



**8 Channel 800MHz Bi-Directional  
Booster Amplifier  
Model 50289-BA-8-PA**

**Operations and Installation  
Instruction Manual**

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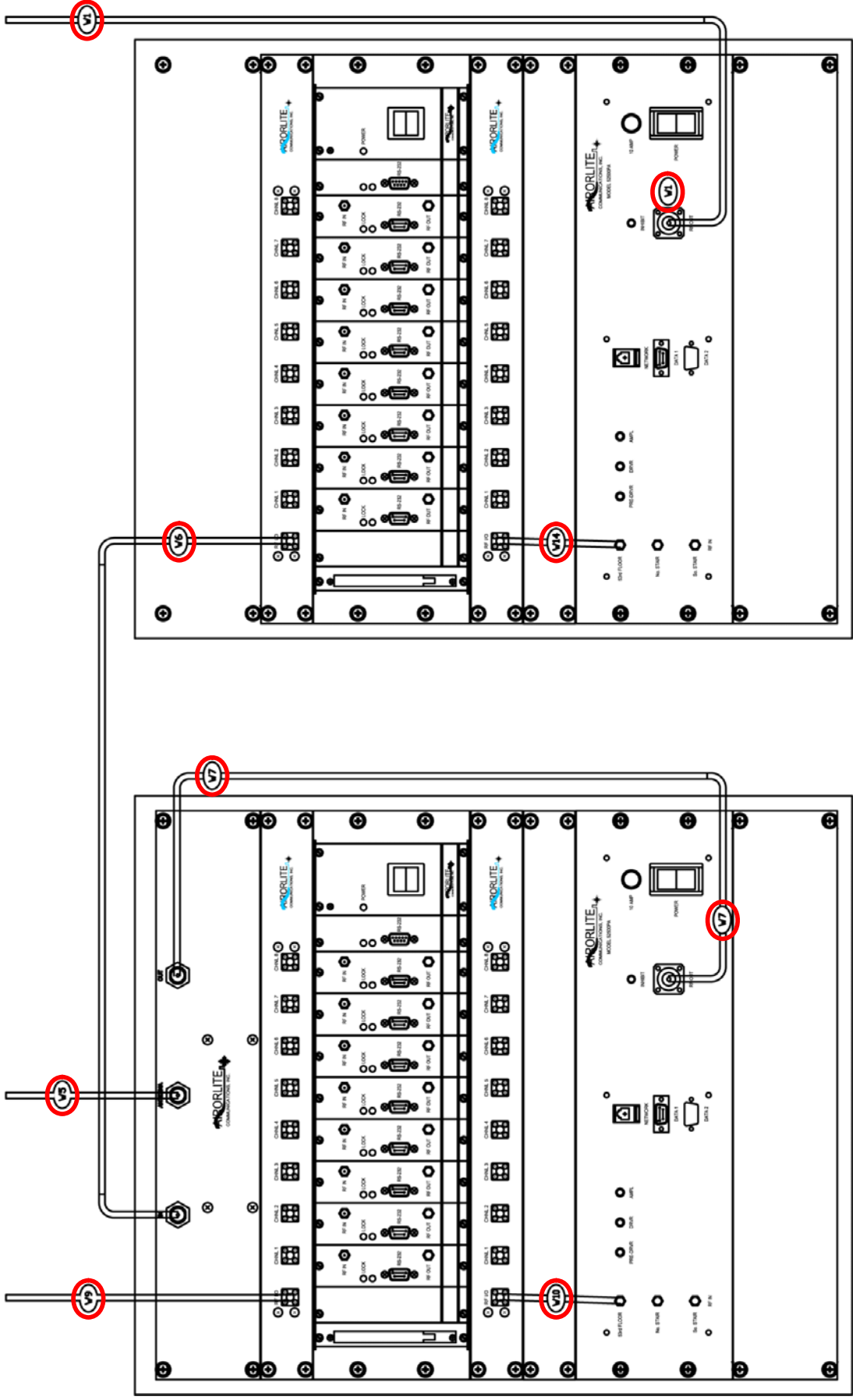
## SYSTEM SPECIFICATIONS

