



Kelunji EchoPro User Manual

Firmware v2.33

(changes since user manual v2.28)



engineering solutions for monitoring the environment

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Firmware Updates

There have been several firmware updates since the user manual was finalised. The firmware features were detailed in the release notes that accompanied the updates. This document covers all features added to the firmware since v2.28.

Changes in Firmware v2.30 – 29 Jan 2010

- Removal of FIR filter phase offset in raw data (required removal of FIR filtered rates of 5sps and 10sps)
- Fixed a problem where some FTP connection attempts incorrectly returned successful file transfer flag, deleting unsent data
- Automatically restarts DataCapture when saving Connected Sensors
- Improvement in responsiveness of web pages
- Added web page to view current raw signal values
- Corrected scaling problem when using internal accelerometers with dedicated 3-channel internal digitiser boards (used in EchoPro SMA)
- Now keeps PPP link open when there are multiple trigger files to send
- Improved bitstream handling to remove data spikes
- Introduced algorithm to detect unreliable configurations and flag warning to the user
- Fixed bug where large backlogs of continuous data caused telemetry failure
- Added support for displacement sensors

Changes in Firmware v2.32 – 17 May 2010

- Added support for external trigger function to the Level Trigger process via the internal Alarm I/O connector (v2.02 main PCBs only, although v2.01 PCB can be modified with a resistor to enable this functionality)
- Added serial streaming option to the "Sample rate" screen (cannot be used if PPP enabled). Streams channels 1 to 6 at up to 100sps at 24-bit resolution data over 57600 baud serial port (external serial connector not included standard on EchoPro)
- Changed the displayed/embedded Lat/Long coordinates from NMEA standard to decimal degrees
- Changed the displacement sensor input format to Volts per metre (was Volts per millimetre in v2.30) in line with other metre-based sensitivity formats

Changes in Firmware v2.33 – 16 July 2010

- Ability to save system log files to USB
- Support for non-partitioned USB devices
- After this upgrade is running, reboots will re-direct to home page so that users can refresh to re-connect
- Periodic SOH files can be written to the Logs folder as well as to the FTP outbox when enabled in Triggered Processes
- Checks for sample rate synchronisation between PCBs at power-up - will reboot if invalid sample rate detected

User Interface Changes

There have been minor changes to the browser based interface. These are detailed below.

Sitename & Timezone



System Log Files

Users now have the ability to view daily log files as generated by the EchoPro's Operating System, as well as daily FTP log files. If the **Save system log files** option is enabled, files are generated daily at 0000 UT and stored in the Logs folder on the USB storage device. After the daily file is written, the log is reset so that the next file contains only new entries.

The files are named by date followed by either `_sys.log` or `_ftp.log` depending on their type (eg. 2010-07-16_sys.log). These files can be downloaded using the **File browser** menu and viewed with any text editor on your PC.

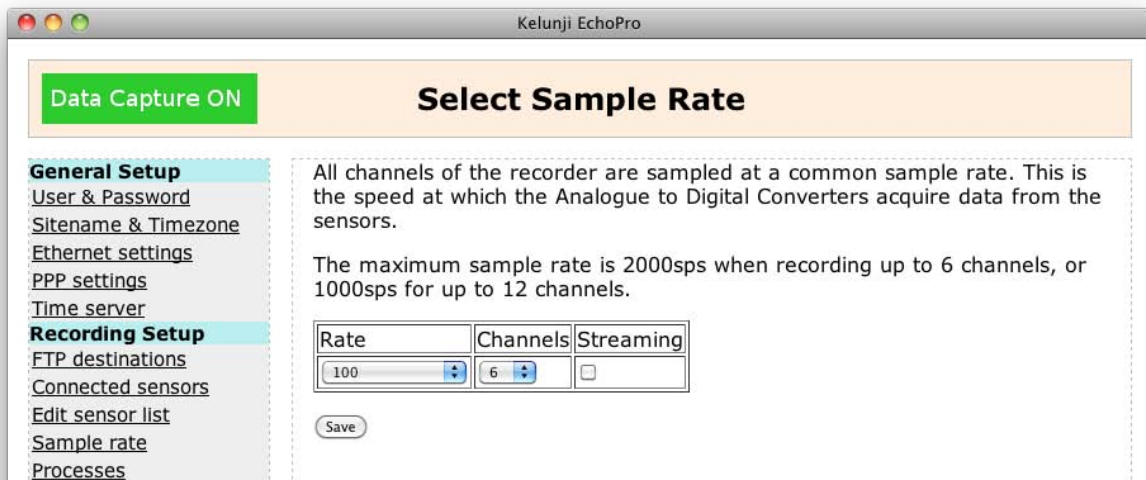
Edit Sensor List

The EchoPro now supports displacement sensors, so the **Displacement** option is now visible in the drop-down list when selecting the sensor type.



