



SLINKE

S.Bus Link for EX Bus

User's Guide

Installation, Operation and Technical Notes



V1.2, last revised: 21 Oct 2016

1 General

This document provides details on the installation and operation of the "SlinkE" S.Bus protocol converter for Jeti EX receivers.

SlinkE reads the servo channel data provided on the EX Bus port, and converts the data into S.Bus format.

You can drive (one or more) S.Bus compatible servos directly from the output of the SlinkE, or feed the S.Bus signal into a multicopter flight controller or similar device that can read S.Bus data natively.

1.1 How do I pronounce "SlinkE" ?

You can pronounce it any way you like, however my preference is **slīng'kē**, like the little kids toy made out a large soft spring 😊

2 Installation

Follow these steps to install the SlinkE:

- Using Device Explorer on your DC16/DS16/DS14 transmitter, change the output of the receiver to "EX Bus" mode.
 - Note: Before changing to EX Bus mode, ensure that the receiver number of output channels is "16". If it is set to 8 and you enter "EX Bus" output mode, only 8 channels will be outputted. This appears to be a bug as of v3.11 TX software.
- It is strongly recommended that you set the transmitter refresh rate to 100 Hz (instead of the default 50 Hz), to produce the smoothest servo movements.
- Connect the male servo connector from the SlinkE to the Ext port on your Jeti receiver. This cable is identified also by the "EX" label on the underside of the SlinkE.
- Connect your S.Bus device to the female servo connector on the SlinkE (identified by the "SB" label on the underside of the SlinkE).

There is no configuration or adjustments required for the SlinkE. You should now be able to operate your SlinkE and S.Bus devices.

3 Operation

3.1 Power Supply

SlinkE draws power from the receiver port. When you turn on your receiver, the SlinkE will turn on immediately. Status LED's provide indication of the state of the SlinkE (see notes below).

S.Bus devices also draw their power from the SlinkE (and hence from the Jeti receiver). If you plan on powering several S.Bus servos from the SlinkE, consider the current limitations noted below.

3.1.1 Current Limits

SlinkE provides power to any connected S.Bus device. The printed circuit board tracks are nominally rated to 3.5 amps continuous current (for a 20 degree track temperature rise and 50 mV voltage drop). Higher currents can be tolerated for short periods.

Note that the Ext port on Jeti receivers and Central Boxes cannot be relied on to provide power above a few hundred mA. Depending on the particular model and age, it is possible that powering even a single servo from the Ext port may permanently damage that port.

As a result, if you plan on powering S.Bus servos directly from the SlinkE, you should consider providing a separate power supply to these servos (by cutting the red wire in the output cable; however ensure that the ground wire is common between SlinkE and the external power supply).

3.2 Status LED's

There are green and red status LED's on the SlinkE, located just above the letter "k" in the SlinkE label.

The state of the SlinkE can be interpreted as follows:

- On initial power-up, both status LED will be on for a short period of time.
- After a short delay you should see the green and red LED's blink alternately. This indicates that the SlinkE is in "initialisation phase", ie awaiting valid data from the receiver.
 - Note: if your transmitter was turned on before you turned on your receiver, you may not see this state at all.
- Once SlinkE receives valid packets of data from the receiver, the green LED will remain on and the red LED will turn off.

- If the time since the last valid packet exceeds 25 milliseconds, SlinkE will decide that it has experienced a single packet loss, and the red LED will blink slowly (with the green LED still on).
- If packet loss continues for more than 0.5 seconds, it considers that there has been a complete loss of communication with the receiver, in which case the green LED will turn off and the red LED will blink rapidly.

4 Firmware Updates

SlinkE can be updated using the standard Jeti USB adaptor with dedicated SlinkE update software. A Windows compatible firmware updater is available from the rConix website.

5 Technical Notes

5.1 Neutral Position and Travel Limits

Jeti defines their servo neutral point as 1500 microseconds, with minimum value of 1000 us and max value of 2000 us for +-100% stick travel. These limits can be extended to min value of 750 us and max value of 2250 us if servo limits are adjusted to +-150%. Many servos can physically accept signals outside of these ranges.

Futaba define the servo neutral point as 1520 us, and minimum value of 1100 us and max value of 1950 us for +-100% stick travel. The S.Bus format inherently limits the extreme values to a minimum of 880 us and maximum of 2168 us (since it is a 11-bit digital signal with a resolution of approx. 0.6 us).

SlinkE convert the EX channel data into S.Bus channel data without any shift in neutral points. It does however limit the minimum and maximum values to the limit of the S.Bus protocol (ie 880us and 2168us).

This means that servo neutral positions should not change when switching between conventional PPM receiver output signals and S.Bus output signals, however servo travel limits may be reduced.

The logic of this approach was based on the following philosophy:

"If I own an S.Bus servo and drive it with standard PPM signal from my Jeti DS-16, and then change over to using an S.Bus digital signal, I expect the neutral point (but maybe not travel limits) for that servo will not change."

5.2 Frame Rate

By default, the Jeti transmitters output data at 50 Hz frame rate (ie one packet every 20 ms). This can be increased to 100 Hz (ie one packet every 10 ms) within the system menu.

The S.Bus protocol has two defined frame rates, a "low speed" option (one packet every 14 ms) and a "high speed" option (a packet every 7 ms). The current version of SlinkE outputs at the low speed rate of one packet every 14 ms.

The difference in frame rates between EX and S.Bus means that the last packet of EX Bus data may not be a good value to use when sending the next S.Bus packet. The current version of SlinkE uses linear extrapolation to calculate the S.Bus servo values at any point in time, based on the last two EX packets. This provides significantly smoother servo movement compared to the crude approach of just outputting the last received EX data. Nevertheless, increasing the transmitter frame rate to 100 Hz does further improve the servo movement smoothness, and is strongly recommended.

5.3 Failsafe

If SlinkE receives an invalid EX Bus signal from the receiver, it will ignore the invalid data and send an S.Bus packet based on the last known good value. The S.Bus protocol defines two "flags" to indicate a packet loss and lost communication state, and SlinkE does set these flags accordingly.

If however SlinkE receives invalid data (or no data at all) for more than 0.5 seconds, it will stop sending S.Bus packets completely.

If you intend to connect your SlinkE to a flight controller, you should check how it responds to failsafe events and verify that a complete loss of S.Bus signal will trigger failsafe on the flight controller.

6 Acknowledgements

SlinkE uses the "TinySafeBoot" bootloader (http://jtxp.org/tech/tinysafeboot_en.htm), copyright Julien Thomas 2016.

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