Description	SPECIFICATIONS
Frequency Range	819-824 MHz & 864-869 MHz
<b>Outbound Signal - Uplink (# of channels=8)</b>  (Uplink channel cards can be programmed to these frequencies only)	<b>821.2150 MHz</b> <b>821.8125 MHz</b> <b>822.3750 MHz</b> <b>822.8750 MHz</b> <b>823.0125 MHz</b> <b>823.5500 MHz</b> <b>823.6000 MHz</b> <b>823.9125 MHz</b>
<b>Inbound Signal - Downlink (# of channels=8)</b>  (Downlink channel cards can be programmed to these frequencies only)	<b>866.2125 MHz</b> <b>866.8125 MHz</b> <b>867.3750 MHz</b> <b>867.8750 MHz</b> <b>868.0125 MHz</b> <b>868.5500 MHz</b> <b>868.6000 MHz</b> <b>868.9125 MHz</b>
Channel Bandwidth (Uplink/Downlink)	25 kHz Nominal
Channel Spacing	25 KHz
RF Frequency Accuracy	Tracks input signal exactly
Adjacent Channel Selectivity	70 dB @ $\pm 17.5$ kHz Fc
RF Output Power (Downlink)	~25 dBm/carrier, minimum
RF Output Power (Uplink)	~26 dBm/carrier, minimum
Variation of Output Power w/Input Level	+0, -1.0 dB in either direction
Maximum Passband Ripple Across Full Band	2 dB
Maximum Passband Ripple Across any 100 kHz segment	0.1 dB
Amplifier Input Ports (no damage)	0 dBm
Propagation Delay	32 microseconds, maximum
Intermodulation/Crossmodulation Distortion at Full Output Power	-60 dBc
Channel to Channel Isolation	-70 dBm
Minimum High Band Signal to produce +25 dBm output to Radiating Antenna Cable	-90 dBm
Minimum Low Band Signal to produce full output	-90 dBm
AGC Control Range (Uplink & Downlink)	+80 dB
Duty Cycle	Continuous
RF Spurious Output, less than 800 MHz, but greater than 1000 MHz	-60 dBc, Maximum
RF Spurious Output for frequencies ranging from 800 - 1000 MHz	-85 dBc, Maximum
Operating Temperature Range	-20°C to +60°C
System Noise Figure	< 9 dB
Input/Output Impedance	50 Ohms, nominal
Input/Output VSWR	1.35:1, worst case
Input/Output Connectors	Type "N" Female
Input Power	95-132 VAC, 45-64 Hz
Amplifiers are unconditionally stable	under all operating conditions
Alarm	Loss of Power Supply, DC Change in current draw of +/- 20% for each internal amplifier

# BASIC CONNECTION DIAGRAM

UP LINK QFF-THE-AIR RADIATOR ANTENNA

DOWN LINK RADIATOR



ENCLOSURES STACK-UP DOWN LINK

ENCLOSURES STACK-UP UP LINK

## BASIC CONNECTION DIAGRAM KEY

ID	Item 1	Item 2
W1	Downlink Power Amp Output	Downlink Radiator
W5	Duplexer Antenna Port	"Off the Air" Antenna
W6	Duplexer Downlink	Downlink 8 Way Splitter
W7	Duplexer Uplink	Uplink Power Amplifier Output
W9	Uplink 8 Way Splitter	Uplink Radiator
W10	Uplink 8 Way Combiner	Uplink Power Amplifier Input
W14	Downlink 8 Way Combiner	Downlink Power Amplifier Input

The Basic Connection Diagram shown above, is the proper way the BDA should be connected and once up and running, require minimal to none manual configuration. Connections between cabinets are made through N-Bulkhead connectors located on the top of each cabinet. All programming and adjusting is done through the software and this manual primarily deals with this topic.

The computer running the software is connected via an RS232 serial cable to each channel card in the manner shown below.



## MAIN SCREEN

Below is the main working screen used to configure the channel card settings.

The primary fields addressed are:

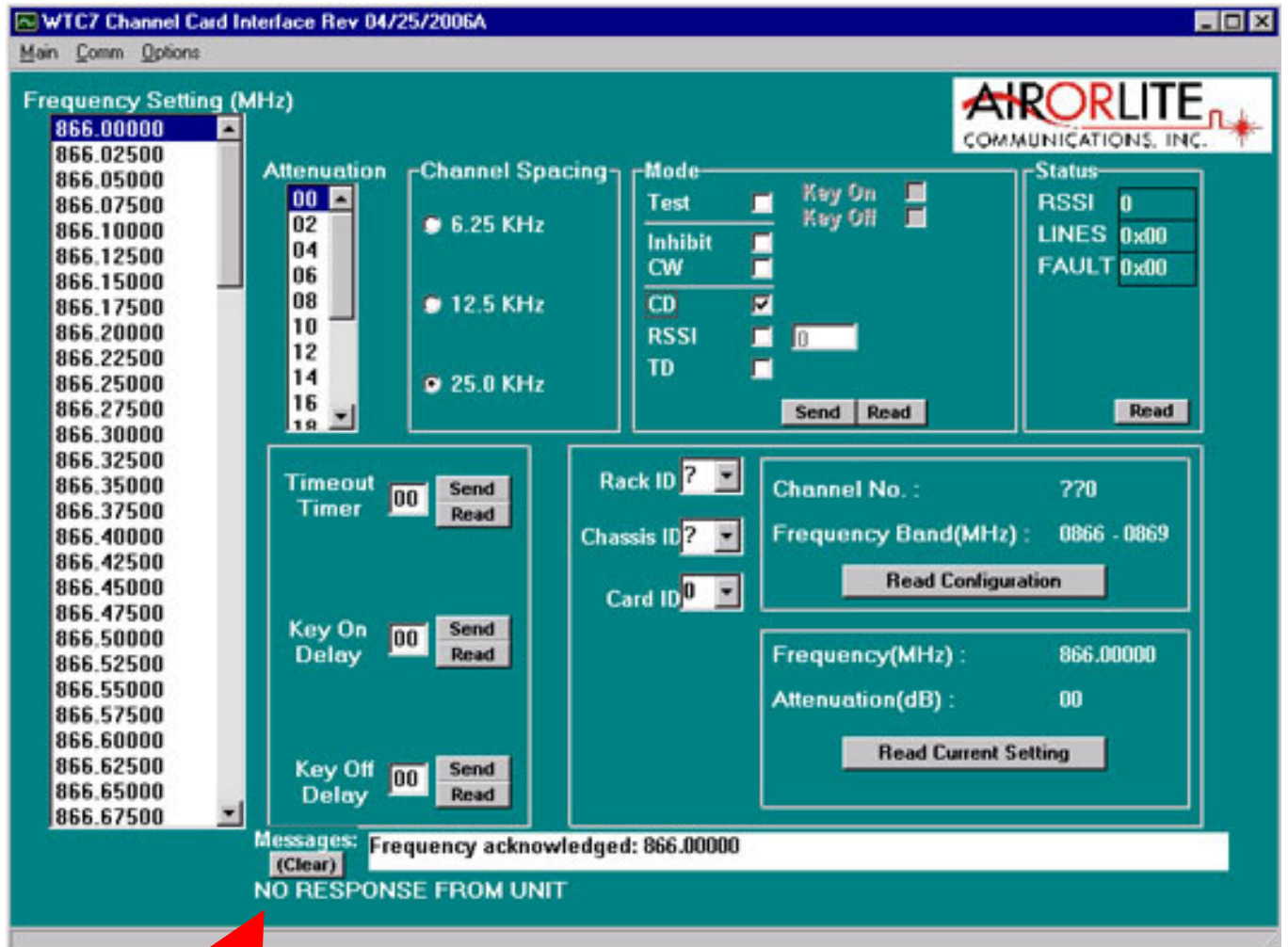
- Communication Connection
- Time Out Timer
- Mode Setting
- Key On Delay
- Key Off Delay
- Attenuation
- Setting a Frequency

