KNUDSEN
ENGINEERING LIMITED

Knudsen Chirp 3260
Show & Tell

For

UNOLS

November 8, 2007

UNOLS

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320BR: Workhorse for the UNOLS Fleet

THE HISTORY:

March 1996	1st Knudsen 320B System delivered to Univ. Miami
Sept. 1996	1st Knudsen 320BR deep water unit delivered to Scripps

UNOLS TODAY:

30 Units spread over 16 UNOLS organizations

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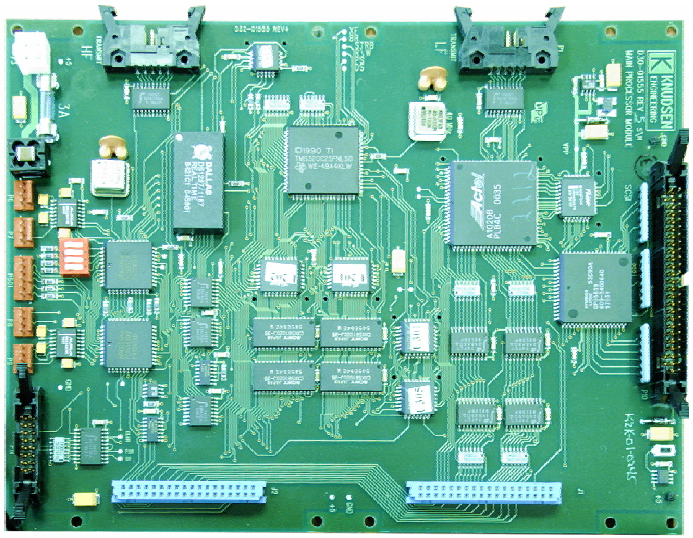
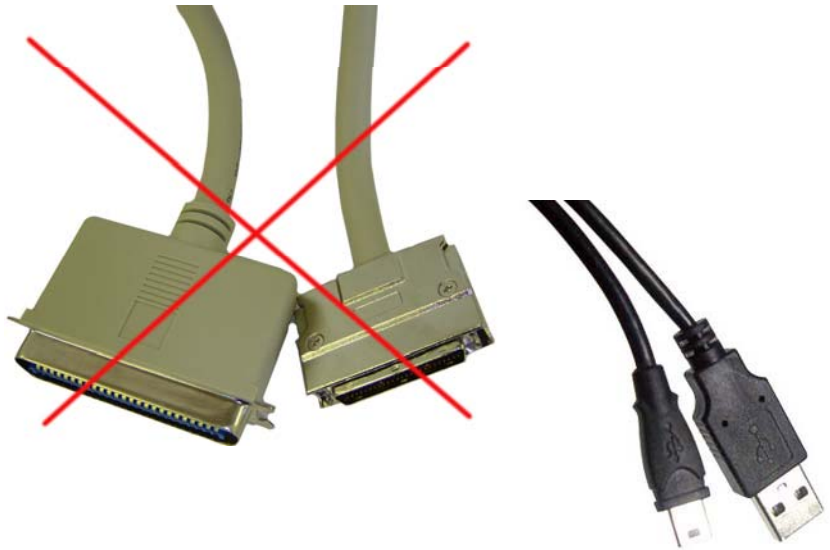
Hardware Evolution: Part Obsolescence

Major End of Life components:

DSP Processor TMS320C25 (Texas Instruments)



SCSI is obsolete!



Replaced by USB

Next Generation Product Strategy

SPLIT PRODUCT LINE IN TWO:

SOUNDER SERIES

- **General Purpose Shallow Water Applications**
- **24 - 210 kHz**
- **1 kW Power limit per channel**

CHIRP SERIES

- **Scientific, Deep Water, Sub Bottom Applications**
- **3.5 - 210 kHz**
- **1 kW, 2 kW up to 10 kW Power**

INTRODUCE BOTH SERIES WITH 16 BIT PROCESSOR

FOLLOW ON SWITCH OF BOTH SERIES TO 32 BIT

- **Anticipated switch Q1 2009**

Sounder Series: Shallow Water

Sounder 1600

Sounder 1610

Sounder 1650

Sounder 1620

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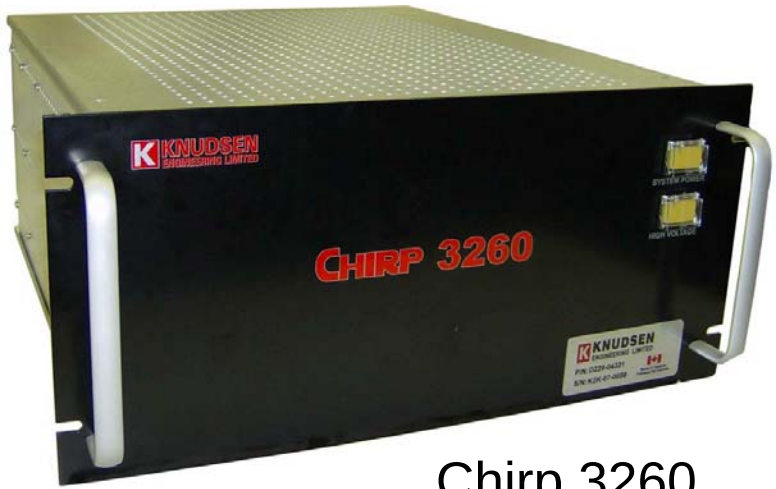
Chirp Series: Scientific, Deep-water, Sub-bottom

Chirp 3200

Chirp 3210



Chirp 3260

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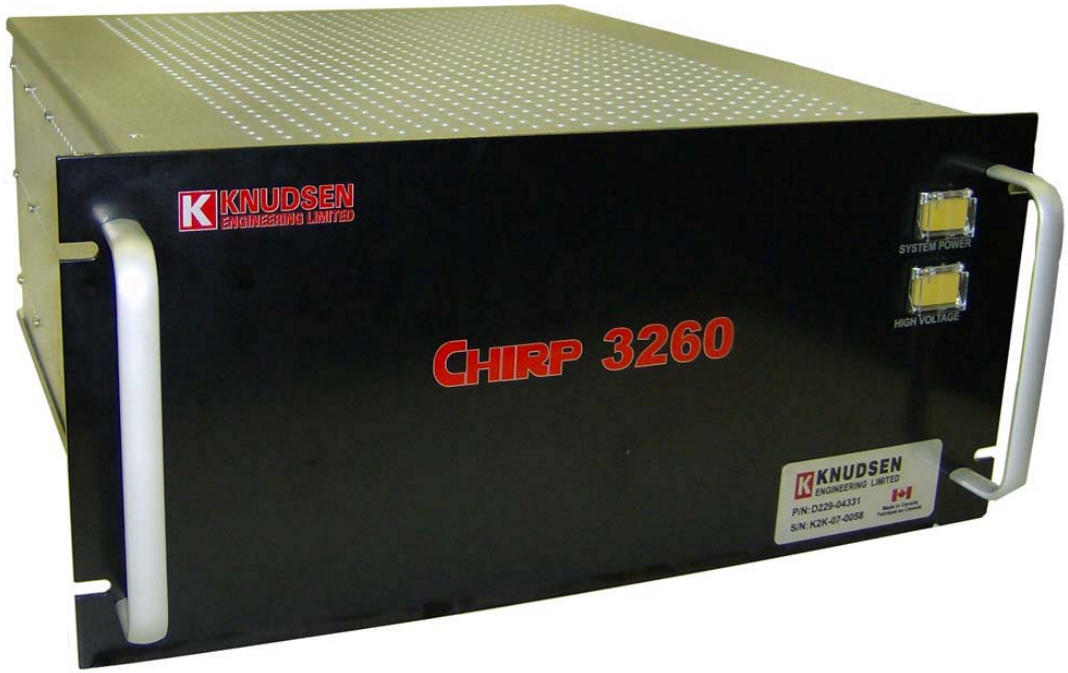
Chirp 3200: Shallow Water Sub-bottom

- Up to 2 kW output power, for up to 2 channels
- Latest 16-bit TI Processor *(32-bit floating-point now in planning stages for follow-on introduction)*
- Windows SounderSuite-USB Software
- 3U Rack Case

Chirp 3260: Hull-Mounted SBP/Deep Water Echosounder



Next generation replacement for 320BR!

