



SCS900/SonarMite Interface

Interfacing external echo
sounder sensor to Trimble
SCS900 application software

Ted Read – Ohmex Ltd.



New

SCS900 + SonarMite

www.ohmex.com

Trimble
Authorised Business Partner

SCS900 Hydro Extension

Trimble
DIMENSIONS 2007

SCS900 Hydro Functionality



- Perform initial site levels *
 - Measure site features
 - Check grade & thickness *
 - Stockpiles and volumes *
 - Stake out
 - As-built site measurements *
- (* = Hydro requirement)



SCS900 Hydro Extension

SCS900 SDK Module

- SCS900Api.h header file
- SCS900Api.lib library
- Example Source Code
- SCS900 software package



SCS900 Hydro Extension

SDK requirements

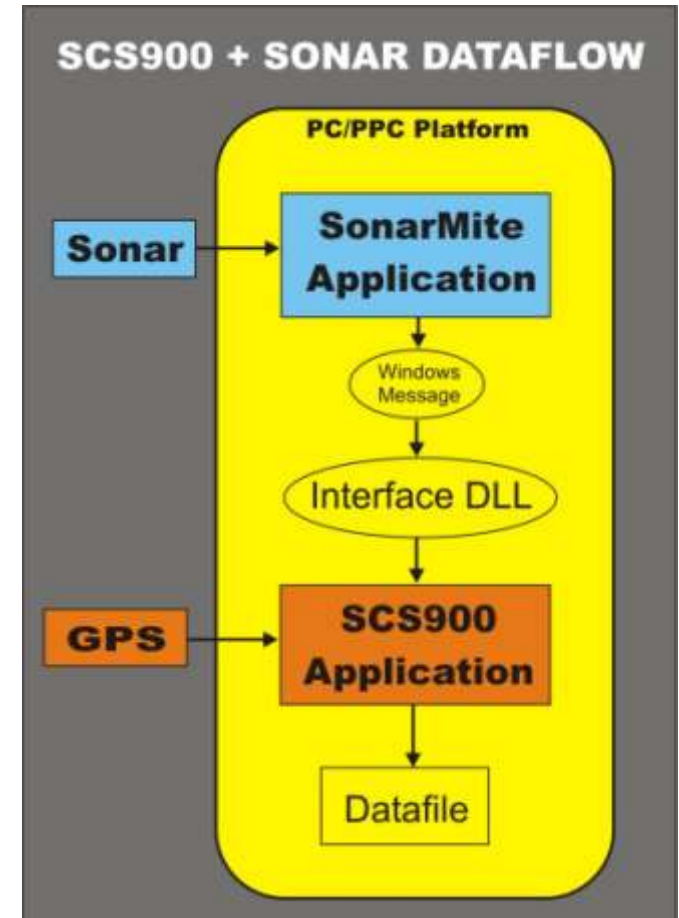
- **Medium/High skill level**
 - Conversant with MFC/C++
 - Embedded C++ for WinCE/PPC
 - Understanding of DLLs
 - Callback Functions/Events
 - Inter-application Comms.



SCS900 Hydro Extension

Interface Methods

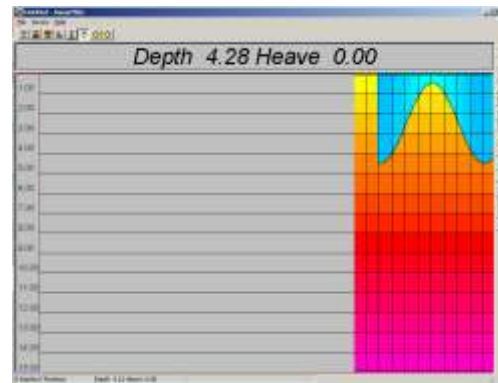
- External DLL using MFC
- Event callback functions
 - SCSE_Initialise
 - SCSE_RegisterEvent
 - SCSE_OnMeasuredPos
 - SCSE_Destroy
- Autoload SCSE_?????.DLL