The screenshot displays the 'WTC7 Channel Card Interface Rev 04/25/2006A' software window. The interface is divided into several sections:

- Frequency Setting (MHz):** A list of frequencies from 866.00000 to 866.67500, with 866.00000 selected.
- Attenuation:** A dropdown menu showing values from 00 to 18.
- Channel Spacing:** Radio buttons for 6.25 KHz, 12.5 KHz, and 25.0 KHz.
- Mode:** Checkboxes for Test, Inhibit, CW, CD (checked), RSSI, and TD. Includes 'Key On' and 'Key Off' checkboxes.
- Status:** Fields for RSSI (0), LINES (0x00), and FAULT (0x00).
- Timeout Timer:** A numeric field set to 00 with 'Send' and 'Read' buttons.
- Key On Delay:** A numeric field set to 00 with 'Send' and 'Read' buttons.
- Key Off Delay:** A numeric field set to 00 with 'Send' and 'Read' buttons.
- Configuration Section:** Includes 'Rack ID', 'Chassis ID', and 'Card ID' dropdowns, and a 'Channel No.' field set to '???'.
- Frequency Band (MHz):** A field showing '0866 - 0869'.
- Current Settings:** A box showing 'Frequency(MHz) : 866.00000' and 'Attenuation(dB) : 00'.
- Messages:** A status bar at the bottom showing 'Frequency acknowledged: 866.00000'.

## COMMUNICATION CONNECTION

This software automatically checks the condition of its communication with the intended channel. Each message is acknowledged and displayed in the message box at the bottom of the screen. If the software does not receive a response from the channel, a warning message is displayed, "NO RESPONSE FROM UNIT".