- Up to 10 kW output power
- Latest 16-bit TI Processor *(32-bit floating-point now in planning stages for follow-on introduction)*
- Windows SounderSuite-USB Software
- Multiple Pings in water column
- SEG-Y, KEB, KEA, XTF (sidescan only)

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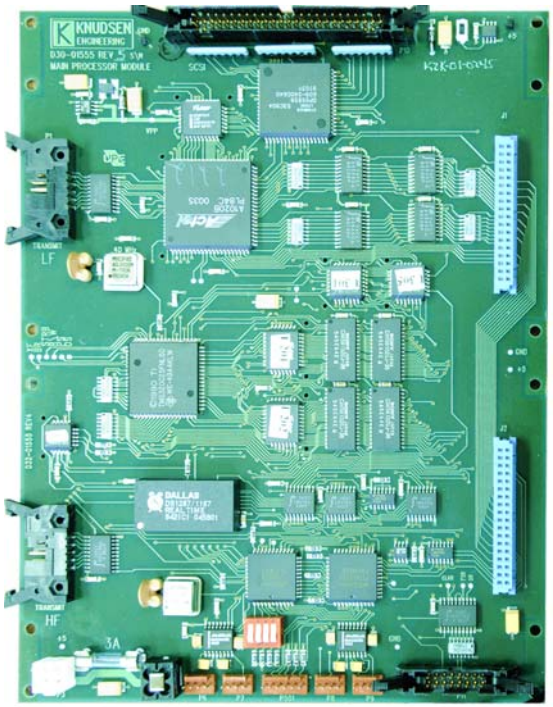
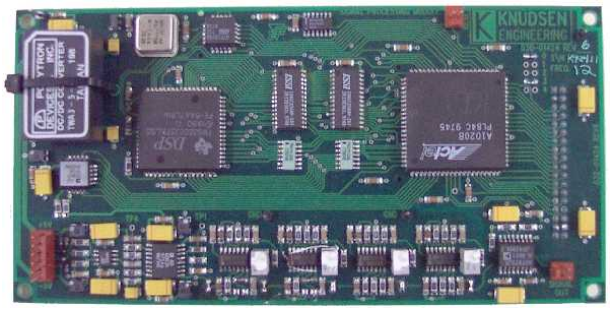
System Comparison: 320BR Series vs. Chirp Series

320BR Series	Chirp 3260 Series
10 MHz TMS320C25 digital signal processor	200 MHz TMS320VC5509A 16-bit fixed point digital signal processor (300 MHz TMS320C6713B 32-bit floating-point DSP processor to follow-on)
End of Life Technology	Latest technology
14-bit A/D	16-bit A/D (24-bit A/D)
80 dB dynamic range	96 dB dynamic range (118 dB)
Limited S/W self test	Built -in test signal generator for basic receiver functionality checks
SCSI	USB
Good signal pickup	Better low noise signal pickup circuit
RS232 com ports on Sounder	Serial interface functions moved to PC
Frequencies: 3.5 - 210 kHz	Frequencies: 3.5 - 210 kHz
Chirp/Correlation only 12 & 3.5	Chirp/Correlation on all frequencies

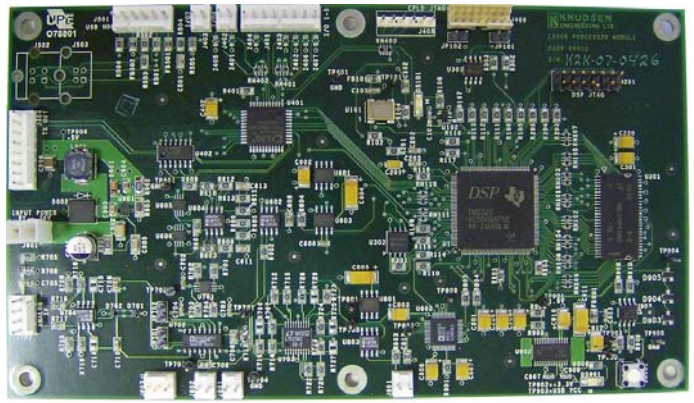
System Comparison: Processing Modules

320BR





Chirp 3260



New 5509 module replaces both MPM and SPM modules used in 320BR - One less module to deal with!

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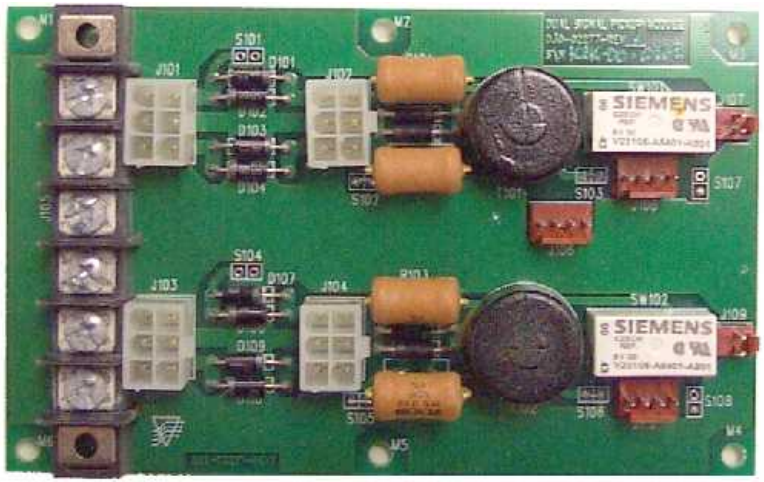
System Comparison: Pick-up Modules

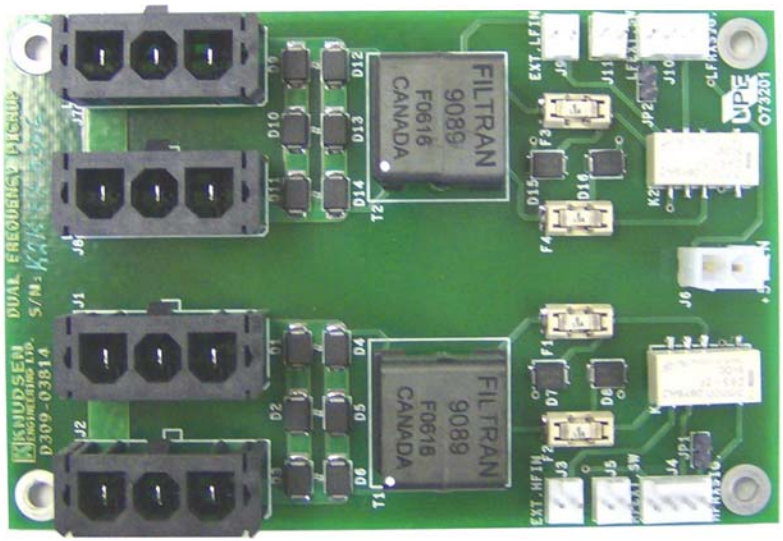


320BR:

- parallel pick-up
- higher noise
- higher losses

Chirp 3260:

- series pick-up
- lower noise
- lower losses
- added protection circuitry



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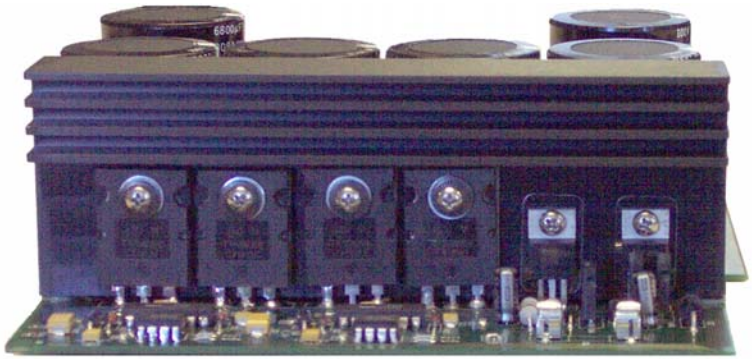
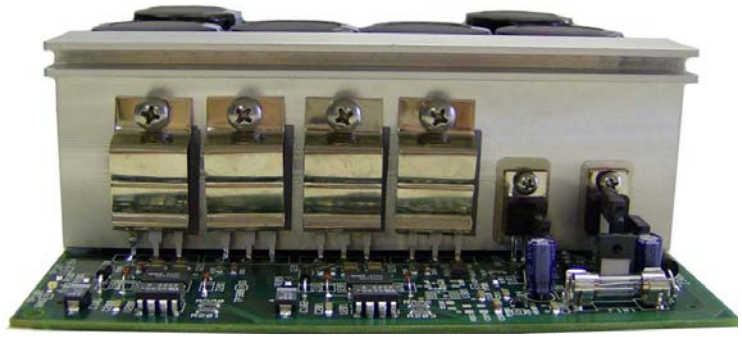
System Comparison: Transmitter Modules



320BR:

- 95V Rail, upgraded to 144V
- Higher losses



Chirp 3260:

- 144V Rail
- Lower losses

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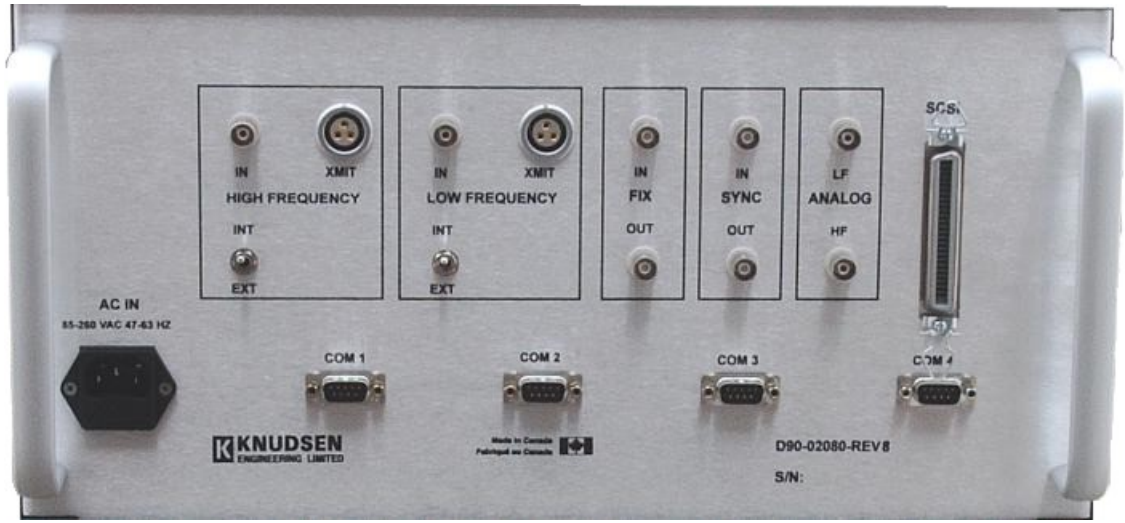
System Comparison: Connector Panels