SCS900 Hydro Extension

SonarMite data messages

- **TSC Pocket PC**
 - Messagequeues (Pipes)
- **Windows XP/Vista**
 - TCP/IP windows Socket
 - LAN Network
- **Windows TabletPC**
 - TCP/IP windows Socket
 - WiFi Network



SCS900 Hydro Extension

Interface Features

- **Robust inter-application module**
- **Safe – Zero offset fallback**
- **Application level settings**
- **Verbose ‘Debug’ version**
- **Simulation Mode**
- **Recent Topo v Hydro issue workaround**



SCS900 Hydro Extension

SDK module V2 updates

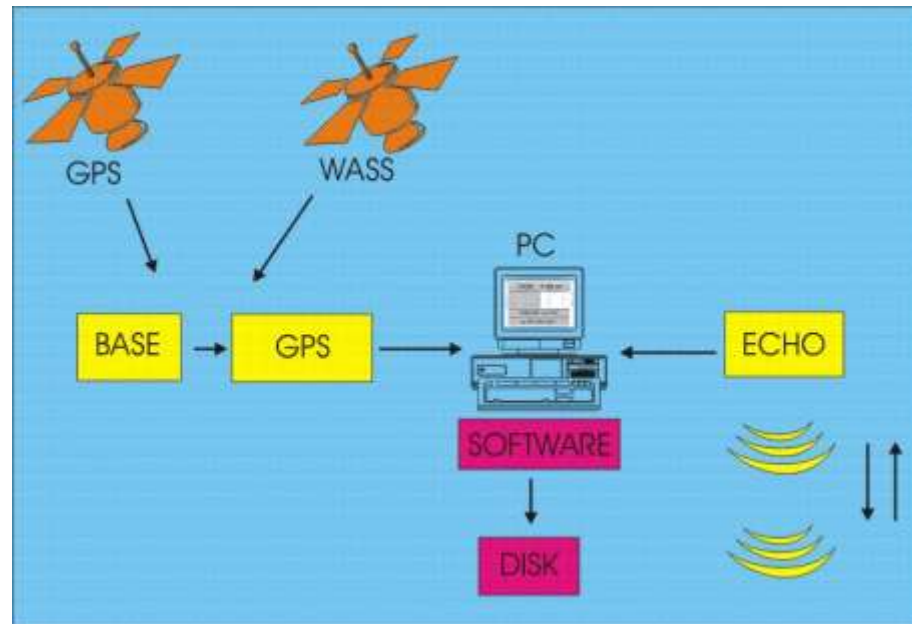
- **Custom Fields**
 - #1 is raw depth
 - #2 is QA value
 - #3 is tickcount
 - Buffering
- **WinCE 4.??**
 - **Survey Controller issues**
 - **Bluetooth Issues**
 - **ACU/TCU Version Dropped**



SCS900 Hydro Extension

SCS900 Hydro - System review

- **Positioning**
 - Radios
 - Geometry
- **Computer**
 - Serial Ports
 - Storage
- **Sonar**
 - Serial data
 - Geometry
 - Physical