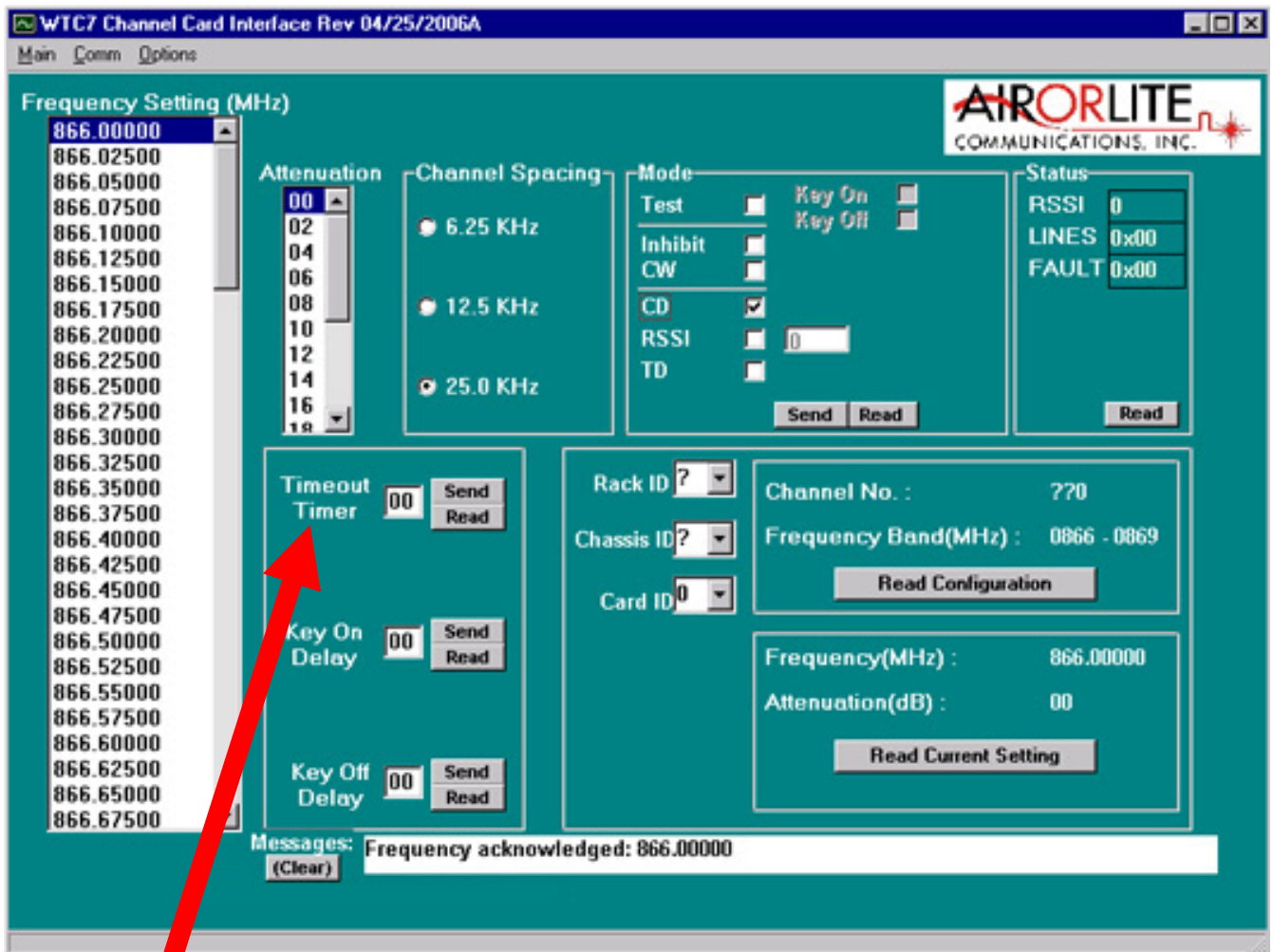


## TIME OUT DURATION

The time-out duration is how long a channel can be held open (keyed on) for a retransmission. An inadvertent or intentional “key and hold” action without any voice communication will not disable the channel because of this feature. The time-out duration can be up set from 1 second to 99 seconds 1 second intervals. The time-out duration can be disabled by setting it to 00, when disabled, the channel will key continuously with the presence of a received signal.

## SETTING A TIME-OUT TIME

To set a time-out time, click on the text box “**Time Out Timer**” and enter the desired time-out time up to 99 seconds then click “**Send Button**” next to the box. To verify the setting, click on the “**Read Button**” and the display will be updated with the channel setting.