320BR:
- SCSI
- RS-232



Chirp 3260
- USB
- no RS-232

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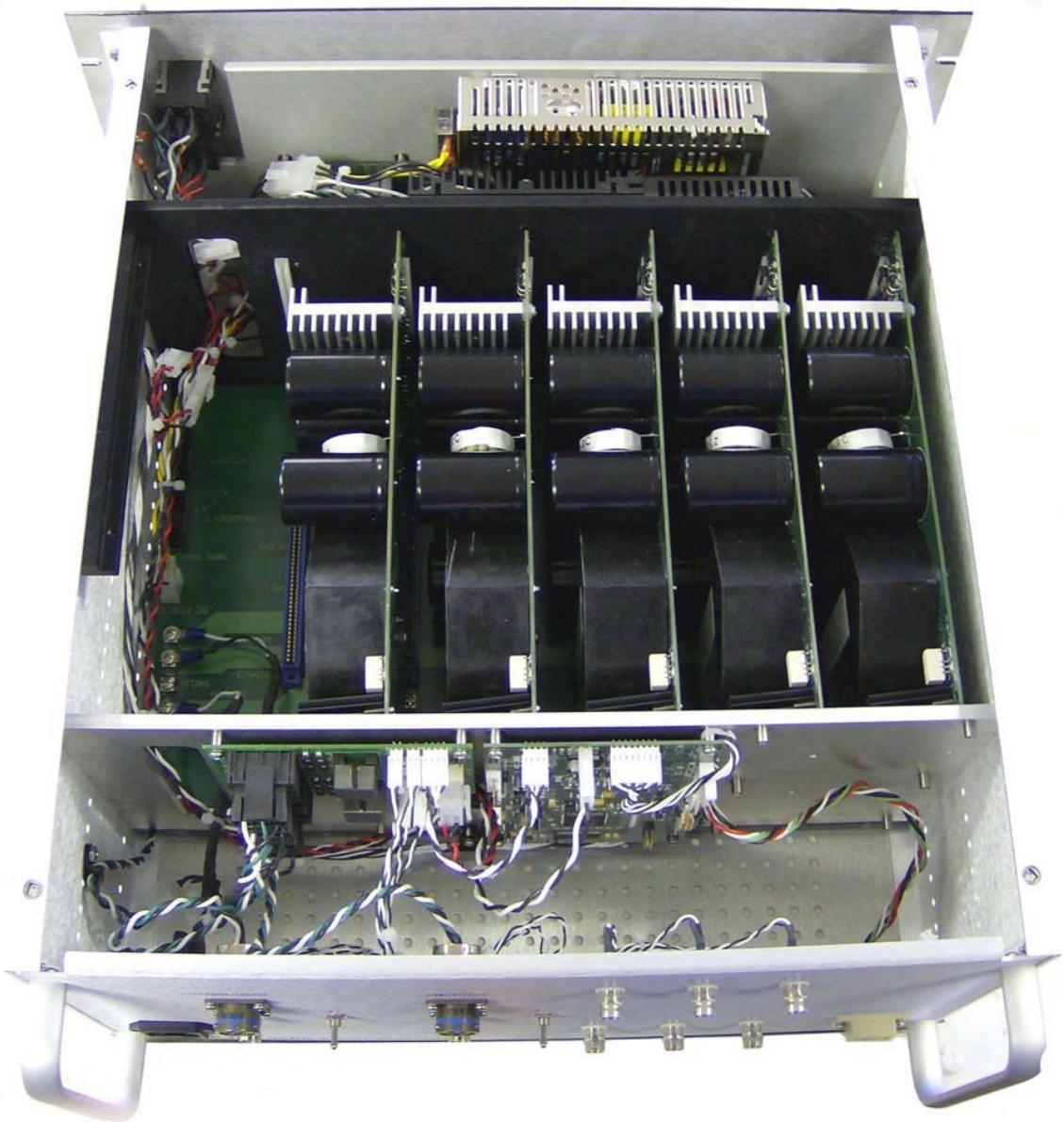
Chirp 3260 Physical Configuration: Front Panel

Chirp 3260 Physical Configuration: Internal Layout



Chirp 3260 Software: Release Package

SounderSuite-USB comprised of:

Main Applications:

EchoControl Client

User interface with data display and user controls; file recording

EchoControl Server

Sounder control via USB, serial peripheral interfaces, serial data logging

PostSurvey

Display & printing of recorded Sounder data files.

Support Applications:

ConversionUtility

File conversion: KEB to uncompressed KEB, KEA, XTF, SEG-Y

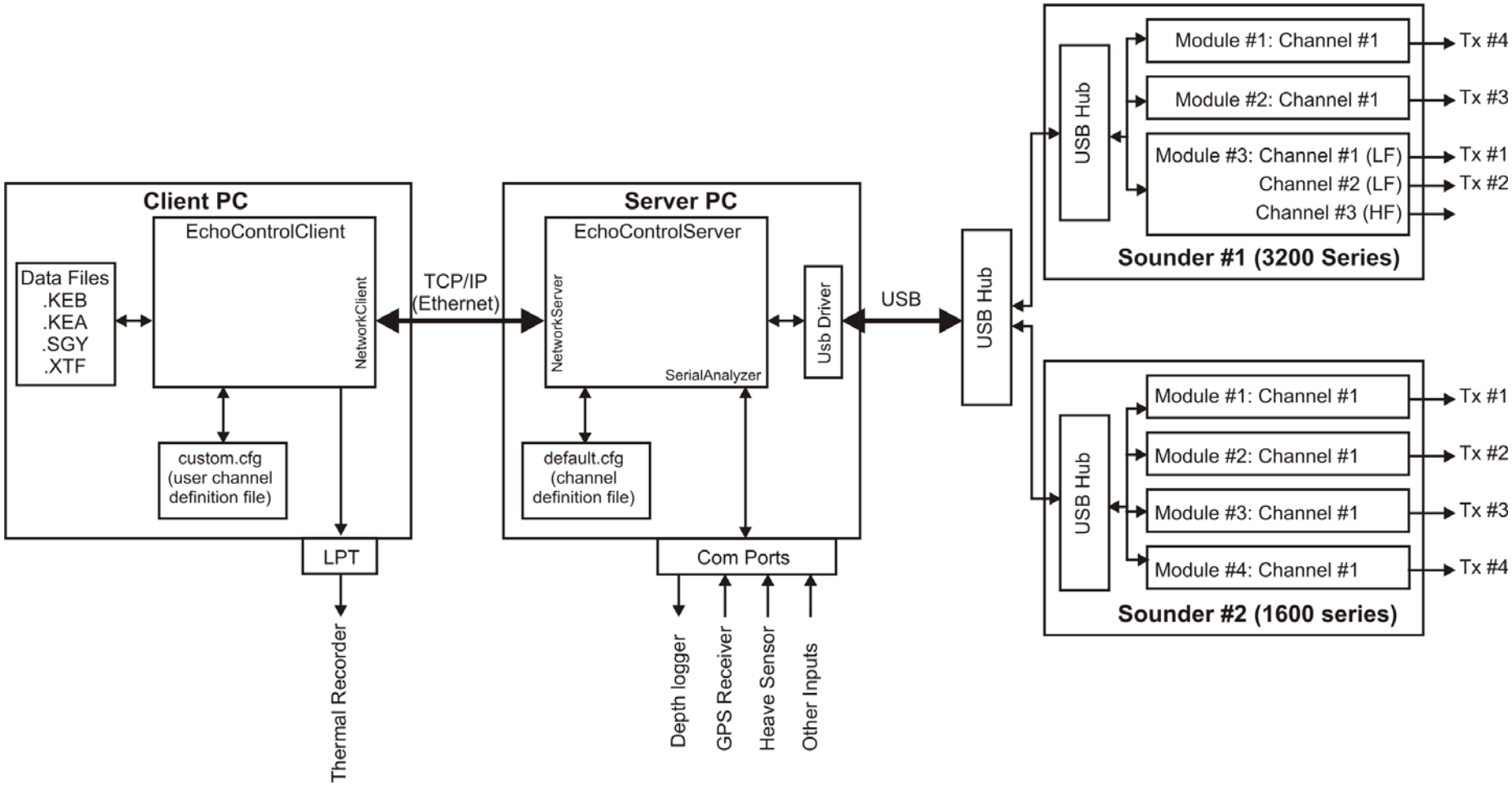
FirmwareLoader

Sounder firmware upgrade via USB connection.

Hypack MAX DLL

Specialized driver DLL for use with Hypack MAX.