The sensitivity of a displacement sensor should be entered in Volts per metre (V/m). This response information is embedded in the PC-SUDS data file and will allow eqWave to display the data with actual ground displacement values.

Sample Rate



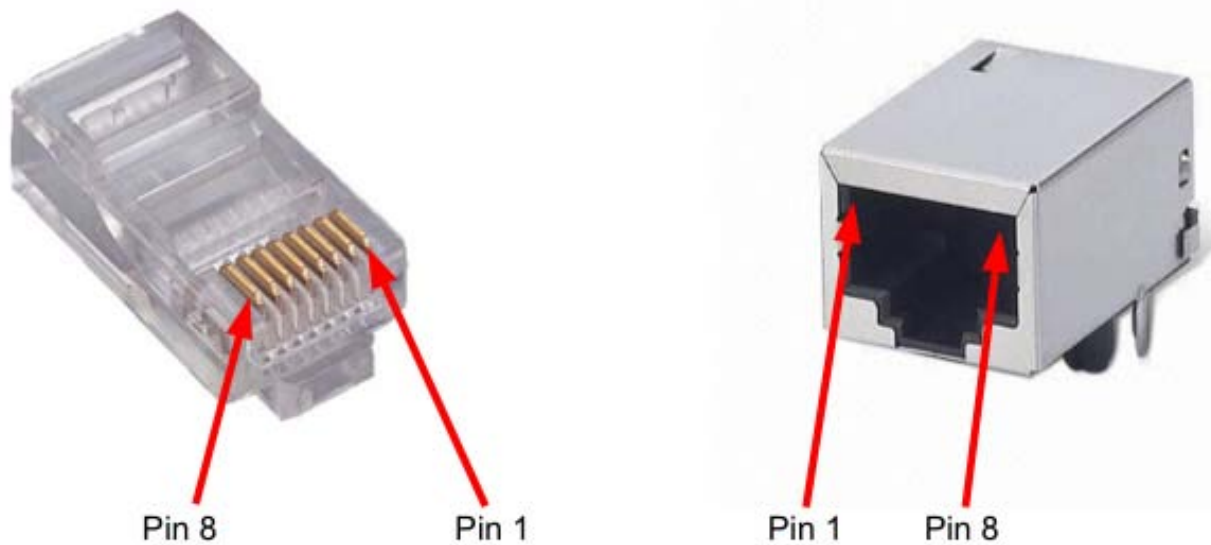
Real-Time Serial Data Streaming

The EchoPro has an internal serial port that is either used to establish a PPP connection using an internal modem, or wired to an external connector for PPP via an external modem, and can now be used to stream out serial data. Unless your EchoPro was specified with an external serial port at the time of manufacture, the internal and external hardware required will not be fitted to your recorder, but it can be added at any stage by returning it to the factory.

If enabled, serial data from all 6 channels on Port A and Port B will be streamed at up to 100 samples per second in the format detailed below. The technical note on this feature is described in more detail on the following pages.

The EchoPro shares a serial port between the internal socket modem, and an external device. Only one device can be in operation at any one time. If the internal modem is being used to transfer data via a PPP link, real-time serial data streaming is not possible.

The external serial port is accessed through J16, a RJ45 socket as shown below:



Pin	Signal	Description
1	+12V	Power supply from the EK board to the external device
2	RxD	Received data flowing into the EK board from the external device
3	CTS	Clear to send, from the external device into the EK
4	DCD	Data carrier detect, from the external device into the EK
5	RTS	Ready to send, from the EK board to the external device
6	DTR	Data terminal ready, from the EK board to the external device
7	TxD	Transmitted data flowing from the EK board to the external device
8	GND	Ground

There are two pins required for serial data streaming, these being pins 7 and 8.

Once serial data streaming is enabled through the web interface, raw ADC data will be sent via the external serial port at 57600, N, 8, 1. This is fixed in the FPGA, and is not user configurable. The maximum sampling rate supported is 100sps. Trying to stream data at more than 100sps will result in intermittent loss of data.

The EchoPro uses the same serial formatting protocol as the Echo. This is described below:

Real-Time Serial Streaming Protocol

Standard RS232, at 57600 baud, 1 start bit, 8 data bits, no parity, 1 stop bit, no flow control.

