

Freewave Transceiver Setup Parameters (08/01/05):

Instructions for setting FGR-HT series FreeWave transceivers.

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Notes:

All of the changes in radio settings can be done by using a standard Windows “HyperTerminal” program or similar.

In the case of “HyperTerminal” connected to the DATA port of the RS232 interface board, the program should be set for 19200 b/s, 8 data bits, 1 stop bit, “None” flow control.

The data port of the RS232 interface board should be connected to a COM port on computer via a regular RS232 straight (not a null modem) cable. One (1) cable is included in the shipment.

When changing settings on the radio, enable “Caps Lock” on the computer’s keyboard. All alpha characters referenced must be typed as upper case.

The RS232 interface board included in the shipment (10-pin-to-DB9 adapter) is to ease the testing of the EUT and normally provided by FreeWave Technologies as an accessory. Therefore, the RS232 interface board should not be a subject for testing/verification.

Note: For use of this document the terms “EUT”, “radio” and “transceiver” are interchangeable.

Declarations:

- 1) Part 15.247 Modulation Technique: Digital Transmission System (DTS)
- 2) Use PSD Option 2 for testing Power Spectral Density (Section 15.247(d))
- 3) Operating Ranges:
 - a. Wide Band 4.2MHz up to 1 Watt
 - b. Narrow Band 800kHz Up to ½ Watt (subject to change)
- 4) Power requirements (nominal) 12VDC -- 500mW
- 5) RF Antenna connector is Straight SMA type.

Current Transceiver settings:

The EUT is programmed for Point-to-MultiPoint Master Mode. This setting is found in Menu 1 Setting 2. To change to Point-to-MultiPoint Slave, enter Menu 1 and select 3. Other configurations are not yet available.

The Point-to-MultiPoint Master is to be used for intentional radiated emissions testing in the Transmit mode. The Point-to-MultiPoint Slave is to be used for unintentional radiated emissions testing in the Receive mode.

The radio is currently setup to operate in Wideband mode, Modulation is enabled, and will transmit at a center frequency of 914.8416MHz.

Note: In this mode the spectral density is output as narrowband. Use the '4-T', constant transmit function (described later in this document) which will display the wideband spectral density.

The following table shows the available frequencies and corresponding settings. e.g. To run at 924.0576MHz set Menu 3, Option 0, to 35.

Note: FreeWave recommends the three (3) frequency settings to test at be values 0, 20 and 40 for tests requiring bottom, middle and top of the range.

Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
0	902.5536						
1	903.1680	11	909.3120	21	915.4560	31	921.6000
2	903.7824	12	909.9264	22	916.0704	32	922.2144
3	904.3968	13	910.5408	23	916.6848	33	922.8288
4	905.0112	14	911.1552	24	917.2992	34	923.4432
5	905.6256	15	911.7696	25	917.9136	35	924.0576
6	906.2400	16	912.3840	26	918.5280	36	924.6720
7	906.8544	17	912.9984	27	919.1424	37	925.2864
8	907.4688	18	913.6128	28	919.7568	38	925.9008
9	908.0832	19	914.2272	29	920.3712	39	926.5152
10	908.6976	20	914.8416	30	920.9856	40	927.1296

Note: If the radio loses the DC power, it will maintain the last settings programmed.

Specific configurations for testing:

- ✓ For testing of harmonics/spurious emissions configure the EUT as follows:
 - ✓ Point-to-MultiPoint Master (Menu 1, Option 2)
 - ✓ Narrowband (Menu 3, Option D, Value 0)
 - ✓ Set Modulation to Off (Menu 5, Option C, Value 0,0)
- ✓ Check Wideband Spectral Density.
 - ✓ Point-to-MultiPoint Master (Menu 1, Option 2)
 - ✓ Wideband (Menu 3, Option D, Value 1)
 - ✓ Set Modulation to On (Menu 5, Option C, Value F,F)
 - ✓ Set continuous transmit to On (Menu 4, T)

Initial connections and entering Setup mode:

- ✓ Plug in the radio.
- ✓ Connect the RS232 interface board data port to a COM port on the PC.
- ✓ Start a "HyperTerminal".
- ✓ Enter the Setup program by pressing the setup switch (black push button by the DB-9 connector). The "Main Menu" from the radio should be displayed on HyperTerminal's screen. At this point the radio should have three green LED's as an indication of being in setup mode.

Set the radio to normal transmit mode:

- ✓ Enter Setup mode as described above,
- ✓ Hit "0" from the Main Menu followed by "2" (Point-to-MultiPoint Master).
- ✓ When done, hit <Esc> a few times until the radio will quit from the programming mode (LED's will start to flash RED) and will be ready for the measurements.

Set the radio to normal receive mode:

- ✓ Enter Setup mode as described above,
- ✓ Hit "0" from the Main Menu followed by "3" (Point-to-MultiPoint Slave).
- ✓ When done, hit <Esc> a few times until the radio will quit from the programming mode (LEDs will start to flash RED) and will be ready for the measurements.

Set the radio to constant transmit mode:

- ✓ Enter Setup mode as described above,
- ✓ Hit "4" from the Main Menu followed by "T". The HyperTerminal will not register anything when the "T" is pressed, however the display on the spectrum analyzer will show the constant signal output and the center LED will be solid red. The other two LEDs will remain off.

Set the modulation off:

- ✓ Enter Setup mode as described above,
- ✓ Hit "5" from the Main Menu followed by "C" (Subnet ID). The following parameters will be requested:
- ✓ Enter Rcv SubNetID (0-F) (Enter "0")
- ✓ Enter Xmit SubNetID (0-F) (Enter "0"). This will refresh the menu and show the SubNet ID as "Roaming".
- ✓ The Modulation is now 'off'.