Chirp 3260 Software: Architecture



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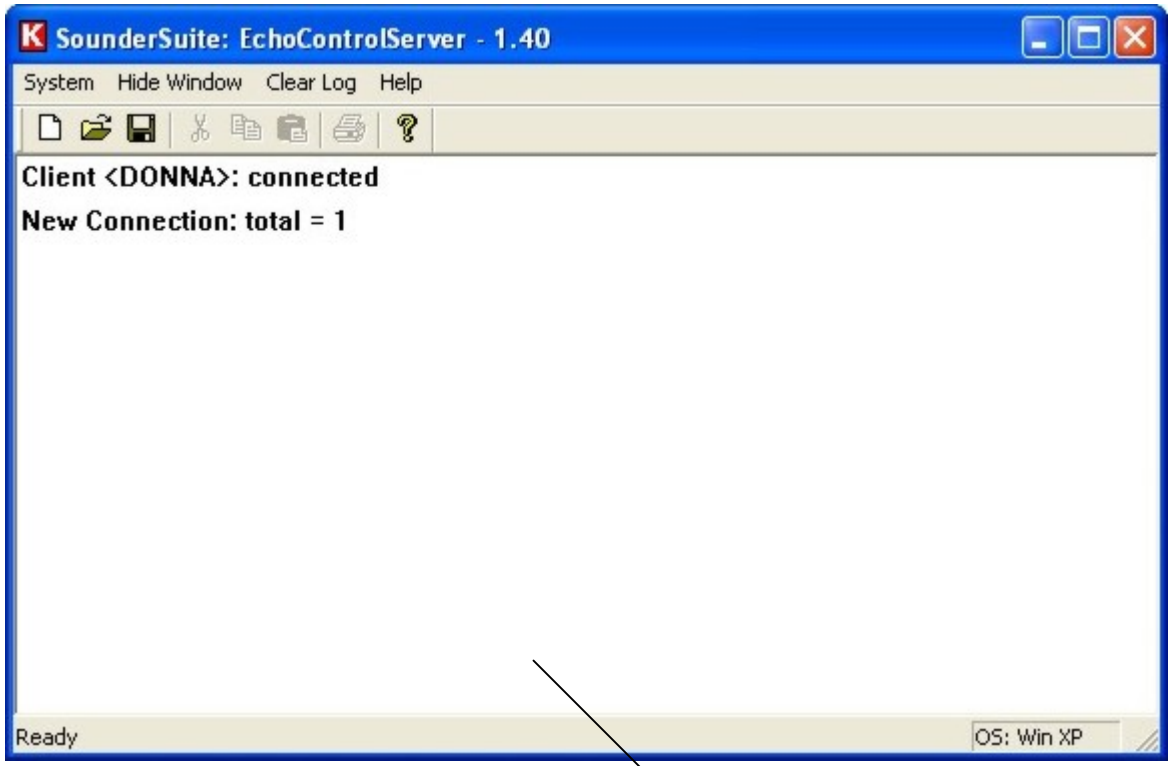
Chirp 3260 Software: EchoControl Server



Minimizes to taskbar for normal operation

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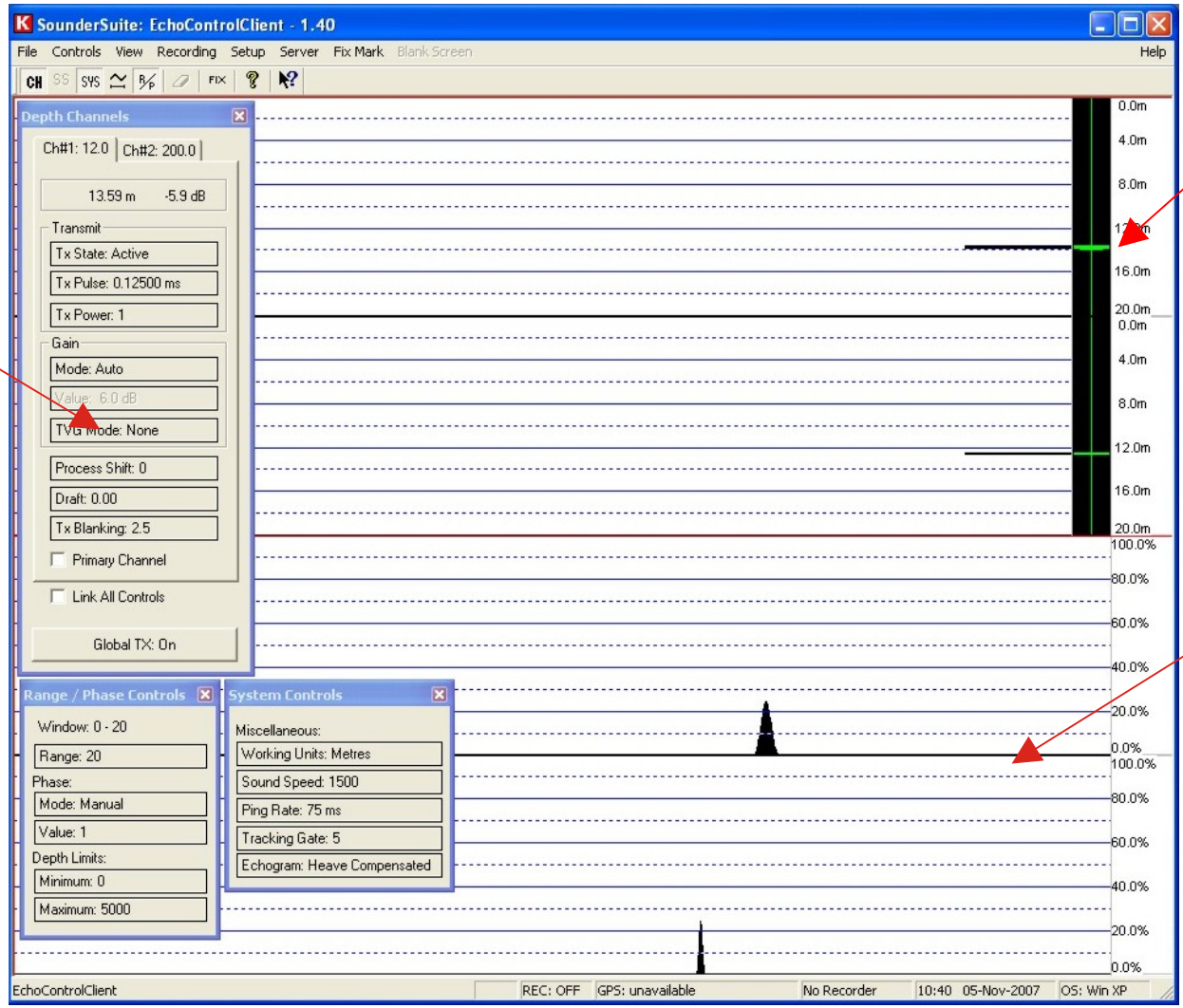
Chirp 3260 Software: EchoControl Client

Integrated status display & control access



New mini-scope trace

Simultaneous Display modes

- Depth Chart
- Waterfall *(sidescan only)*
- Oscilloscope

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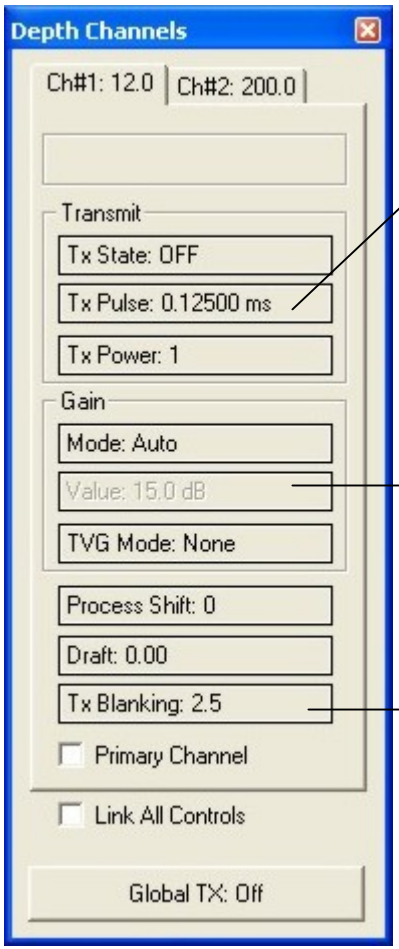
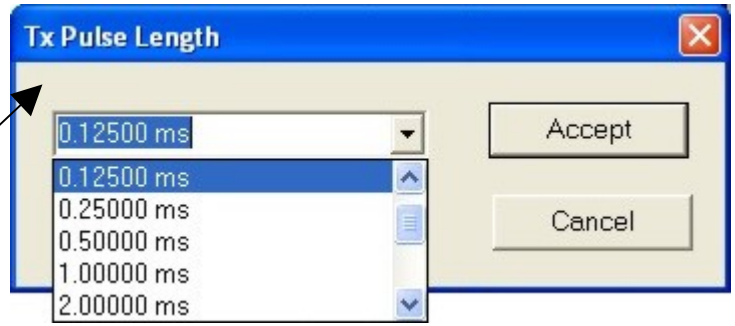
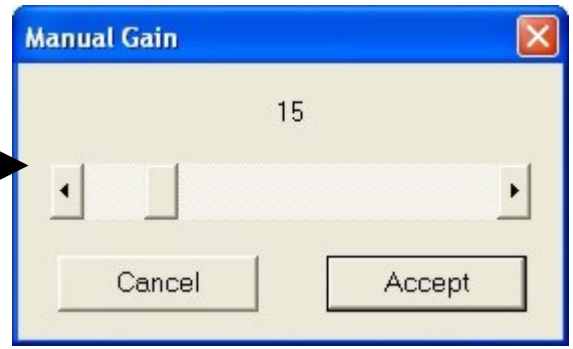
Chirp 3260 Software: Controls / Status Displays