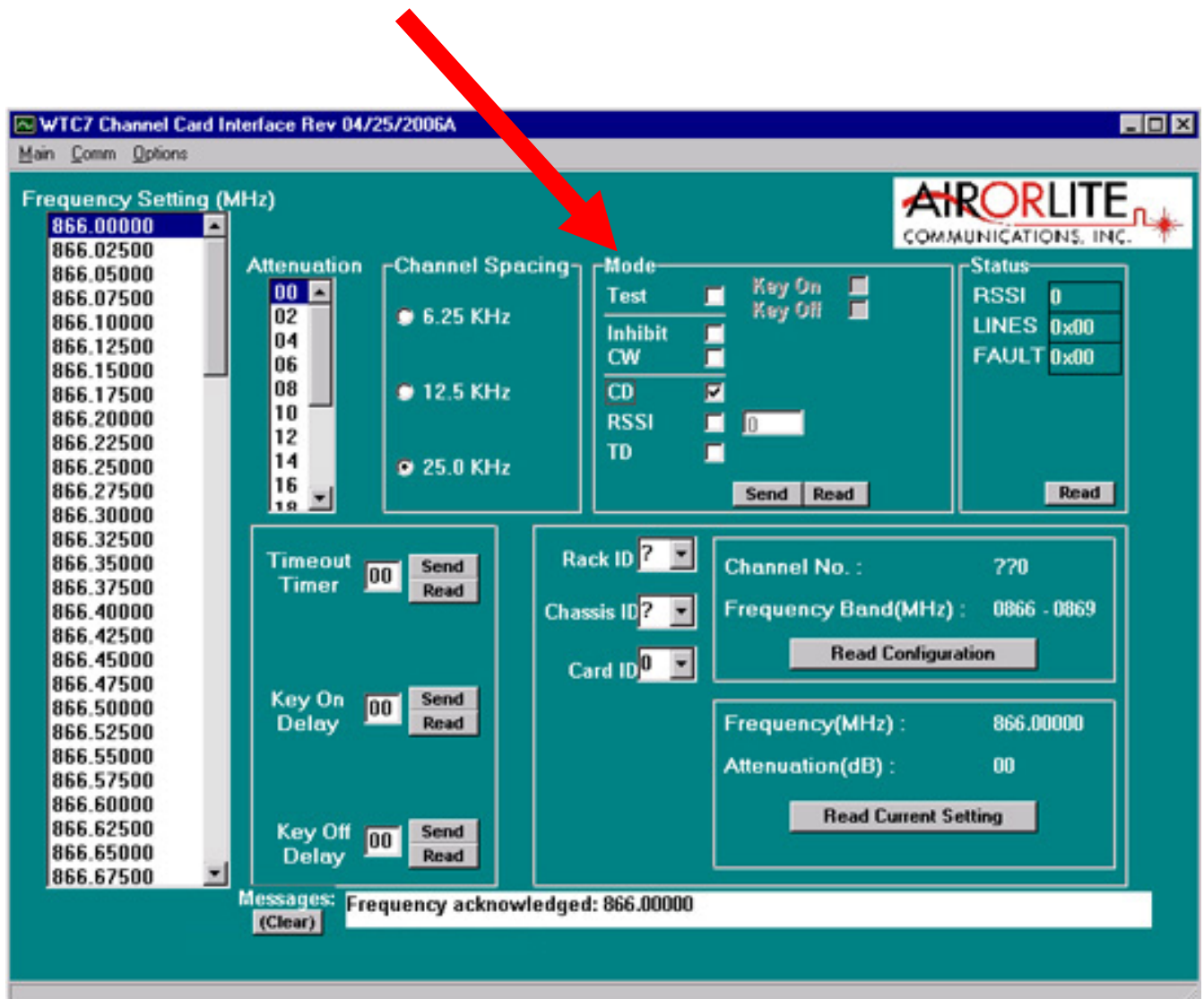


## MODE SETTING

The channel mode may be set to either INHIBIT, CONTINUOUS, CARRIER DETECT or optional TONE DETECT. In the Inhibit mode, the channel is off and will not key on. In the continuous mode, CW, the channel is always keyed and continuously transmitting. In the carrier detect mode, CD, the channel is keyed only when the incoming signal strength is above the factory set threshold level. Normal operation will be in CD mode; continuous mode is normally used for testing.

## CHANGING THE MODE

To change the Mode, click the desired function box on **Mode Selection** on the main screen. Then click "Send Button" next to the box. To verify the setting, click on the "Read Button" and the display will be updated with the mode setting.



