the headerless stream mode)

- In the *headerless stream mode*, setting is made whether the CR/LF character is added to the received data or not.
- In the communication between the modems set to the *headerless packet (or stream) mode*, this setting is invalid because the *terminator* is originally added to the transmit data. However, when a packet is received from the modem in the *normal packet transmission mode*, there is no addition of the CR/LF *terminator*. In this case, set this bit to 1. Then the received packet is output with the CR/LF character is added.
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0	adds the CR/LF to the received data (default value)
1	does not add the CR/LF to the received data

Table 7–?: Deletion of CR/LF character
(setting at the packet transmission mode)

- In the *packet transmission mode*, setting is made whether the CR/LF character is added to the received data or not.

- At the receiver modem (set to the normal *packet transmission mode*), the sender (set to the *headerless stream mode*) side *terminator* (CR/LF character as default) plus *packet transmission mode terminator* (CR/LF) are output. To avoid such redundant outputs, set this bit of the modem in the normal *packet transmission mode* to 1.

REG24: Special communication mode setting [default value: C0H]

Bit 7 : Headerless mode setting

0	Headerless stream mode (FDA type radio compatible)
1	Headerless normal mode (FRH type radio compatible) (default value)

Table 7–? Headerless mode setting

- Along with REG03 and bit 6 of REG24, the headerless mode protocol is selected. To use the *headerless stream mode*, set this bit to '0'.

Bit 6 : Headerless stream mode setting

0	Timeout mode
1	Terminator mode (default value)

Table 7–? Headerless stream mode setting

- Along with REG03 and bit 7 of REG24, detail setting of the *headerless stream mode* is selected. For details, refer Transmission Trigger.

Bits 5 – 0: Reserved

- The FRH-SD07TU/TB does not use this register. Keep the default value as it is.

REG26: Headerless stream mode timeout setting [default value: 00H]

- Timeout value till starting transmission is set where FRH-SD07TU/TB operates in the headerless stream mode and bit 6 of REG24 is specified as timeout mode.
- Message will be transmitted after the elapsing time, where no character is fed from the serial communication interface, excess timeout value set by REG 26.
- Set 10 ms to 2550 ms in 10ms inclement. Set the value that 1/10 of desired timeout time (in ms).
- If value of zero is set, no timeout trigger is performed. Therefore, no data are transmitted.