Select from a list



Adjust across a range

Designed for mouse or touchscreen accessibility

Enter a specific value

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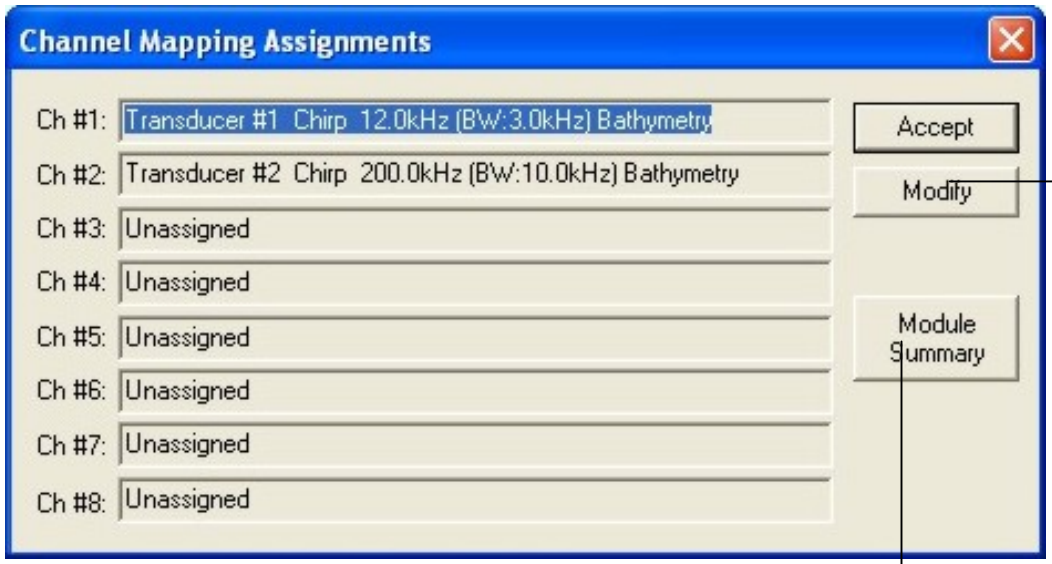
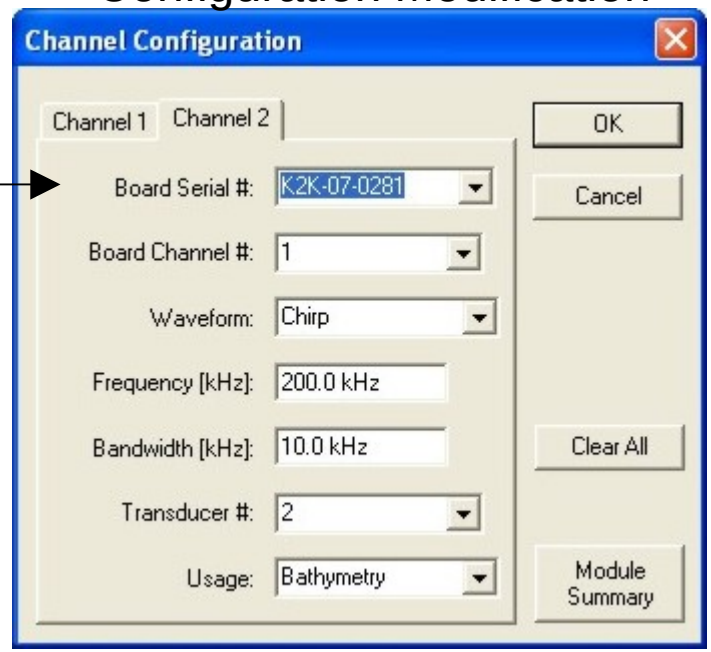
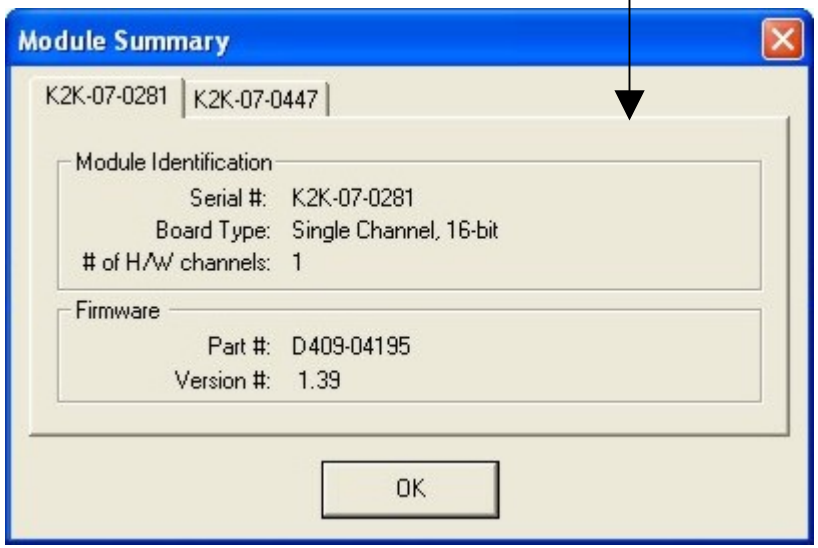
Chirp 3260 Software: Channel Configuration

Channel Configuration Listing



Configuration Modification





Channel Hardware Identification

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Chirp 3260 Software: Peripheral Configuration

Settings are configured from the client but applicable to the server

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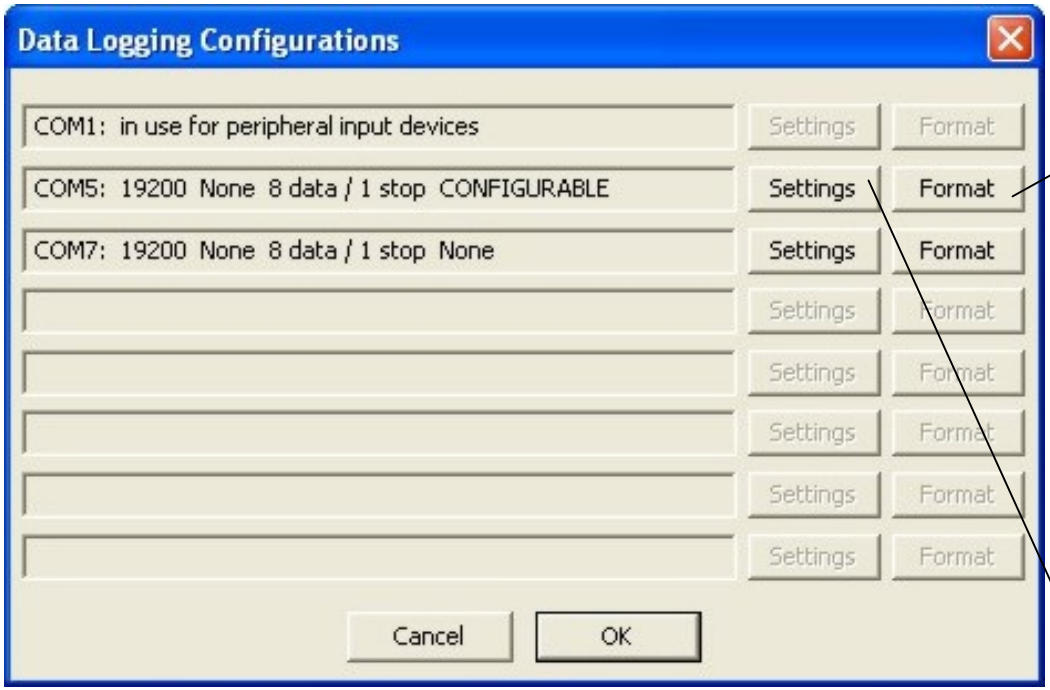
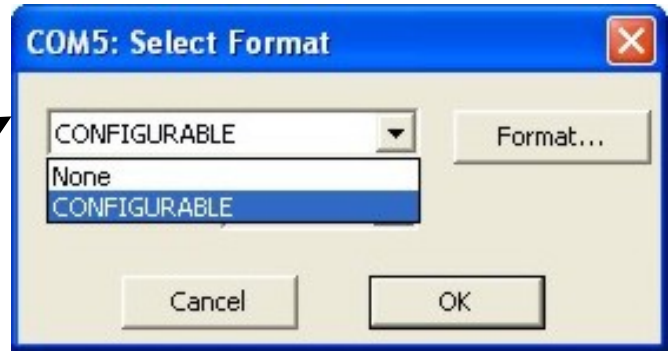
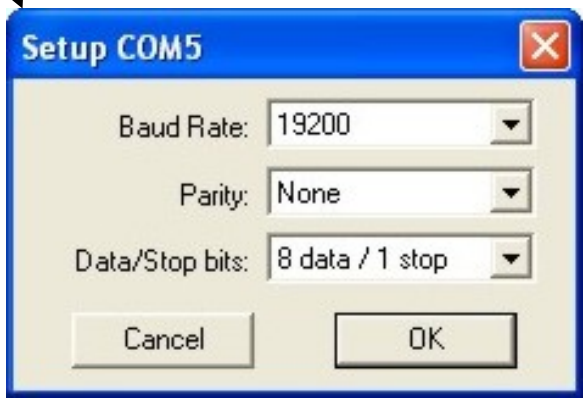
Chirp 3260 Software: Data Logging Configuration







Settings are configured from the client but applicable to the server

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Chirp 3260 Software: PostSurvey Features

