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Client: Airlite Communications, Inc.
Model: 50289 Bi-Directional Booster
Standards: FCC Part 90
FCC ID: UT650289BA8470DL
Report Number: 2007151A

Appendix J: Manual

Please refer to the following pages for the installation manual.



**8 Channel 400MHz Bi-Directional
Booster Amplifier
Model 50289-BA-8-PA**

**Operations and Installation
Instruction Manual**

AIRORLITE UNCONDITIONALLY GUARANTEES THE MERCHANDISE PROVIDED AGAINST DEFECTS OF ANY KIND INCLUDING, WITHOUT LIMITATION, DEFECTS IN OPERATION, DESIGN, MATERIALS, AND WORKMANSHIP FOR TWO YEARS FROM THE DATE OF DELIVERY. AIRORLITE IS NOT RESPONSIBLE FOR ANY EQUIPMENT REPAIRED OR ALTERED BY PERSONS NOT AUTHORIZED BY AIRORLITE OR NOT IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY AIRORLITE. AIRORLITE IS NOT RESPONSIBLE FOR EQUIPMENT RENDERED DEFECTIVE AS A RESULT OF MISUSE, IMPROPER REPAIR, OR ABNORMAL CONDITIONS OF OPERATION, NOR DOES AIRORLITE ASSUME ANY LIABILITY FOR ANY CONSEQUENTIAL DAMAGE CAUSED BY SUCH EQUIPMENT.

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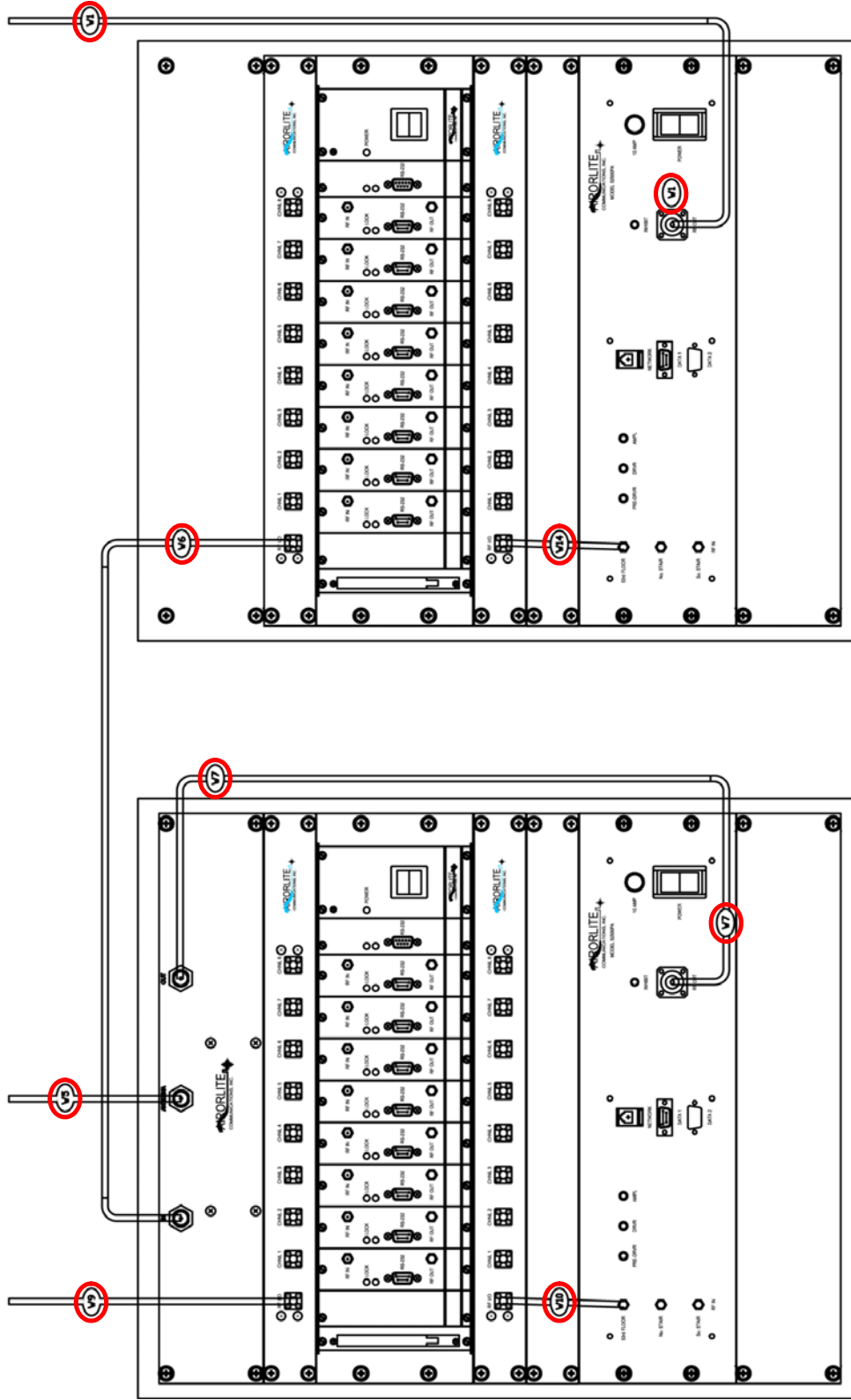
SYSTEM SPECIFICATIONS