Data is sent as plain ASCII text, and can be recorded using a simple terminal emulator such as HyperTerminal or Minicom.

Data from each ADC is represented by a two's-complement, 24-bit hexadecimal number. This is raw data, and is not scaled in any way. Each channel is separated by a space character, and each line is terminated with a CR/LF.

A time packet is inserted into the data at each second. This string is formatted according to: YYYY-MM-DD HH:MM:SS and is both preceded and terminated with a CR/LF. This means there is a blank line before each second of data.

A typical example is shown below:

```
...
...
00772e ff2b6f 00508e
00792f ff2d12 005146
007adb ff2dca 005245
007bab ff2c30 005287
```

```
2009-12-07 21:42:50
007a02 ff2b5e 00520f
0077ac ff2ca6 005075
007427 ff2d41 004a75
0075ea ff3293 005a43
007cb8 ff36d0 006fc4
```

```
...
...
007451 ff3016 0059f4
006fd5 ff2a09 00456d
0076e3 ff2bea 00504d
007be5 ff2d62 0059cb
```

```
2009-12-07 21:42:51
0076a4 ff2b84 004d39
00776d ff2cac 004ee8
0079ef ff31ce 005b8f
007ca0 ff31a5 006151
0075f0 ff2c25 00509f
```

```
...
...
```

Processes – Level Trigger

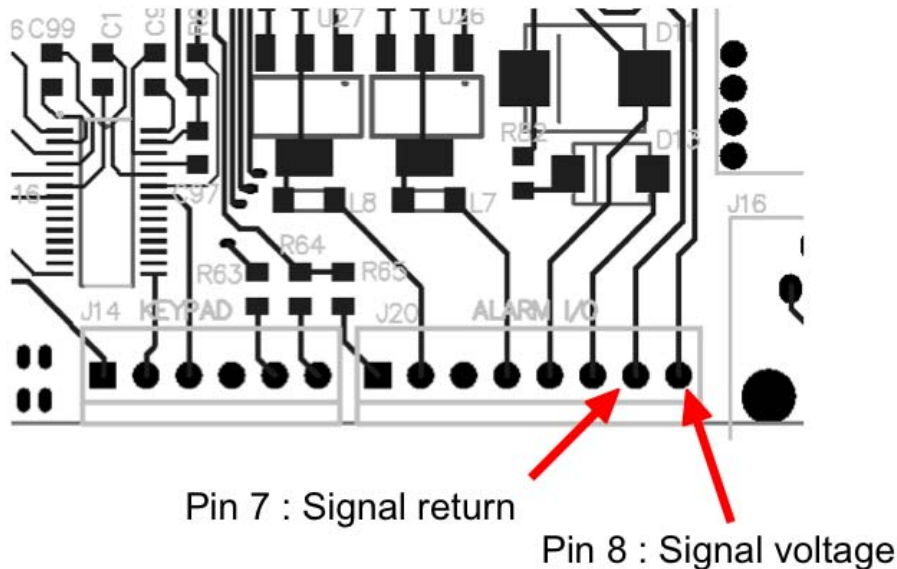
External input triggering

<input type="checkbox"/> Enabled						
Process Name: <input type="text" value="Level"/>						
Process Type: Level Triggered						
Trigger Channels						
1	2	3	4	5	6	Ext
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
199.88 mg	85.84 Pa					N/A

Level triggered processes now have the option of being triggered via an external event. This allows third-party equipment to be used to initiate recording. Such an event could be the closure of a relay, or the digital alarm output from some other hardware. The external input channel cannot be recorded. It is used solely to initiate recording on real data channels.

To enable external triggering, tick the **Ext** trigger channel box in a Level trigger process.

The external level triggered input is optically isolated, and requires two connections to be made to pins 7 and 8 of J20 on the main (EK) circuit board as shown below.