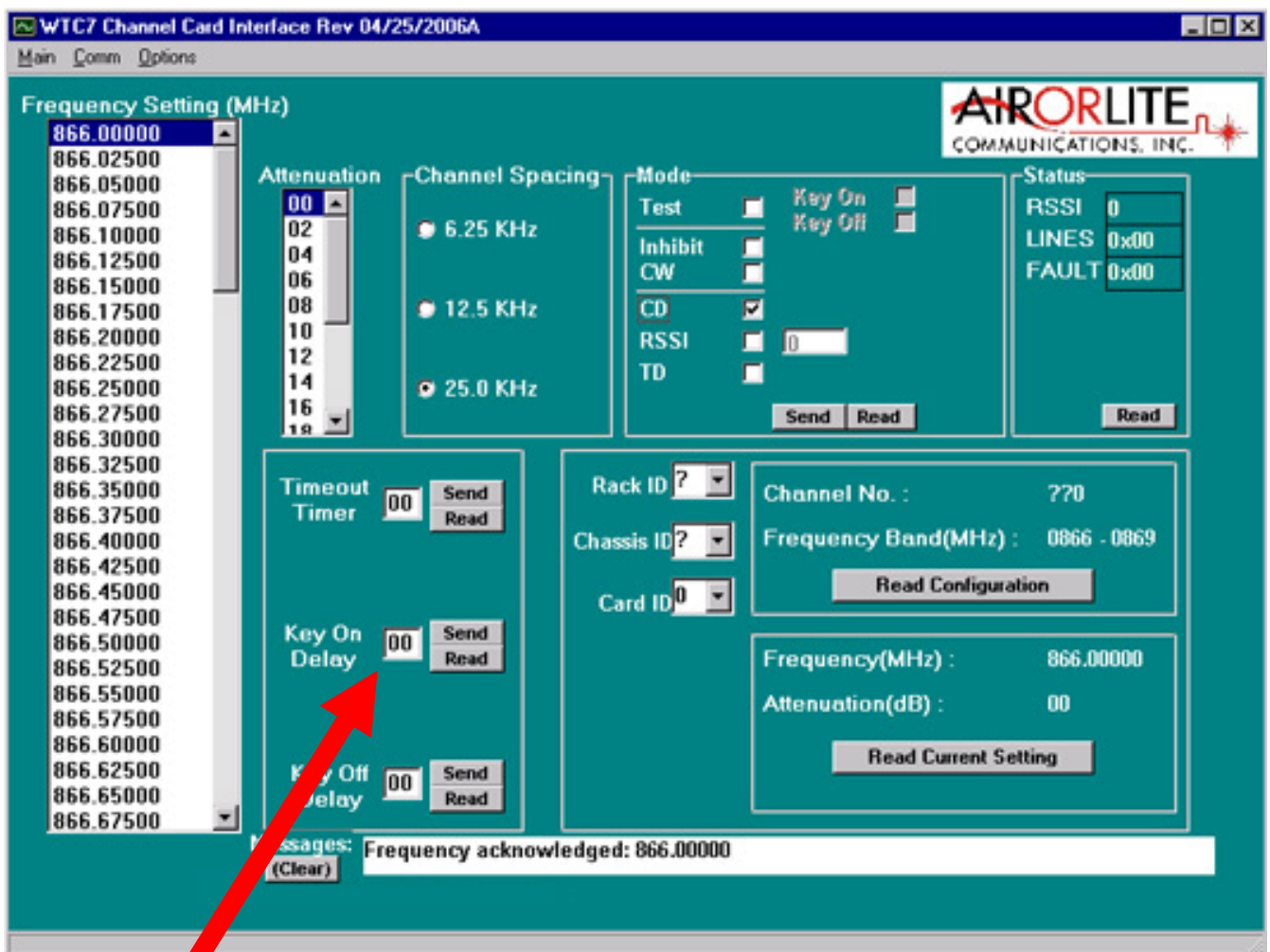


## KEY ON DELAY

The key on delay is a delay duration between the detection of carrier detect and the transmitter key on. The key on delay duration can be up set from 0 to 99 milliseconds 1 millisecond intervals.

## SETTING KEY ON DELAY

To set a time-out time, click on the text box **“Key On Delay”** and enter the desired delay up to 99 milliseconds then click **“Send Button”** next to the box. To verify the setting, click on the **“Read Button”** and the display will be updated with the channel setting.