Description	SPECIFICATIONS
Frequency Range	470-490 MHz
Outbound Signal - Uplink (# of channels=8) (Uplink channel cards can be programmed to these frequencies only)	470-480 MHz, 480-490 MHz
Inbound Signal - Downlink (# of channels=8) (Downlink channel cards can be programmed to these frequencies only)	470-480 MHz, 480-490 MHz
Channel Bandwidth (Uplink/Downlink)	25 kHz Nominal
Channel Spacing	25 KHz
RF Frequency Accuracy	Tracks input signal exactly
Adjacent Channel Selectivity	70 dB @ ± 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	<120 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 470 MHz, but greater than 500 MHz	-60 dBc, Maximum
RF Spurious Output for frequencies ranging from 500 - 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 Loss of Power Supply, DC
Alarm	Change in current draw of +/- 20% for each internal amplifier

BASIC CONNECTION DIAGRAM

DOWN LINK
RADIATOR

UP LINK QFF-THE-AIR
RADIATOR ANTENNA



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

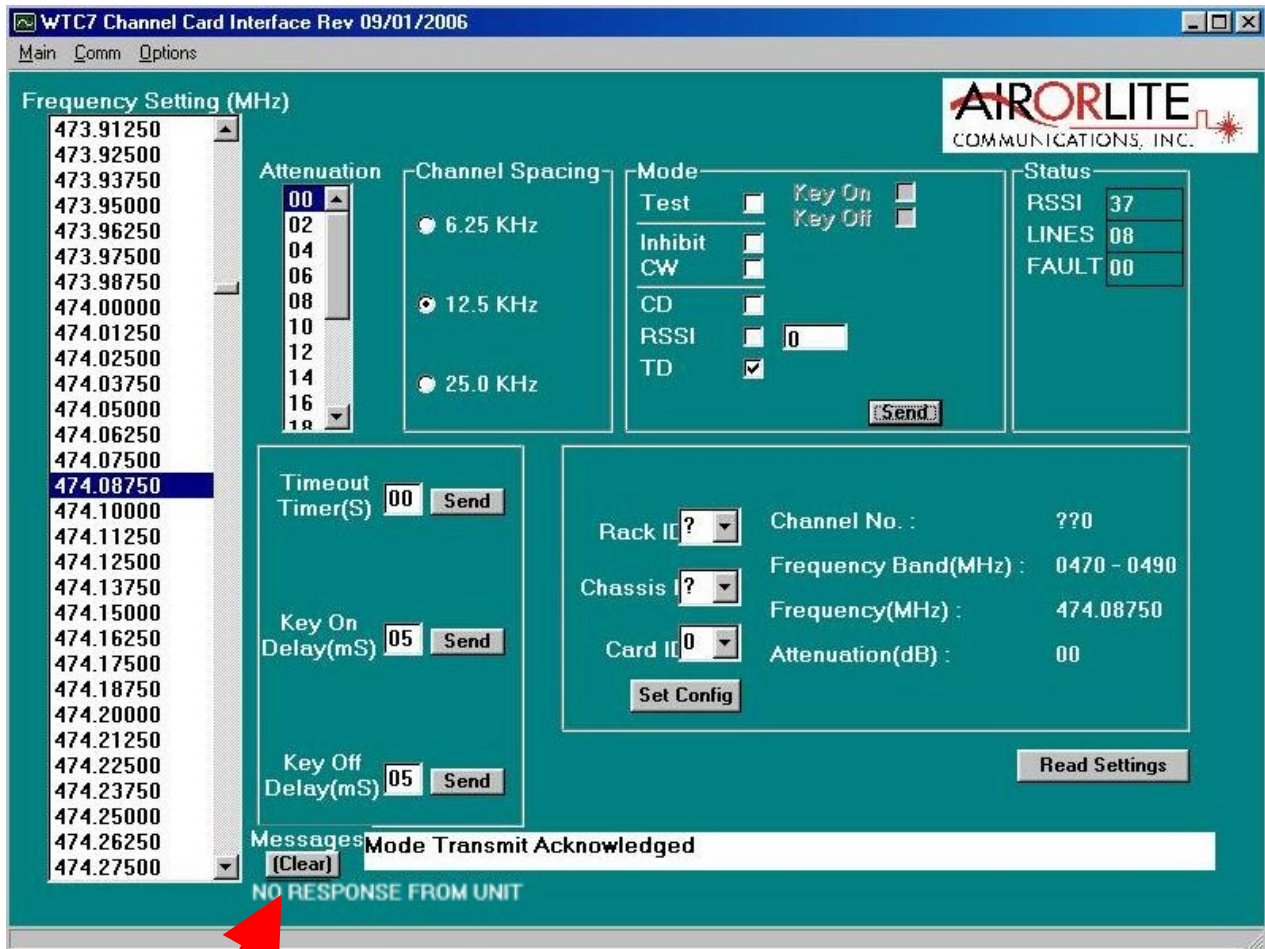
The screenshot displays the 'WTC7 Channel Card Interface Rev 09/01/2006' software window. The interface is divided into several sections:

- Frequency Setting (MHz):** A list of frequencies from 473.91250 to 474.27500. The frequency 474.08750 is currently selected.
- Attenuation:** A numeric input field set to 00, with a 'Send' button.
- Channel Spacing:** Radio buttons for 6.25 KHz, 12.5 KHz (selected), and 25.0 KHz.
- Mode:** Checkboxes for Test, Inhibit, CW, CD, RSSI, and TD. The TD checkbox is checked. There is also a 'Key On' and 'Key Off' checkbox area.
- Status:** A box showing RSSI (37), LINES (08), and FAULT (00).
- Timeout Timer(S):** A numeric input field set to 00, with a 'Send' button.
- Key On Delay(mS):** A numeric input field set to 05, with a 'Send' button.