View Multiple Data Sets At Once

- load multiple data for side by side comparison

Scrolling Data Sets

- entire line set is loaded
- scroll through entire line set

Supported Data Formats

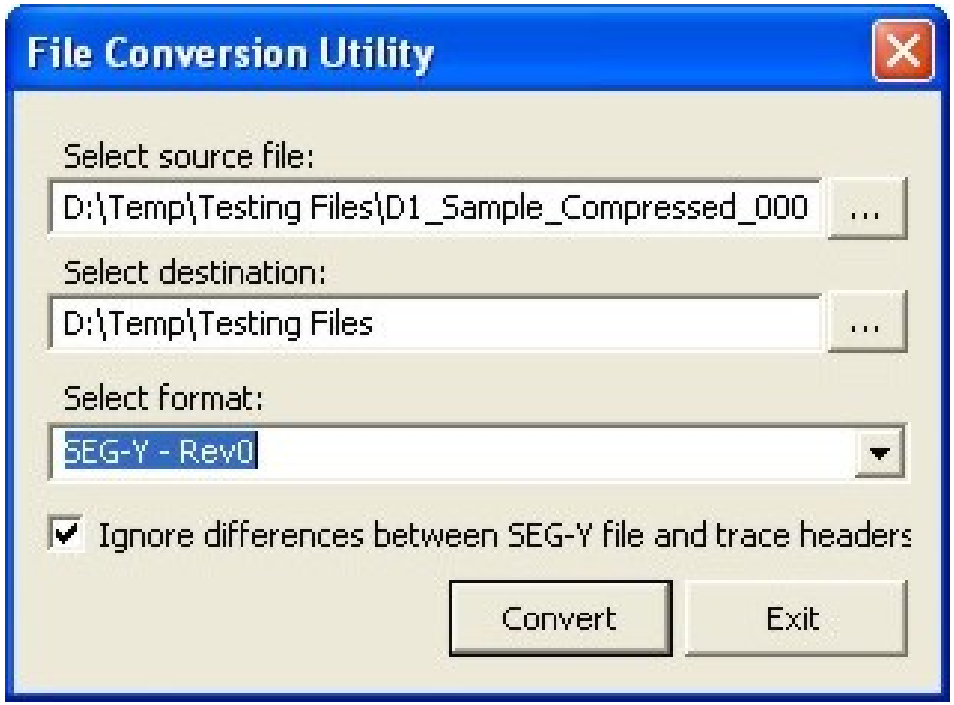
- KEB Compressed / Uncompressed Formats
- SEG-Y Format
- XTF File Format

Data Display Options

- Digital Depth Trace Windows
- “Oscilloscope” graph for individual pings with stop/forward/reverse controls
- Zoom Capabilities

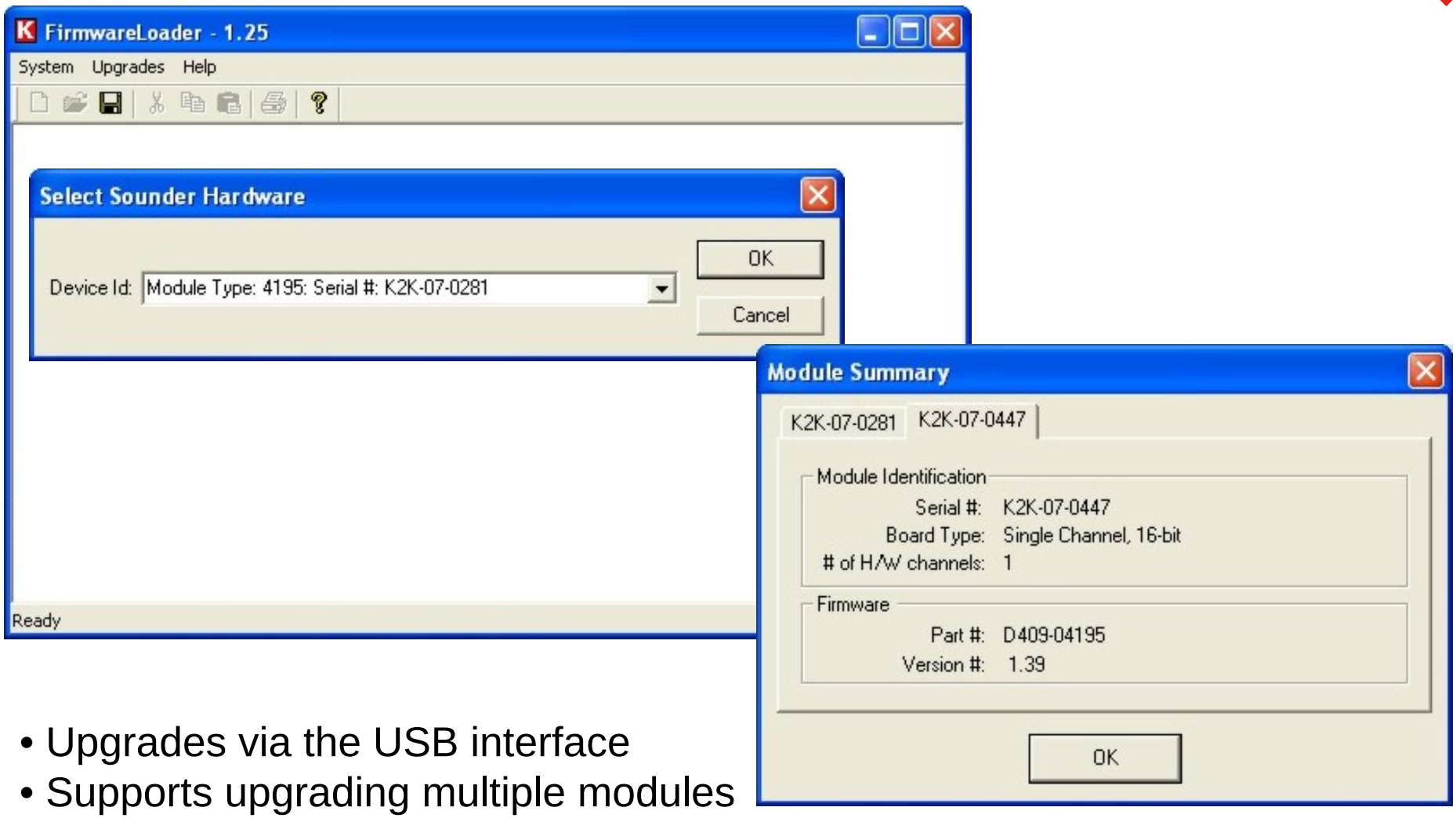
Support for All Windows Printers

Chirp 3260 Software: Conversion Utility



- converts to the latest compressed or uncompressed KEB format
- converts to SEG-Y, XTF and KEA formats
- allows customization of conversion options where applicable
- supports multiple file selection for batch converting

Chirp 3260 Software: Firmware Loader



- Upgrades via the USB interface
- Supports upgrading multiple modules

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Chirp 3260 Software: Chirp & Correlation Processing

1) Pulse Compression:

$$\tau = 1/\Delta f$$

2) Improved Signal to Noise:

$$\Delta \text{ SNR} = 10 \log T\Delta f \quad \text{dB}$$

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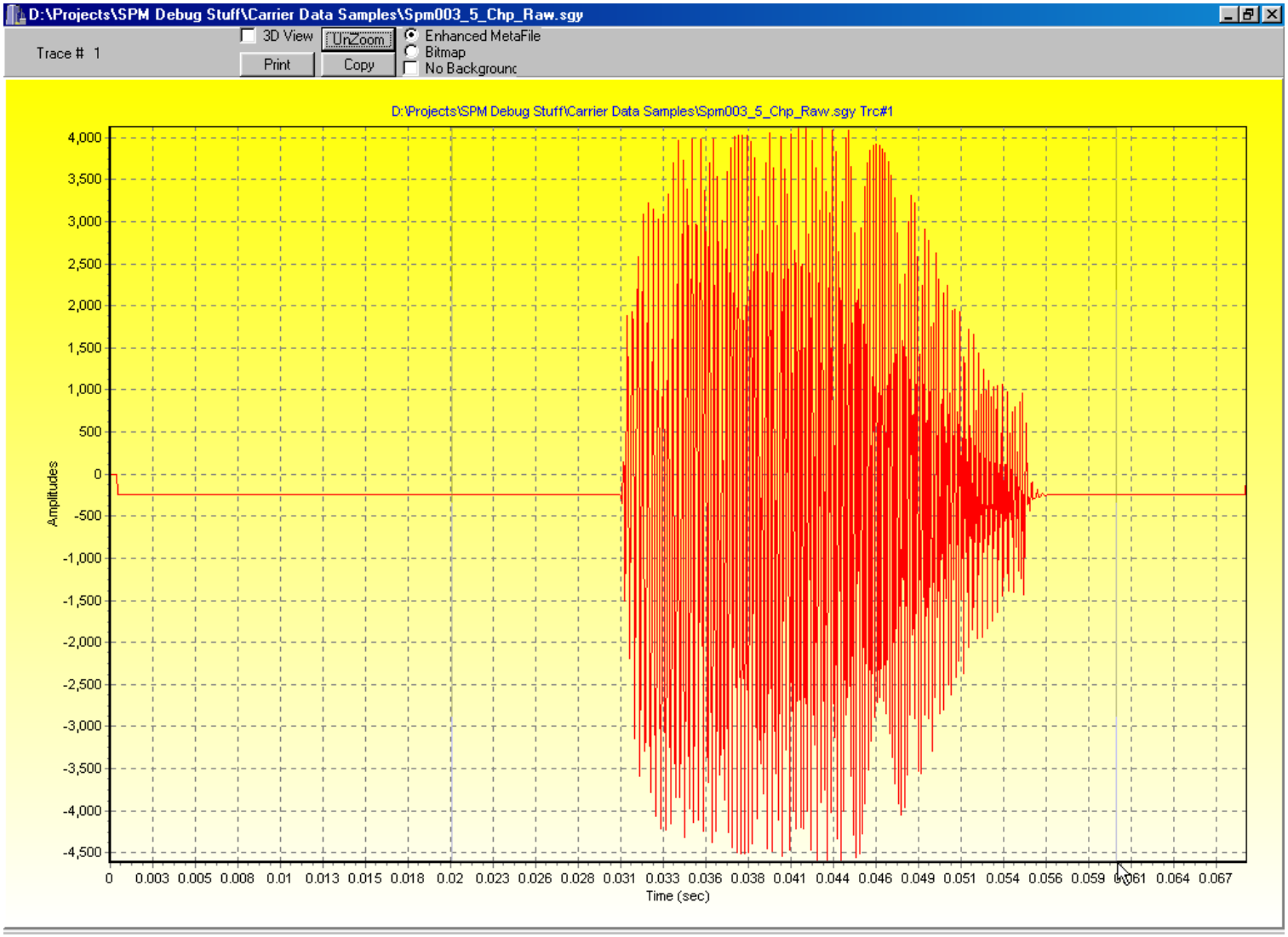
Chirp 3260 Software: Raw Carrier Data



