

Xtreme Power Systems

XtremeLINK[®]

Satellite Receiver

Installation And Usage Manual

XtremeLink[®] is a registered trademark of Xtreme Power Systems, LLC.

Firmware v1.0

Manual v11

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Introduction

Thank you for purchasing the XtremeLink® satellite receiver. This product requires the XtremeLink® radio system. If you do not have the XtremeLink® radio system then this product will not work. This product is not compatible with any other 2.4GHz radio system.

Installation Requirements

The installation of the XtremeLink® satellite receiver is very simple. However, if after reading through this manual you believe that you cannot perform the installation, please seek someone who can assist you.

This manual should provide ample information and clarity to install and use this product.

Warranty Information

The XtremeLink® satellite receiver carries a limited lifetime warranty. Units subject to improper installation, misuse, abuse, or modifications will not be covered under this warranty.

Xtreme Power Systems may at its discretion either repair or replace the unit covered under warranty. The customer will pay all freight charges to and from Xtreme Power Systems. Xtreme Power Systems must be contacted to obtain a return authorization. Any product returned without authorization will be returned without repair or replacement.

Liability

By using this product, you agree to hold Xtreme Power Systems free from any type of liability either directly or indirectly while using this product.

Legal Information

The 'look and feel' and functionality of this product are protected by U.S. copyright laws. Various terminology and feature names are protected under U.S. trademark laws.

The satellite receiver is part of the XtremeLink® radio system's telemetry support. This product offers extra protection in case of a RF link failure of the main receiver. The satellite receiver requires that your XtremeLink® radio system firmware be v3.0 or later. A system with v3.0 or later can be easily identified by turning on the transmitter and observing the RF module's STATUS LED. If the LED is flickering red very fast, it is v3.0 or later.

The satellite receiver connection requires a female-to-female servo extension lead. Any length up to 10 feet can be used.

SECTION 1 – INSTALLATION

Step 1 – Installing the cable

Attach the cable to the satellite receiver as shown in Figure 1. Note the orientation of the cable. **If the cable is backwards, the satellite receiver will power up, but it will not be able to transfer data to the XtremeLink® receiver!**

Once the cable is connected to the satellite receiver attach the other end to your XtremeLink® receiver's "B/T" port as shown in Figure 2. Note the polarity of the plug. If you plan to use a battery or additional satellite receivers, you will need to use a Y-cable connected to the "B/T" port. See Figure 3.