- Key Off Delay(mS):** A numeric input field set to 05, with a 'Send' button.
- Configuration Summary:** A box showing Rack ID, Chassis, Card ID, Channel No., Frequency Band (0470 - 0490), Frequency (474.08750), and Attenuation (00). A 'Set Config' button is present.
- Messages:** A text area showing 'Mode Transmit Acknowledged' and a 'Clear' button.
- Read Settings:** A button to refresh the configuration data.

At the bottom of the window, the text 'SELECT A FREQUENCY' is displayed.

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.

The screenshot displays the 'WTC7 Channel Card Interface Rev 09/01/2006' software window. The interface is divided into several sections:

- Frequency Setting (MHz):** A list of frequencies from 473.91250 to 474.27500. The frequency 474.08750 is selected and highlighted in blue.
- Attenuation:** A dropdown menu showing values from 00 to 18. The value 00 is selected.
- Channel Spacing:** Radio buttons for 6.25 KHz, 12.5 KHz (selected), and 25.0 KHz.
- Mode:** Checkboxes for Test, Inhibit, CW, CD, RSSI, and TD. The TD checkbox is checked. A 'Send' button is located below these options.
- Status:** A table showing RSSI (37), LINES (08), and FAULT (00).
- Timeout Timer(S):** A text box containing '00' and a 'Send' button. A red arrow points to this text box.
- Key On Delay(mS):** A text box containing '05' and a 'Send' button.
- Key Off Delay(mS):** A text box containing '05' and a 'Send' button.
- Configuration:** Fields for Rack ID, Chassis, and Card ID, along with Channel No., Frequency Band (0470 - 0490), Frequency (474.08750), and Attenuation (00). A 'Set Config' button is present.
- Messages:** A text area displaying 'Mode Transmit Acknowledged' and a '(Clear)' button.
- Buttons:** 'Read Settings' and 'SELECT A FREQUENCY' buttons are also visible.