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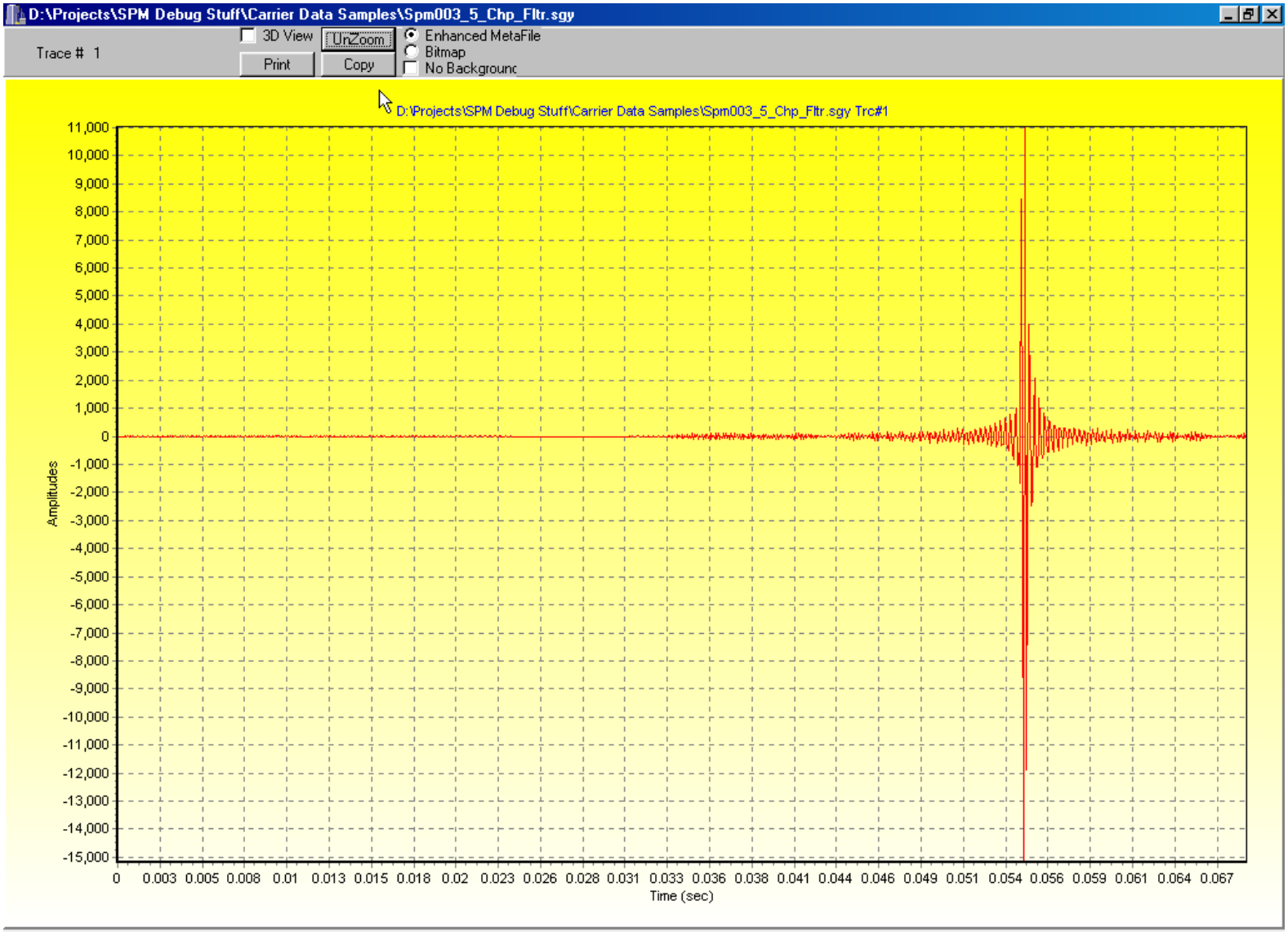
Chirp 3260 Software: Filter Carrier Data



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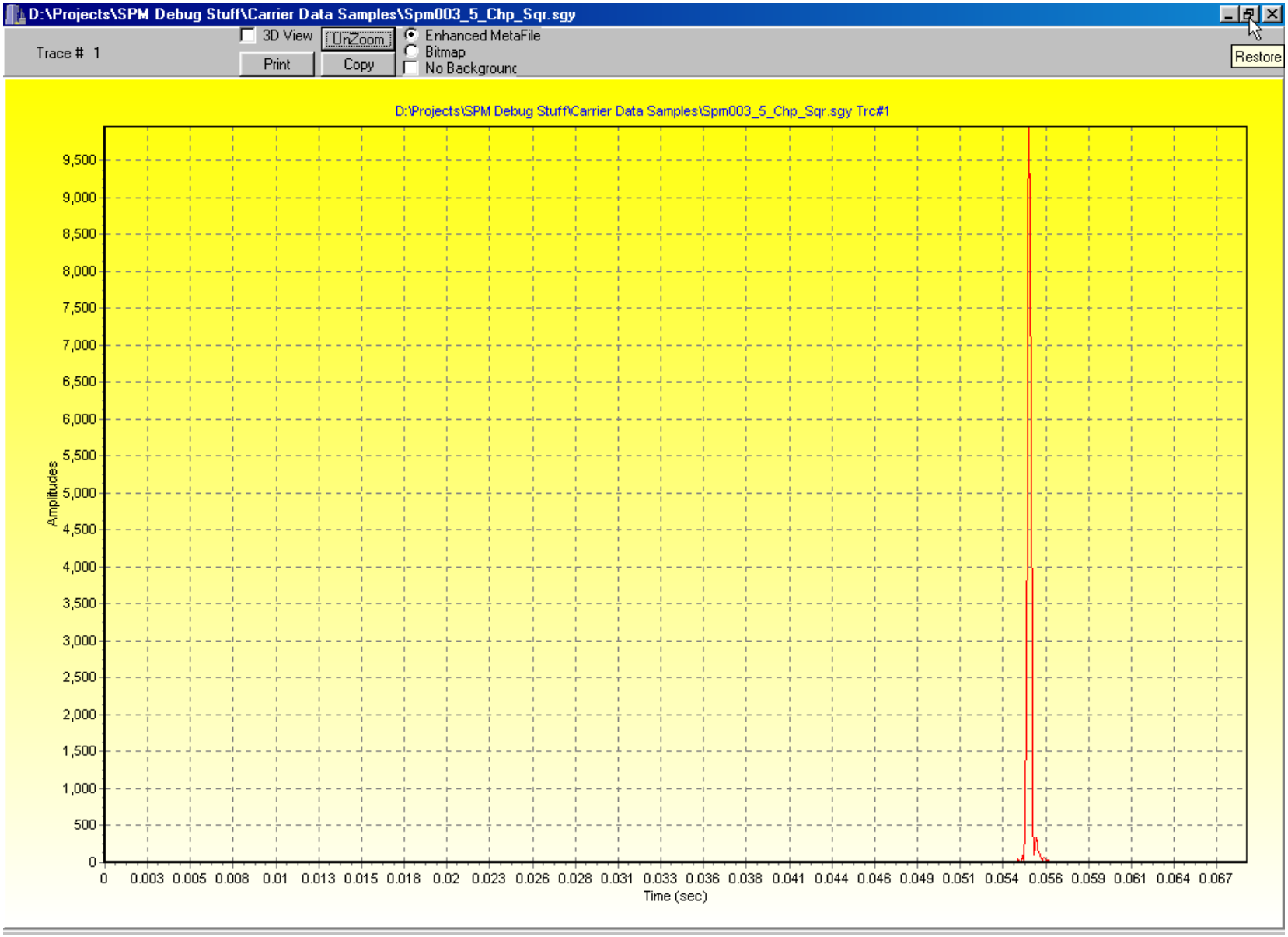
Chirp 3260 Software: Envelope Detected Data



