

TB32 32-Channel Digitizer

TB32 Overview

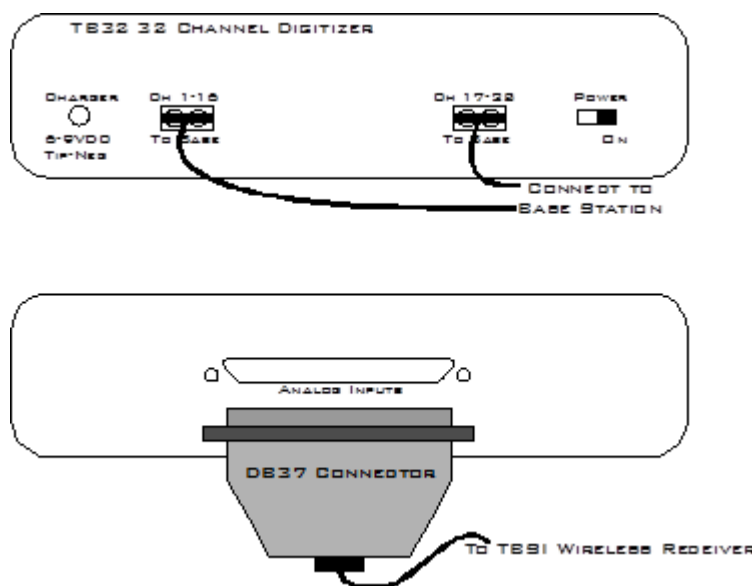
The TB32 32 channel digitizer interfaces directly with Triangle BioSystems, Inc. (TBSI) wireless headstage and receiver allowing up to 31-channels of recording from a free moving subject.



TBSI's wireless headstage captures the analog signals and wirelessly transmits them up to 3 meters from the subject to the TBSI receiver. The analog signals are then passed to the TB32 for digitization through a 37-pin connector. Signals are digitized at up to ~25 kHz on the digitizer and sent over two fiber optic links to a DSP device such as the RZ5 base station, where they are filtered and processed in real-time.

Hardware Setup

The diagram below shows the connections made to the front and back panels of the TB32 digitizer.



TB32 Front (top) and Back (bottom) Panels

TB32 Features

Analog Acquisition Channels

The TB32 acquires signals using 16-bit sigma-delta As, which provide superior conversion quality and extended useful bandwidths, at the cost of an inherent fixed group delay. Each converter has a two-pole anti-aliasing filter (12 dB per Octave) at 4.5 kHz.

Note: The TB32 16-bit sigma-delta A/D converters contain a 20 sample group delay.

Scale Factor

To determine the actual biopotential from the TB32, two scale factors should be applied in the DSP. The first scale factor is 400. This is used to convert the input from the TB32 into the standard voltage range expected by the DSP. The second scale factor is used to scale the signal according to the amplification of the TBSI headstage and receiver.

This can be simplified into a single conversion of $400 / G^{TBSI}$

Where G^{TBSI} = Gain of TBSI wireless headstage and receiver

Headstage Connector

The headstage connector is a 37-pin (31-channel) female connector. Information on the pin inputs is provided with “TB32 Digitizer Technical Specifications” on page 6-99.



Base Station Connectors - To Base

One end of the fiber optic cable connects to the digitizer and the other end connects to the digitizer (amplifier) input on the base station. Two fiber optic base station connectors are provided. Connect each fiber optic cable as shown below.

Each connector on the TB32 is labeled and corresponds to the channels of the wireless headstage. Refer to the System 3 Manual for specific device channel configurations.

Digitizer Output
to Base Station



Base Station Connector
for Digitizer Input



Power Switch

A switch on the front panel powers up the digitizer. The power light and fiber connectors at the left will be illuminated when the digitizer is on.

Power Light

The power light is illuminated when the device is on. It flashes quickly if the battery is low. It flashes slowly while the battery is charging.

Power Requirements

Onboard lithium-ion batteries charge in ten hours. Keeping the battery charger connected to the digitizer does not affect the battery life. However, the charger will significantly increase the noise of the system if it is plugged in while an experiment is running. A 6 Volt battery charger is included with the digitizer. The charger tip is center negative.

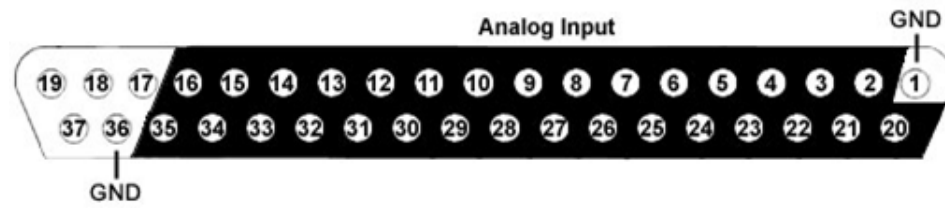
The Li-ion battery supplied with the system cannot be removed. If battery life longer than 20 hours is required, contact TDT for more information.

TB32 Digitizer Technical Specifications

A/D	31-channels: 16-bit sigma-delta
Maximum Voltage In	+/- 2 Volts
Frequency Response	3 dB 2.2 Hz - 4.5 kHz
Highpass Filter	2.2 Hz
Anti-Aliasing Filtering	4.5 kHz (3 dB corner, 2nd order, 12 dB per octave)
S/N (typical)	74 dB
Input Referred Noise (Re 2V)	rms 400 microvolts bandwidth 300 - 3000 Hz* 1 millivolt bandwidth 30 - 5000 Hz*
Group Sample Delay	20 Samples
A/D Sample Rate	6, 12, or 25 kHz
Input Impedance	10 ⁵ Ohms
Power Requirements	500 mAmps while charging, 50 mAmps once charged
Battery	Li-Ion Polymer Battery 5000 mAh, 20-30 hours between charges.
Charger	6-9 Volts , greater than 500 mAmps, center negative
Fiber Optic Cable	5 meters standard, maximum cable length 20 meters

***Note:** Given the standard gain on the TB32 these values are 1 uV and 2.5 uV respectively.

Pinout Diagrams



Pin	Name	Description	Pin	Name	Description
1	GND	Ground	20	A1	Analog input channels 1,3,5,7,9,11,13,15,17,19,2 1,23,25,27,29,31
2	A2	Analog input channels 2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30	21	A3	
3	A4		22	A5	
4	A6		23	A7	
5	A8		24	A9	
6	A10		25	A11	
7	A12		26	A13	
8	A14		27	A15	
9	A16		28	A17	
10	A18		29	A19	
11	A20		30	A21	
12	A22		31	A23	
13	A24		32	A25	
14	A26		33	A27	
15	A28		34	A29	
16	A30		35	A31	
17	NA		Not Used	36	GND
18	NA	37		NA	Not Used
19	NA				

Note: No connections should be made to pins 17, 18, 19, and 37.