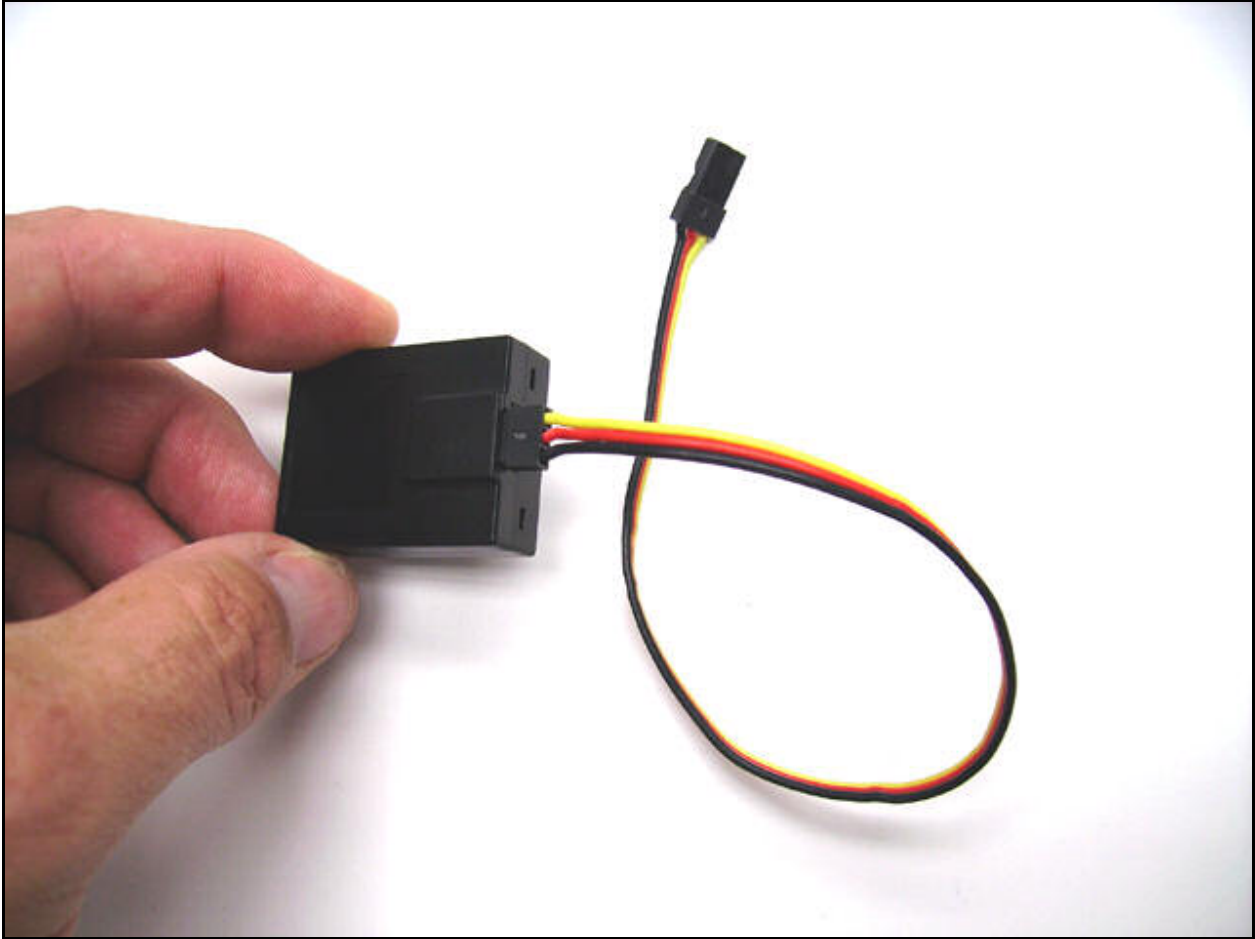


Figure 1 – Attaching the cable to the satellite receiver

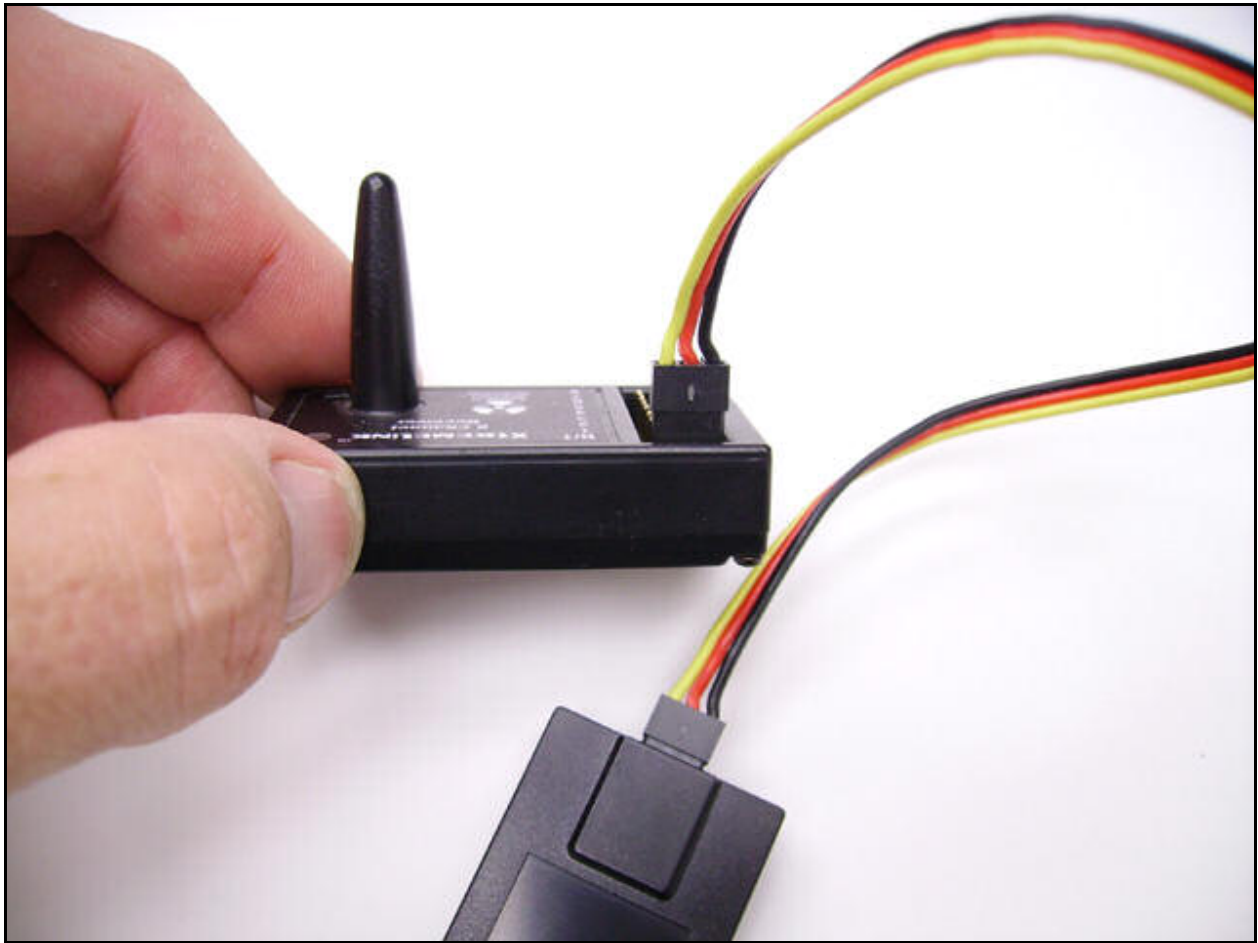


Figure 2 – Attaching the cable to the XtremeLink® receiver

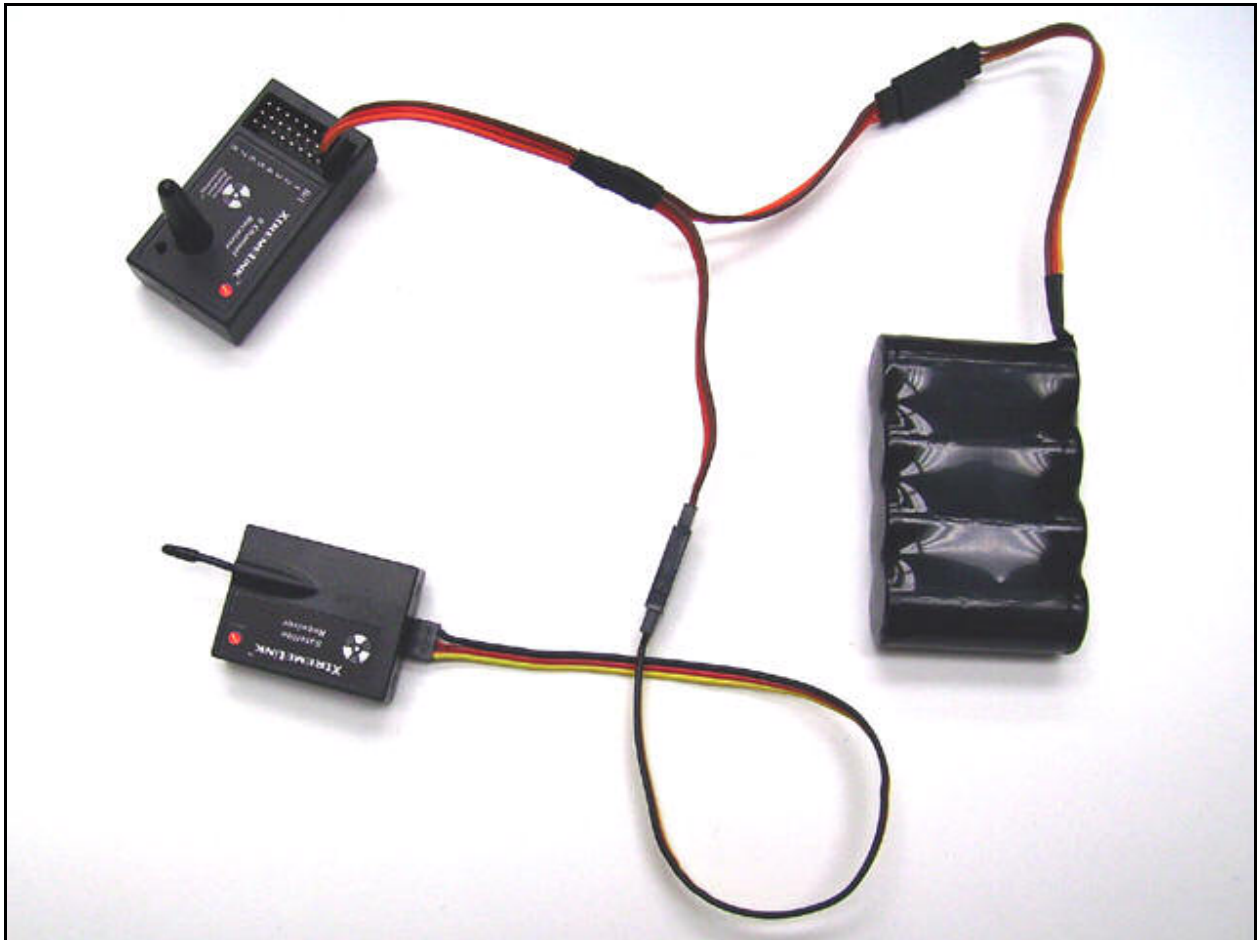


Figure 3 – Using a Y-cable if necessary

SECTION 2 – SETTING UP THE SATELLITE RECEIVER

Step 1 – Setting up telemetry communication

Before the satellite receiver can be recognized by the XtremeLink® receiver it must be told how to communicate. This is accomplished by putting the XtremeLink® receiver into Telemetry Setup mode.

To put the XtremeLink® receiver into Telemetry Setup mode, follow the instructions below:

Make sure the XtremeLink® transmitter is turned off. Power up your XtremeLink® receiver and wait for the STATUS LED to begin flashing red. Now press and hold the programming button on the XtremeLink® receiver until the STATUS LED changes from off, then to green, then to red. This process will take approximately 7 seconds. This puts the XtremeLink® receiver into “programming mode”.

Once you have entered programming mode, the STATUS LED will be solid red (the first programming option). Each time you press and release the programming button, the STATUS LED will change colors, indicating a different programming function. Press and release the programming button 5 times. The STATUS LED should be flashing orange. Now, press and hold the programming button until the STATUS LED turns off, and then release the programming button. The STATUS LED will now be green indicating that telemetry setup mode is active. Once in this mode, the STATUS LED on the satellite receiver (and any other telemetry devices) will be orange. If not, check the cable to make sure that it is correctly attached to the satellite receiver and XtremeLink® receiver and repeat the process.

Now, press and release the programming on the satellite receiver. The STATUS LED will turn off. The satellite receiver has now been programmed to communicate with the XtremeLink® receiver. If you have other satellite receivers or telemetry sensors attached, press and release the programming button on each device, one at a time.

Disconnect power to the XtremeLink® receiver. This should also disconnect power the satellite receiver(s).