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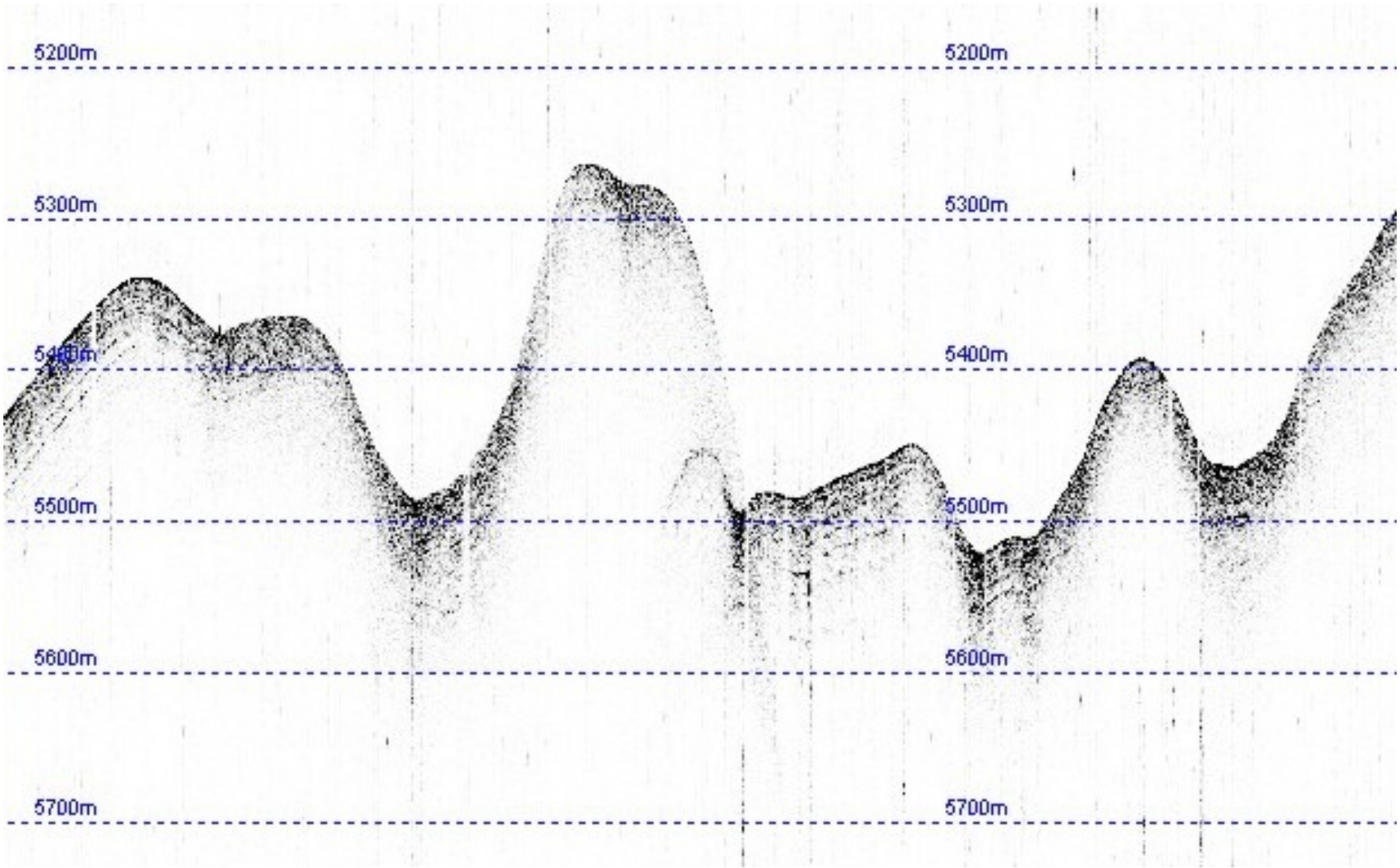
Data Sample: 5400m with some sub-bottom



Data Taken From a Chirp 3260 @ 3.5 kHz

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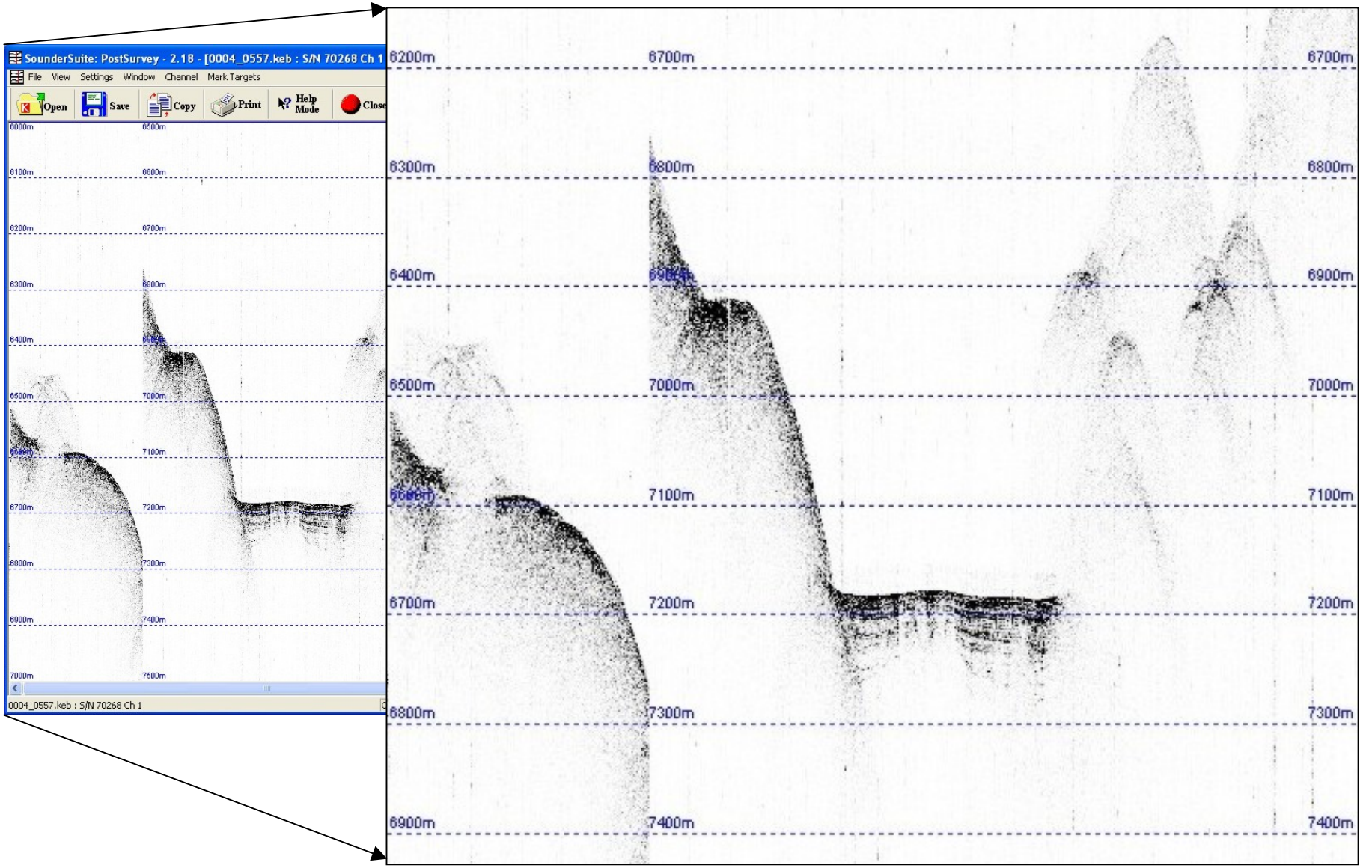
Data Sample: 7200m



Taken From a Chirp 3260@ 3.5 kHz

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Chirp 3260: New Features & Options

New Features:

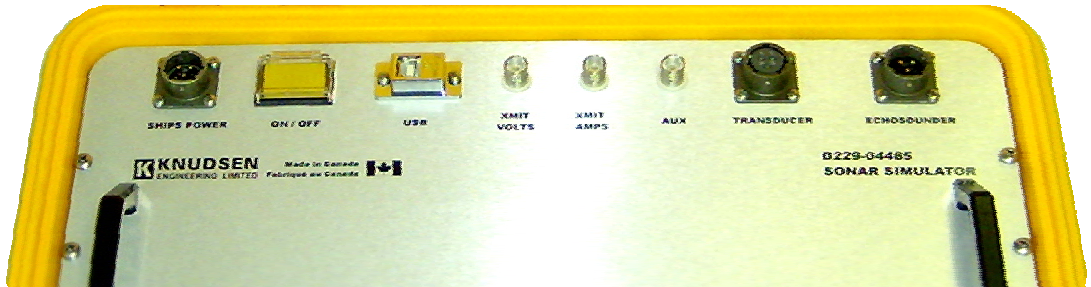
- USB connectivity
- Frequency agility
- Multiple pings in the water column

New Hardware Options:

- Optional KEL USB printer - available in future
- Optional Simulator Box - 2U Rack Case or Portable case

Simulator Box

- Monitors transmitted pulse voltage, current, power, pulse length, and frequency
- Provides simulated echo in response to transmit pulse (to test validity of depth measurement)
- Measures and displays transducer impedance
- Firmware/Software upgradeable



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UNOLS Purchase

- Current order for 8 systems (16 bit processor)
- Current order delivery Jan. 2008
- Current Order Trade In Option for Spares
- Complimentary upgrade to 32 bit
- Dedicated effort to control fleet configuration to same commonality.

Questions

320BR

Chirp 3260

Feature Suggestions/Requests

THANK YOU!

Hardware: nolan@knudsenengineering.com
Software: donna@knudsenengineering.com