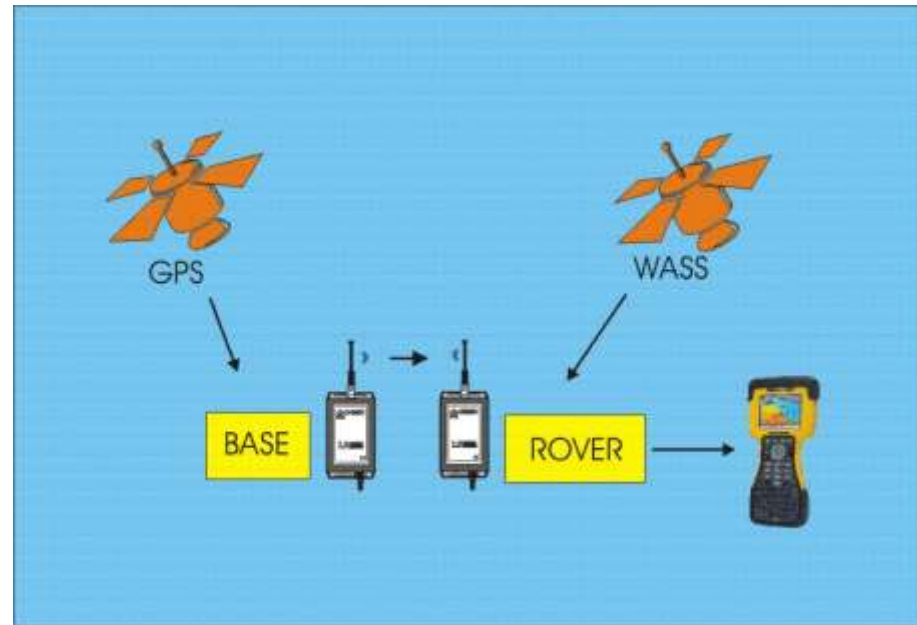
Error Sources (arrows)

SCS900 Hydro Extension

Position Issues

Actual position v Measured Position

- **Main Error Sources**
 - Radio dropout
 - Radio speed
 - Serial Data
 - Correction age
- **Recent error source**
 - GPRS Bandwidth



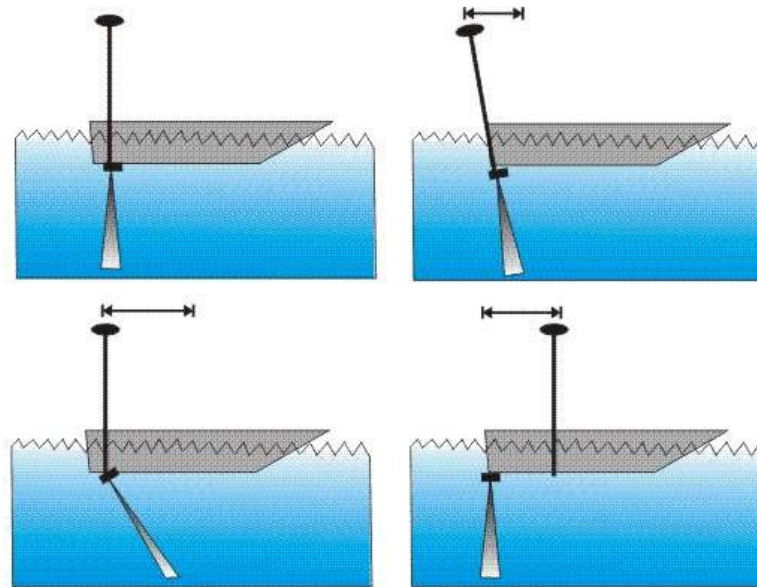
Error Sources (arrows)

SCS900 Hydro Extension

Sonar Issues

Actual depth v Measured depth

- **Error Sources**
 - Sound Velocity
 - Serial Data
 - Physical
 - Geometry
 - DSP
 - Turbidity