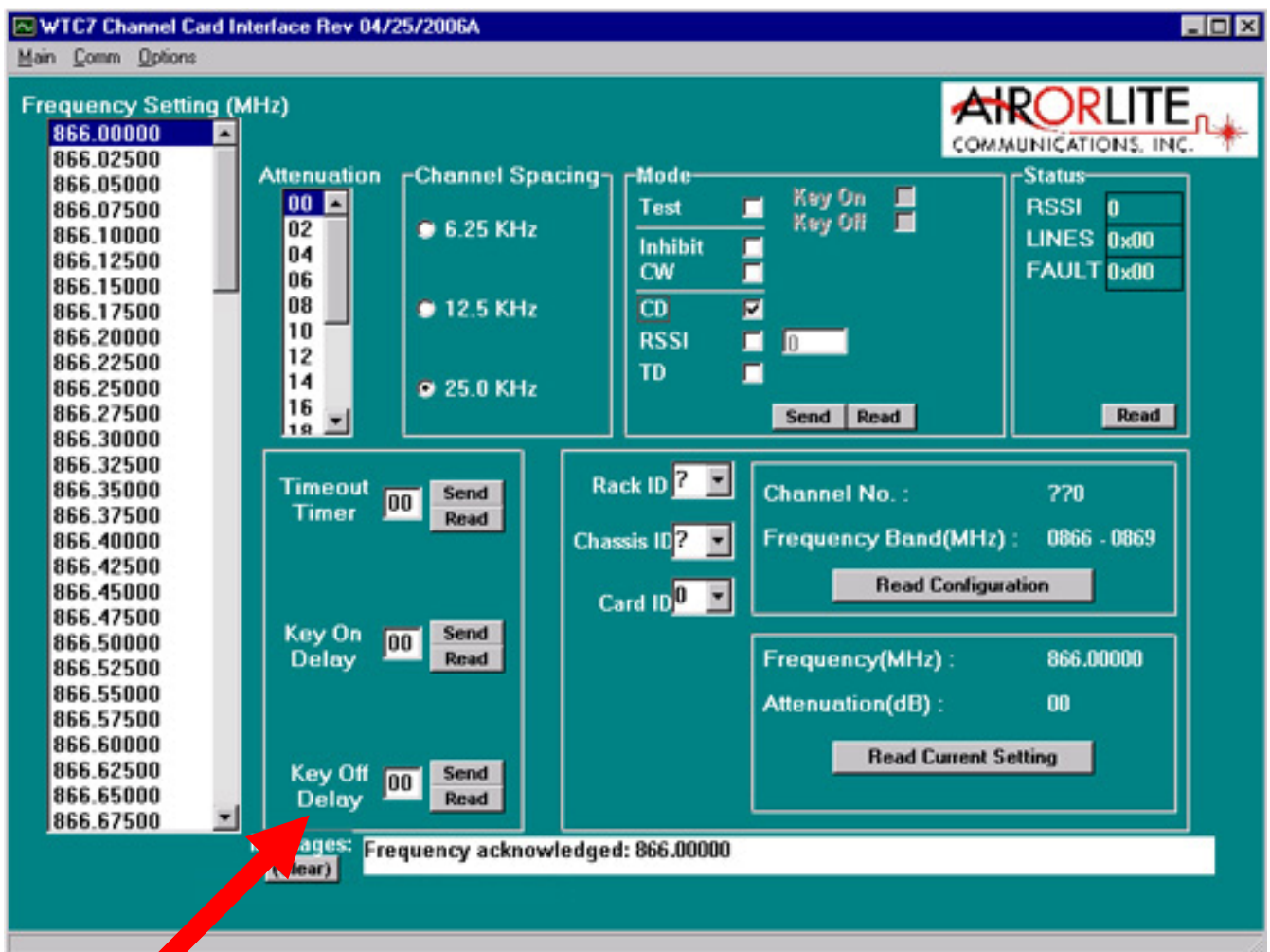


## KEY OFF DELAY

The key off delay is a delay duration between the release of carrier detect and the transmitter key off. The key off delay duration can be up set from 0 to 99 milliseconds 1 millisecond intervals.

## SETTING KEY OFF DELAY

To set a time-out time, click on the text box **“Key Off Delay”** and enter the desired delay up to 99 milliseconds then click **“Send Button”** next to the box. To verify the setting, click on the **“Read Button”** and the display will be updated with the channel setting.

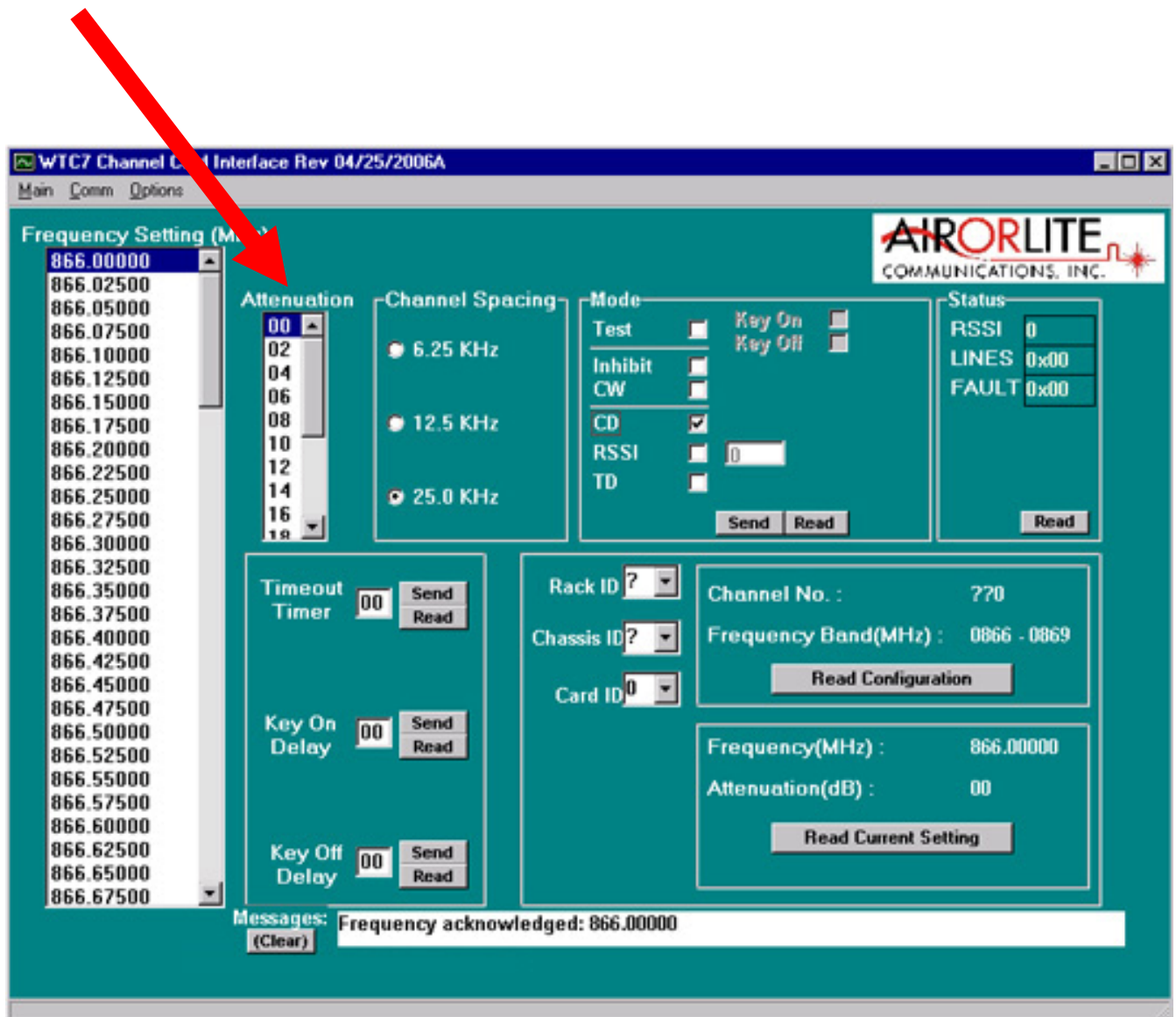


## ATTENUATION

With high RF receive levels, an input attenuator can be set 0 to 15dB in 1dB steps.