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.

The screenshot shows the 'WTC7 Channel Card Interface Rev 09/01/2006' software window. The 'Mode Selection' section is highlighted with a red arrow. The 'Mode' section contains the following options:

Mode	Key On	Key Off
Test	<input type="checkbox"/>	<input type="checkbox"/>
Inhibit	<input type="checkbox"/>	<input type="checkbox"/>
CW	<input type="checkbox"/>	<input type="checkbox"/>
CD	<input type="checkbox"/>	<input type="checkbox"/>
RSSI	<input type="checkbox"/>	<input type="checkbox"/>
TD	<input checked="" type="checkbox"/>	<input type="checkbox"/>

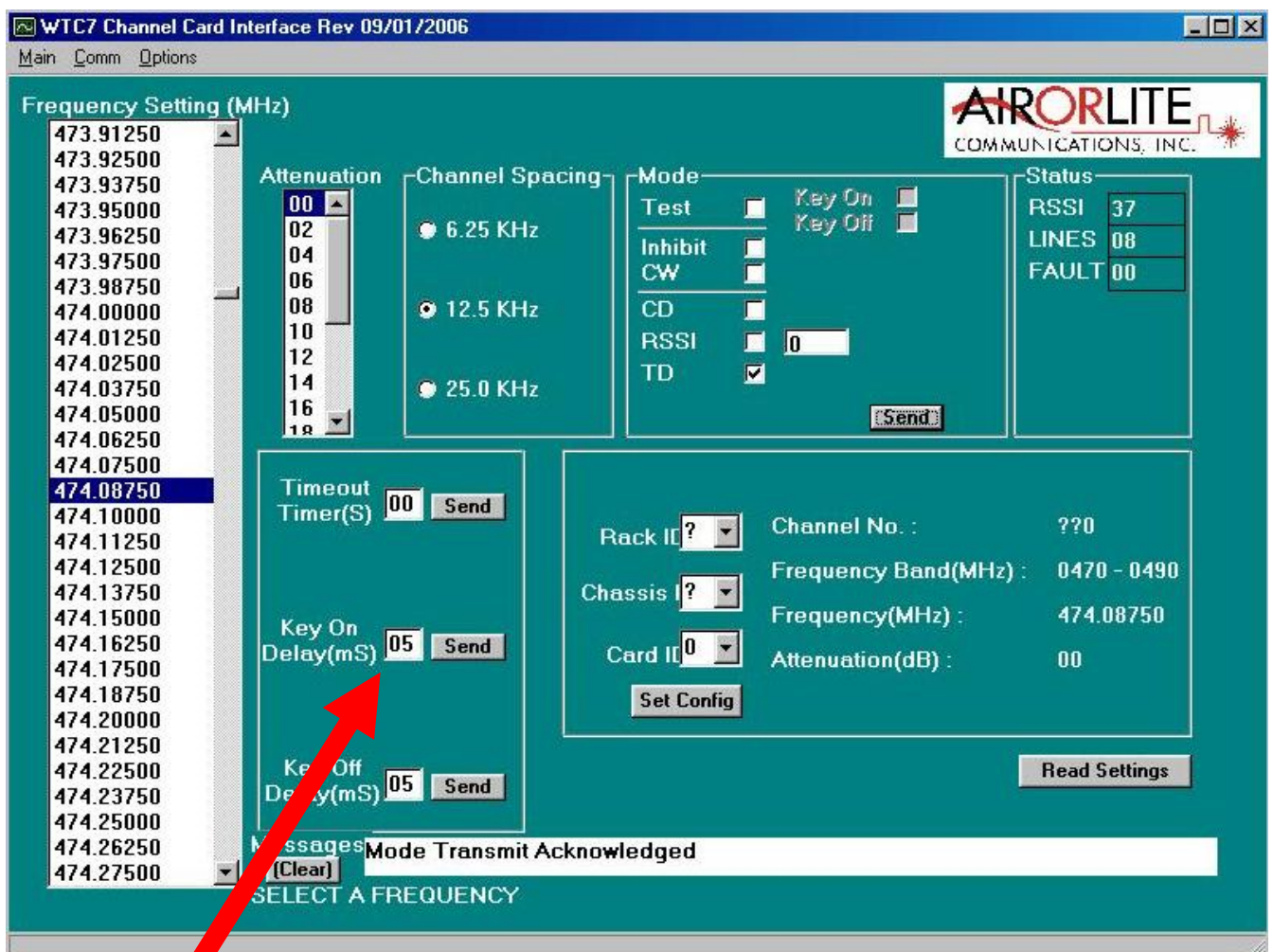
The 'Send' button is located below the 'Mode Selection' section. The 'Status' section shows RSSI: 37, LINES: 08, and FAULT: 00. The 'Frequency Setting (MHz)' list shows 474.08750 selected. The 'Attenuation' is set to 00. The 'Channel Spacing' is set to 12.5 KHz. The 'Timeout Timer(S)' is 00. The 'Key On Delay(mS)' is 05. The 'Key Off Delay(mS)' is 05. The 'Messages' section shows 'Mode Transmit Acknowledged'. The 'Rack ID', 'Chassis', and 'Card ID' are set to '?', '?', and '0' respectively. The 'Channel No.' is '??0', 'Frequency Band(MHz)' is '0470 - 0490', 'Frequency(MHz)' is '474.08750', and 'Attenuation(dB)' is '00'. The 'Set Config' and 'Read Settings' buttons are also visible.