SONAR GEOMETRY ERRORS

SCS900 Hydro Extension

Datalogger Issues

Actual time v Measured time

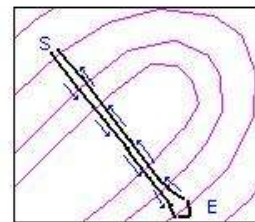
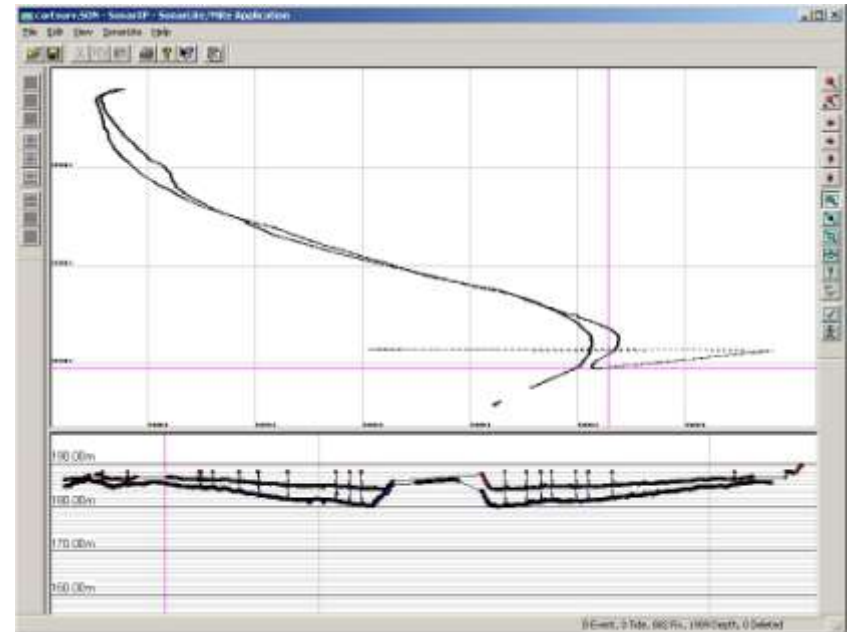
- **Error Sources**
 - GPS v TSC2 time
 - Serial Buffering
 - Inter-application
 - Flash Disks
 - Idle Time



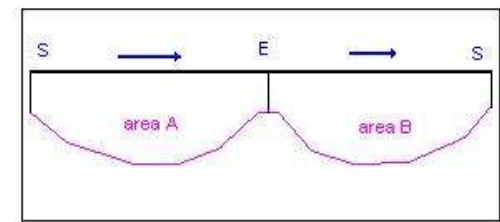
SCS900 Hydro Extension

Patch Test - review

- Patch testing
 - ‘W’ cross section
 - Based on area moments from start point.
 - Shift from difference in moments.
 - Average speed from time and distance
 - Latency time from shift v speed.