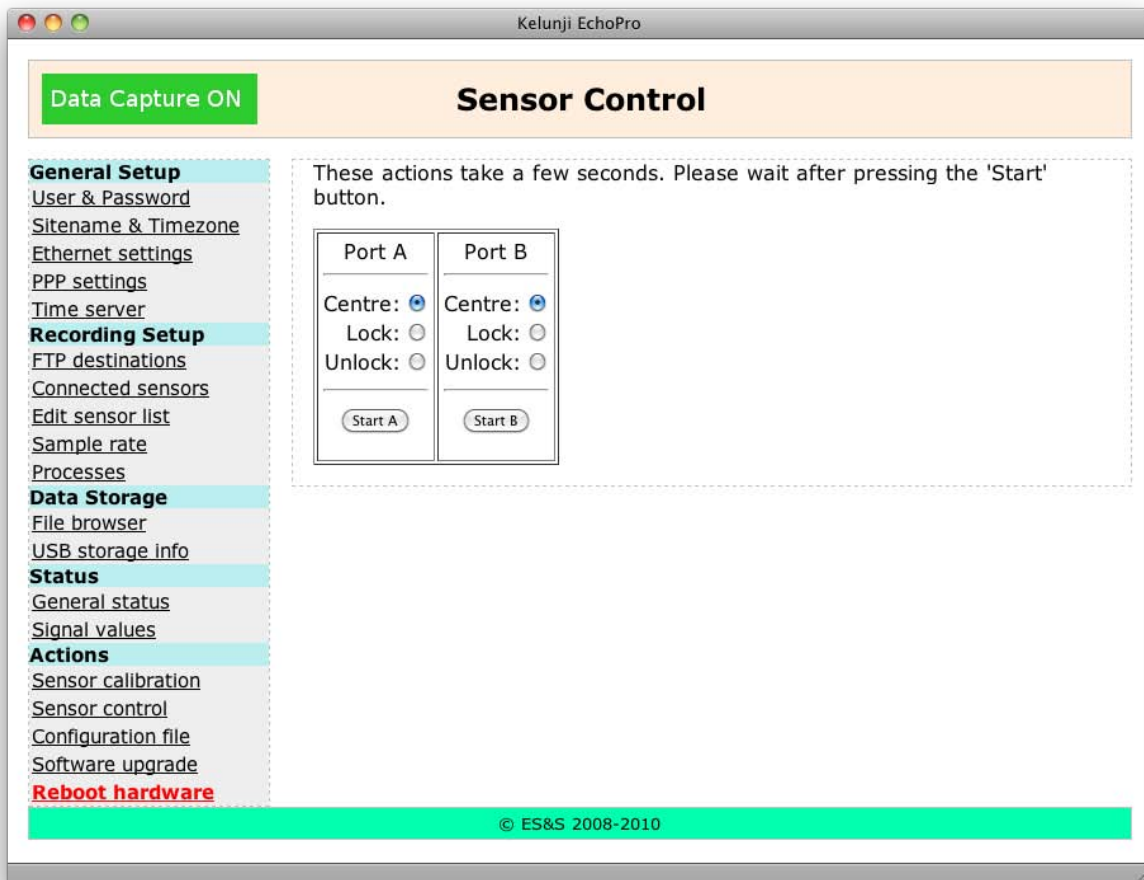


In order to initiate recording, a voltage must be applied between pins 7 (-ve) and 8 (+ve). This voltage must be greater than 3V, and less than 50V. The return path is not connected to ground on the EK board, and must be connected to ground at the external source.

Once the external voltage exceeds the threshold, the process will be triggered and recording will commence. Note that this input is not precisely timed, and should not be used as an accurate indication of the time the event occurred. A pre-trigger buffer should be configured if using an external level triggered source.

An external alarm input connector can be factory fitted to the EchoPro case as an extra cost option and can be retro-fitted to existing recorders. EK boards of version 2.01 and earlier require additional hardware modifications that must be done by factory-trained technicians.

Sensor Control



A new menu item on the main user interface screen appears under **Actions** and allows the user to remotely lock, unlock, and re-centre the mass of a Guralp CMG3-ESP or CMG-3T seismometer. This feature is only available on sensor interface boards manufactured after September 2010. The commands apply the appropriate signal to the sensor control lines in accordance with Guralp's guidelines. As a guide, the sensor locking process takes just a few seconds, but the unlocking and mass centering process can take up to several minutes to complete as the sensor automatically refines its mass positions.

Other Features

Restore Factory Defaults via USB

This feature has been in the firmware code since version 2.11. You have always been able to restore the factory defaults via the web interface, which is under the **Actions** section within the **Configuration File** menu. If for some reason you cannot access the web interface you now have a way to restore the EchoPro to its factory default settings by physically forcing the command using a file on the USB storage memory.

Using your PC, simply create a file (not a folder) with the file name **factorydefaults** (with no file extension) in the root directory of the USB device. While the recorder is not powered, insert the USB device and then power up the recorder. Upon start-up the recorder will look for this file, and if present it will restore the recorder to factory defaults and then delete the file from the USB device. It will then complete the boot process with the default settings.

WARNING! This will reset the network settings also, so you will need to reconnect using the IP address 172.16.5.120. The network settings are not affected when the "restore factory defaults" function is initiated via the web interface menu item.