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.

The screenshot displays the 'WTC7 Channel Card Interface Rev 09/01/2006' software window. The interface is divided into several sections:

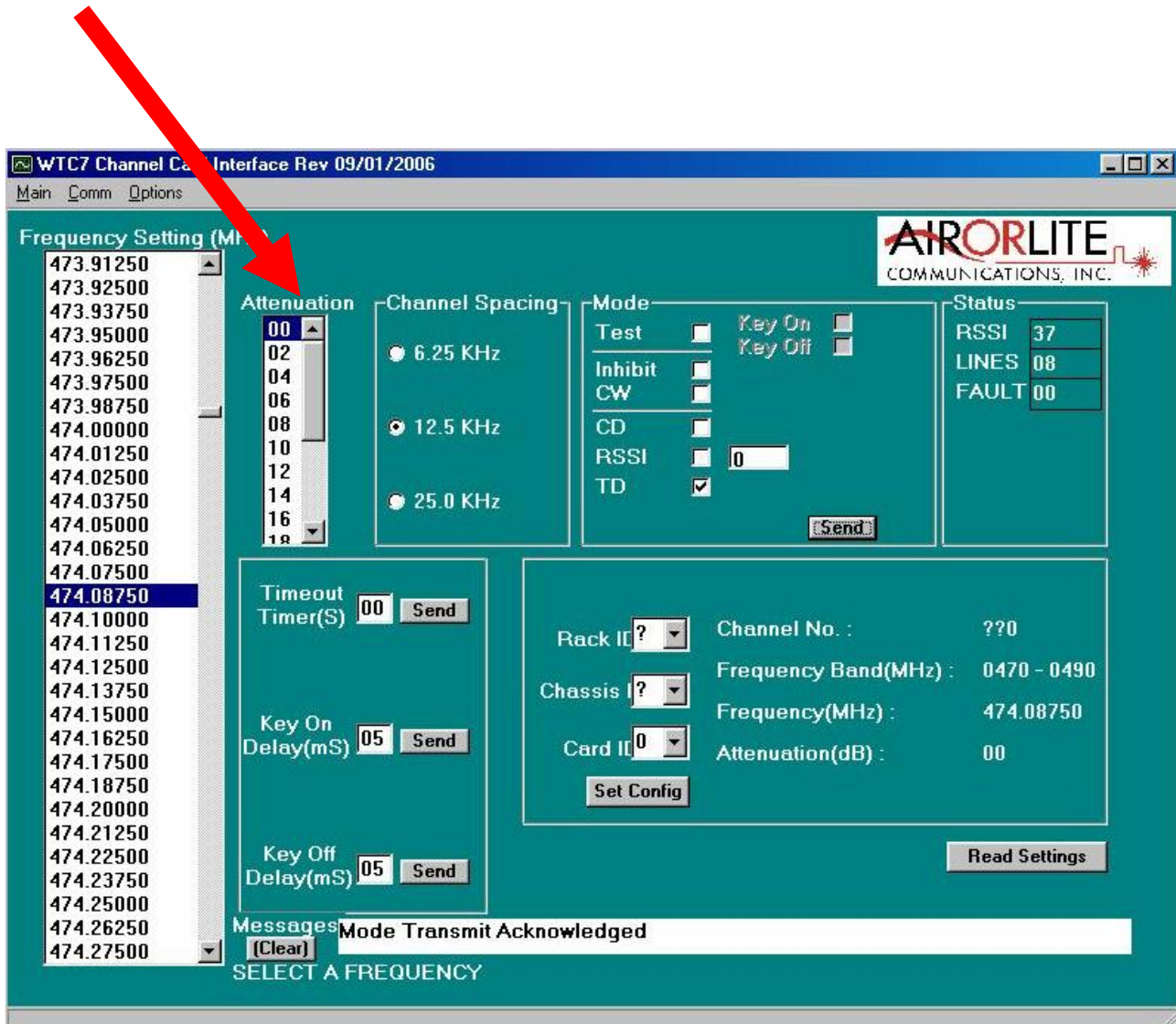
- Frequency Setting (MHz):** A list of frequencies from 473.91250 to 474.27500. The frequency 474.08750 is selected and highlighted.
- Attenuation:** A vertical scrollable list of values from 00 to 18.
- Channel Spacing:** Radio buttons for 6.25 KHz, 12.5 KHz (selected), and 25.0 KHz.
- Mode:** Checkboxes for Test, Inhibit, CW, CD, RSSI (with a value of 0), and TD (checked). There are also checkboxes for Key On and Key Off.
- Status:** A table showing RSSI (37), LINES (08), and FAULT (00).
- Timeout Timer(S):** A text box with '00' and a 'Send' button.
- Key On Delay(mS):** A text box with '05' and a 'Send' button.
- Key Off Delay(mS):** A text box with '05' and a 'Send' button. A red arrow points to this text box.
- Configuration:** Fields for Rack ID, Chassis, and Card ID, and labels for Channel No., Frequency Band (0470 - 0490), Frequency (474.08750), and Attenuation (00). A 'Set Config' button is present.
- Messages:** A status bar showing 'Mode Transmit Acknowledged' and a 'Read Settings' button.

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.