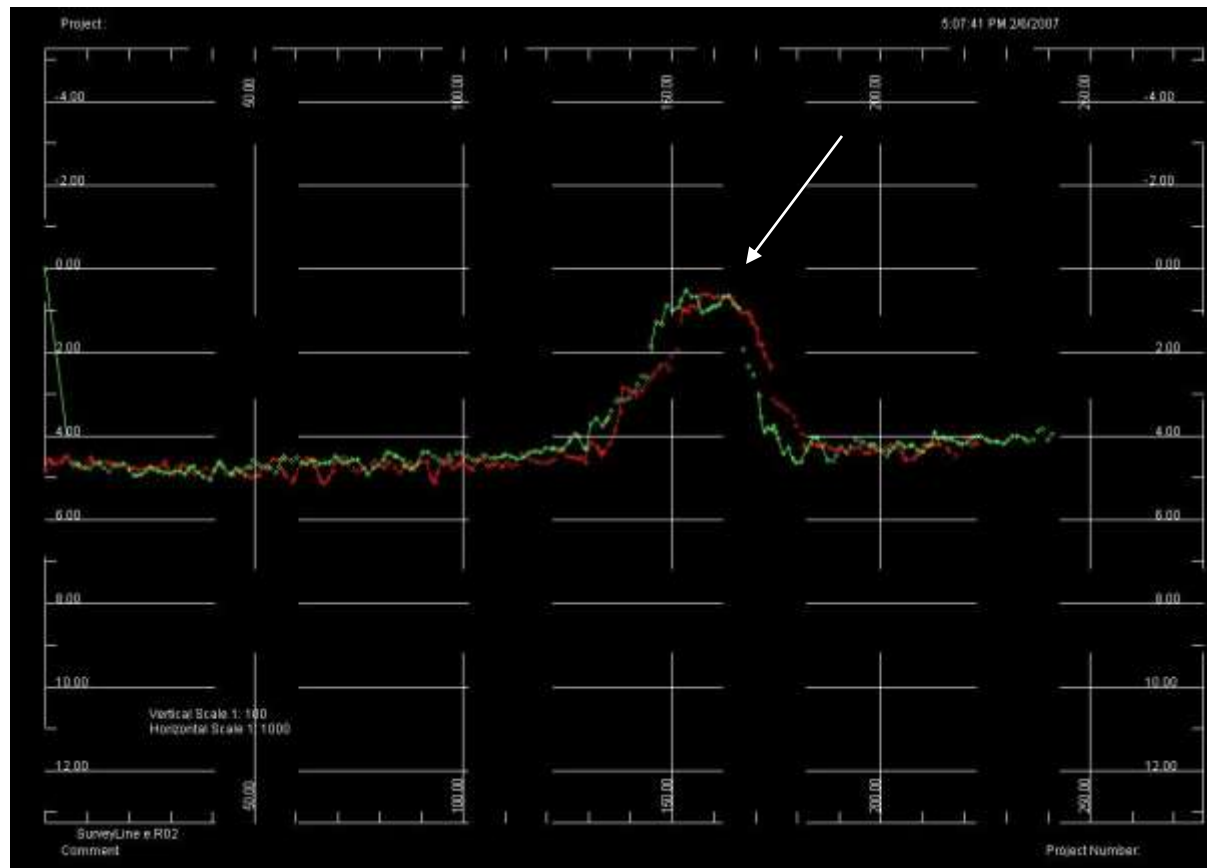
PLAN



SECTION

SCS900 Hydro Extension

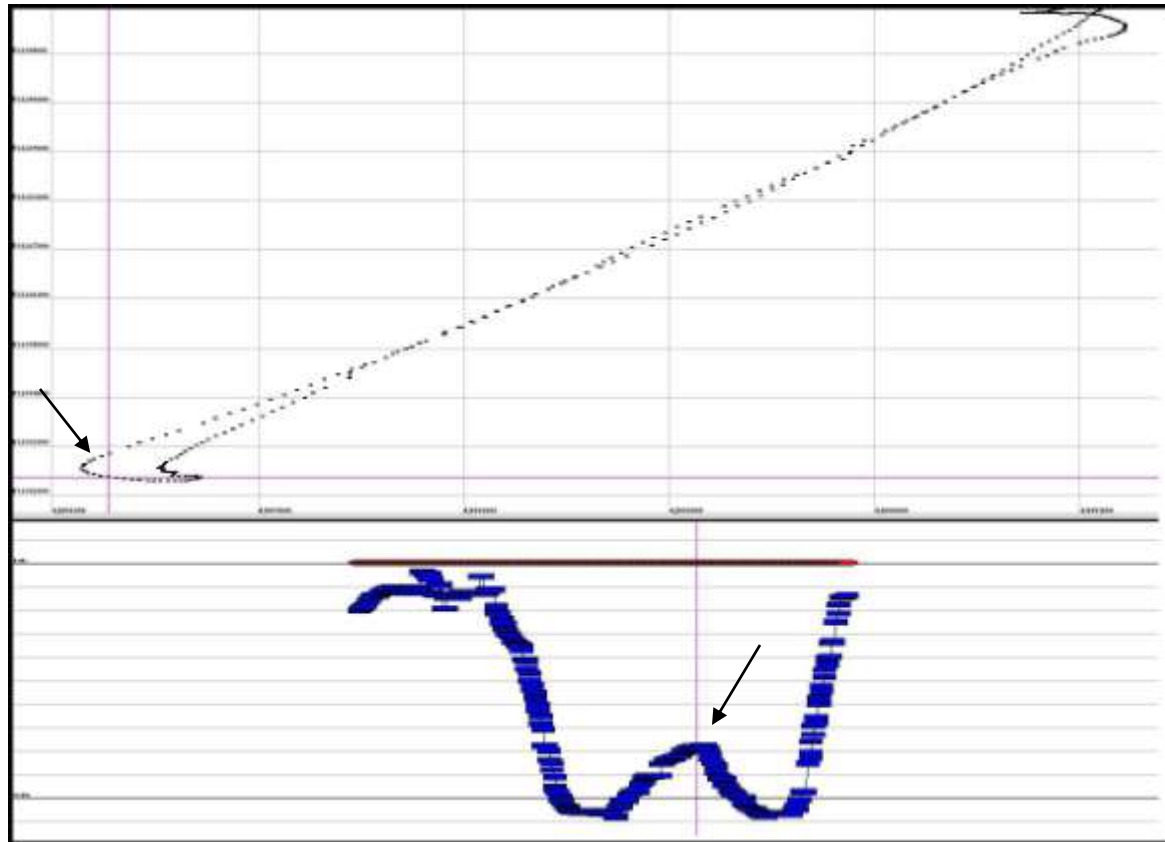
Patch Testing Example (1)