## SETTING ATTENUATION

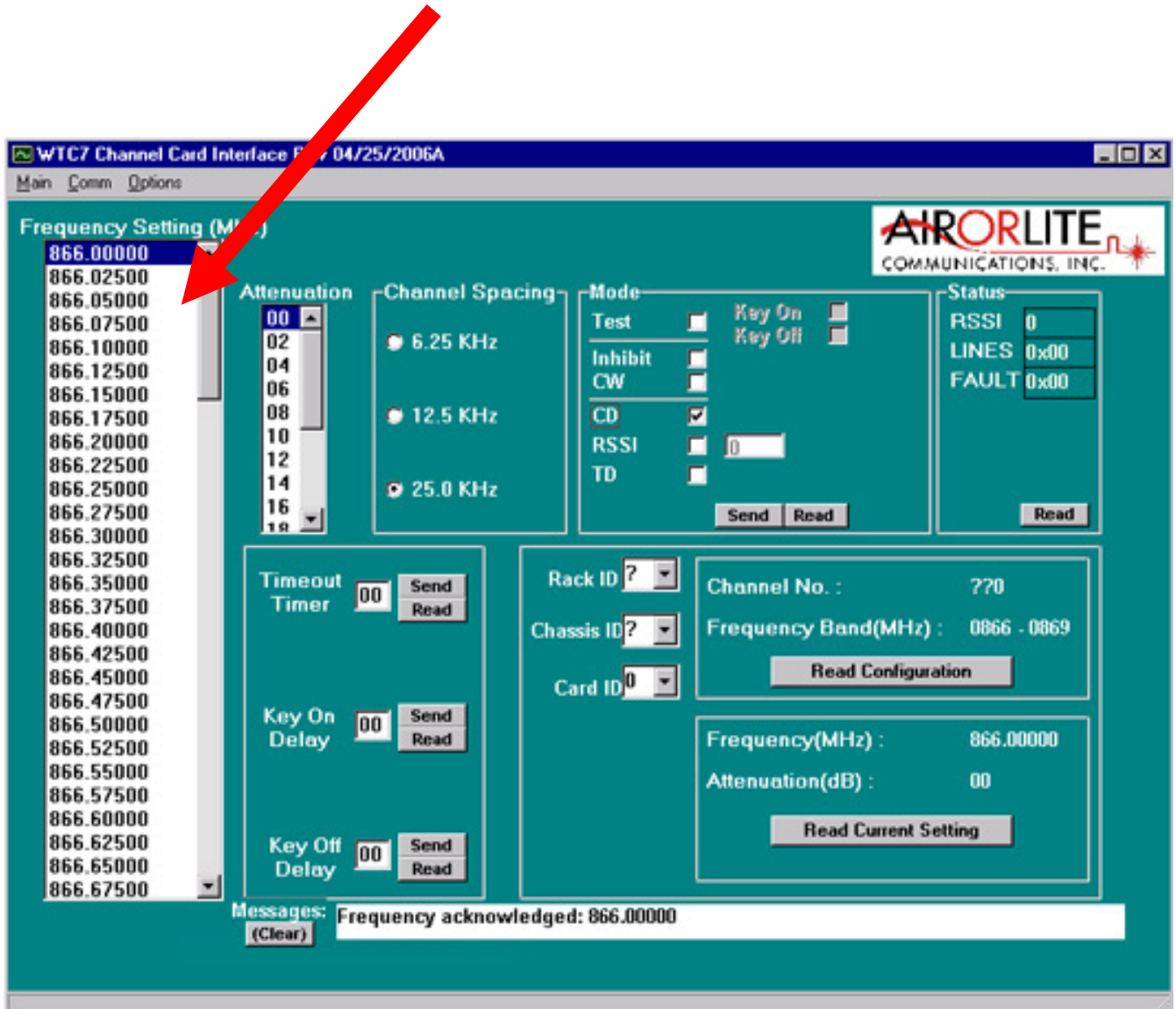
To set Attenuation: click the function window **Attenuation** on the main screen. Click on the *scroll bar* next to the text box, a scroll down list of available attenuation settings. Double Click the on desired setting.



## SETTING A FREQUENCY

The 8 Channel BDA is shipped with 8 Uplink frequencies and 8 Downlink frequencies. The user can program any card to any of these 8 specified frequencies.

To set frequency click the function window **Frequency Setting** on the main screen. Click on the *scroll bar* next to the text box, a scroll down list of available frequency settings. *Double Click* the on desired setting.



## FCC Compliance and RF Exposure Information

This product is certified by the FCC as compliant with CFR.47 Part 90. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

To comply with FCC RF exposure requirements, antennas that are mounted externally at remote locations or operating near users at stand-alone desktop of similar configurations must operate with a minimum separation distance of 15 cm from all persons.

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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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.