The screenshot shows the 'WTC7 Channel Card Interface Rev 09/17/2006' software window. The 'Frequency Setting (MHz)' window is active, displaying a list of frequencies from 473.91250 to 474.27500. A red arrow points to the scroll bar of this list, with the frequency 474.08750 selected. The interface includes several control panels: 'Attenuation' (00-18), 'Channel Spacing' (6.25, 12.5, 25.0 KHz), 'Mode' (Test, Inhibit, CW, CD, RSSI, TD), 'Status' (RSSI 37, LINES 08, FAULT 00), 'Timeout Timer(S)' (00), 'Key On Delay(mS)' (05), and 'Key Off Delay(mS)' (05). Configuration fields include Rack ID, Chassis, Card ID, Channel No., Frequency Band (0470 - 0490), Frequency (474.08750), and Attenuation (00). A 'Messages' window at the bottom shows 'Mode Transmit Acknowledged' and a 'SELECT A FREQUENCY' prompt.

FCC COMPLIANCE AND RF EXPOSURE INFORMATION

This product is certified by the FCC as compliant with CFR.47 Part 90. Any 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, determined at the time of site licensing from all persons.

For Downlink operation, the minimum safe distance from the antenna is 20 cm. For Uplink operation, the minimum safe distance from the antenna is 60 cm.

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, 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 this own expense.*