Customer's section data showing apparent 'lag'

SCS900 Hydro Extension

Patch Testing Example (2)



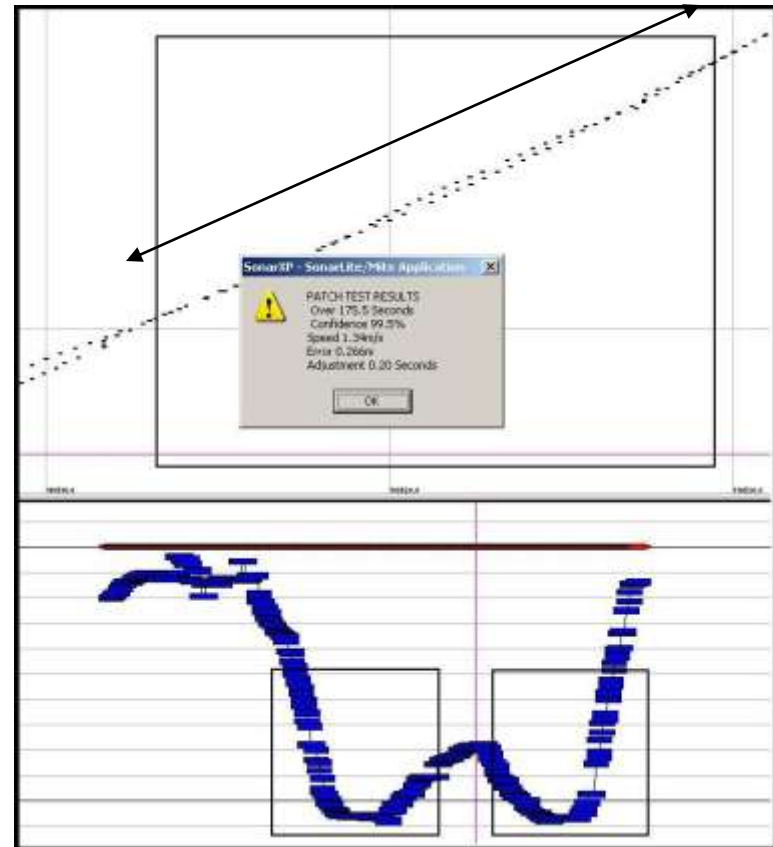
Plan & Section of data set showing 'lag' position

SCS900 Hydro Extension

Patch Testing Example (3)

Error Analysis

- Horizontal Position
 - Check plan & section
- Selective analysis
 - Sensible selection
- 'W' cross section
- Spreadsheet times
 - Only accurate to 1 sec
- Same plan/section units
 - UTM/Coordinate position



Actual Patchtest results

System Recommendations

- **Boat Speed <2m/sec (5mph)**
- **RTK Positioning and Heighting**
- **Depth checkpoint start/end of survey**
- **Care with Geometry of installation**
- **Depth range 0 to 20m in turbid water**
- **Collect patchtest dataset if possible**
- **Survey lines proportional to detail**



Further Information

www.echo-sounder.com

www.ohmex.com

Download SCS900 hydro software

www.lmtech.co.uk/trimble_scs900.htm