Set the modulation on:

- ✓ Enter Setup mode as described above,
- ✓ Hit "5" from the Main Menu followed by "C" (Subnet ID). The following parameters will be requested:
- ✓ Enter Rcv SubNetID (0-F) (Enter "F")
- ✓ Enter Xmit SubNetID (0-F) (Enter "F"). This will refresh the menu and show the SubNetID as "Disabled".
- ✓ The Modulation is now 'on'.

Adjust the conducted RF output power level of the EUT:

- ✓ Enter Setup mode as described above,
- ✓ Hit "3" for "Edit Radio Transmission Characteristics".
- ✓ When under the "Radio Parameters" Menu, hit "5" for RF Xmit Power followed by the value, from "0" to "10". A "10" would correspond to the full output power level, while a setting of "0" would result in almost no output power on EUTs antenna port. The detailed dependency between the RF Xmit Power settings and actual output power level is to be determined upon conclusion of testing.
- ✓ When done, hit <Enter> to store the settings.
- ✓ Hit <Esc> a few times until the radio will quit from the programming mode (LEDs will start to flash RED) and will be ready for the measurements.

Antenna Information:

There are total of two antennas provided with the EUTs. These antennas are

- YA5-900 W,6 dB gain, Yagi antenna by “Larsen”;
- EB8965C, 5 dBi gain, omni-directional antenna by “Antenex”.

The detailed specifications for these antennas with their radiation pattern can be found in the folder named “Antenna Specs” provided with this submittal.

An antenna cable is provided with the shipment (SMA to N-type) supplied for testing.

HyperTerminal settings:

- ✓ Below is a parsed capture of the radios settings from 1 radio. Please use for reference if necessary.

(Main Menu)

```
MAIN MENU
SHVersion 2.34a 07-14-2005
Standard Hop Table
Modem Serial Number 884-0006
```

- (0) Set Operation Mode
- (1) Set Baud Rate
- (2) Edit Call Book
- (3) Edit Radio Transmission Characteristics
- (4) Show Radio Statistics
- (5) Edit MultiPoint Parameters
- (6) TDMA Menu
- (8) Chg Password
- (Esc) Exit Setup

(Menu 0)

SET MODEM MODE
Modem Mode is 2

- (0) Point to Point Master
- (1) Point to Point Slave
- (2) Point to MultiPoint Master Use for Transmission measurements
- (3) Point to MultiPoint Slave Use for Receive measurements
- (4) Point to Point Slave/Repeater
- (5) Point to Point Repeater
- (6) Point to Point Slave/Master Switchable
- (7) Point to MultiPoint Repeater
- (F) Ethernet Options
- (Esc) Exit to Main Menu

(Menu 1) (COMM port baud rate)

SET BAUD RATE
Modem Baud is 230,400

- (0) 230,400
- (1) 115,200
- (3) 57,600
- (4) 38,400
- (5) 19,200
- (6) 9,600
- (7) 4,800
- (8) 2,400
- (9) 1,200
- (A) Data, Parity 0
- (B) MODBus RTU 0
- (C) RS232/485 0
- (D) Setup Port 3
- (E) TurnOffDelay 0 TurnOnDelay 0
- (F) FlowControl 0
- (Esc) Exit to Main Menu

(Menu 2)

MODEM CALL BOOK

Entry to Call is 00

Entry Number Repeater1 Repeater2

(0) 884-0003

(1) 000-0000

(2) 000-0000

(3) 000-0000

(4) 000-0000

(5) 000-0000

(6) 000-0000

(7) 000-0000

(8) 000-0000

(9) 000-0000

(C) Change Entry to Use (0-9) or A (ALL)

(Esc) Exit to Main Menu

Enter all zeros (000-0000) as your last number in list

Menu 2 is not applicable to Elite Engineering tests.

(Menu 3)

RADIO PARAMETERS

WARNING: Do not change parameters without reading manual

(0) FreqChannel 20 Value selects Center Frequency

(1) Max Packet Size 9

(2) Min Packet Size 1

(3) Xmit Rate 0

(4) RF Data Rate 2

(5) RF Xmit Power 10 Value selects Output Power

(6) Slave Security 0

(7) RTS to CTS 0

(8) Retry Time Out 255

(9) Lowpower Mode 0

(A) High Noise 0

(B) MCU Speed 1

(C) RemoteLED 0

(D) WideBand 0 / 1 (0 = Narrow band, 1 = Wide band)

(Esc) Exit to Main Menu

Enter Choice

(Menu 4)

MODEM STATISTICS

Master-Slave Distance (m) 0062464

Number of Disconnects 0
Radio Temperature 26
Antenna Reflected Power 15
Transmit Current (mA) 0658
Local Remote1 Remote2 Remote3
J dBm dBm dBm dBm
Noise 18 121
Signal 0 239
Rate % 0
5474F2
Press <Ret> for Freq Table, <Esc> to return to main menu

Most statistics in Menu 4 will not be accurate with out a companion transceiver.

(Menu 5)

MULTIPOINT PARAMETERS

(0) Number Repeaters 0
(1) Master Packet Repeat 9
(2) Max Slave Retry 9
(3) Retry Odds 9
(4) DTR Connect 0
(5) Repeater Frequency 0
(6) NetWork ID 0255
(7) Reserved
(8) MultiMasterSync 0
(9) 1 PPS Enable/Delay 255
(A) Slave/Repeater 0
(B) Diagnostics 0
(C) SubNet ID Roaming / Disabled
(D) Radio ID Not Set
(Esc) Exit to Main Menu

(Roaming (0, 0) turns off modulation. Disabled (f, f) turns on Modulation)