Step 2 – Binding the satellite receiver

Now, that the telemetry communication has been completed, you must bind the satellite receiver to the transmitter. You must bind your main XtremeLink® receiver and any satellite receivers together

Power the receiver (and any satellite receivers). You must put the satellite receiver(s) into binding mode before the main XtremeLink® receiver. This is done by pressing and holding the programming button on the satellite receiver until the STATUS LED turns green. When you release the programming button, the STATUS LED will turn orange. This means that the satellite receiver is waiting for the main receiver to communicate.

Put the main XtremeLink® receiver into binding mode by pressing and holding the programming button until the STATUS LED turns green. Releasing the programming button will cause the STATUS LED on the main XtremeLink® receiver as well as the satellite receiver, to begin flashing orange. This means the receivers are waiting for a transmitter module to bind to.

Put the transmitter module into binding mode by holding down the PROG button and turning on the power. Do not release the PROG button until the STATUS LED turns green. Once the PROG button is released all of the STATUS LEDs will flicker orange and then all finally turn green. This indicates a successful bind has occurred.

Turn off power to the transmitter and disconnect power from the receiver. Your system is now ready to use.

Notes:

Satellite receivers operate independently from telemetry sensors, so you do NOT need to enable the telemetry support (using the XDP software) for satellite receivers to function.

If you select the TELEMETRY option in the XDP software you will be able to see the satellite receiver connected and view its information.

SECTION 3 – ADVANCED PROGRAMMING

The satellite receiver communicates with the main XtremeLink® receiver using a proprietary and complex packet based system. To allow 3rd party companies the opportunity to use the satellite as a main receiver, we have added the ability to output an easy to use, and fully documented, packet data stream. This data can (and will) be used by devices such as the V-bar stabilization system, autopilots, etc.

To put the satellite receiver into programming mode, apply power to it using a battery or connection to an XtremeLink® receiver. Now, press and hold the programming button until the STATUS LED turns from off, then to green, and then to red. Once the STATUS LED is red you can release the programming button. This process will take about 7 seconds.

Currently, there is only one programming option available (red). Other options will be added in the future. Push button programming menus are done exactly the same as the other XtremeLink® products.

Press and hold the programming button until the STATUS LED turns off. The STATUS LED will then blink the number of times equal to the current setting. This will be either one blink or two blinks with the current firmware. One blink indicates satellite receiver mode (default) and two blinks indicates data stream mode (this is the mode to use if you want a constant stream of serial data).

After the STATUS LED has stopped blinking green, press and release the programming button either one time (satellite receiver mode) or two times (data stream mode). A rainbow of colors will be displayed if your entry was successful. Otherwise, the STATUS LED will flash red/green several times to indicate there was an error (either you pressed the programming button too many times or you waited too long before pressing the programming button).

Data is transferred using a single wire 3.3v serial communication line. You can NOT place any load on this line. This means that your interface hardware must be an input-only connect, and never attempt to drive the line high or low. We recommend either a dedicated serial port on a microcontroller or an open-collector buffer driving a dedicated pin. Since the line is 3.3v you may have to shift the level to a higher voltage. Use a simple transistor level shifter to do this.

Serial data information:

Baud rate: 125,000 (8us per bit)

Data bits: 8

Parity: No

Start/Stop bits: 1

This is typically referred to as 125Kbps, 8, N, 1.

The data format for the serial data is a packet that is output at the transmitter's frame rate. This rate varies depending on the transmitter. Typically, the rate is 22ms for aircraft transmitters and 14ms for car transmitters.

Serial packets vary in length depending on the number of channels that the transmitter outputs. The satellite receiver passes all channel information that is sent by the transmitter. There may be cases where you believe only 6 channels are being used, but the transmitter may output 9 channels.

Serial packet format:

Byte	Value	Description
0x00	0xFF	header
0x01	0x55	packet ID (serial stream)
0x02	0XXXXX	Channel mask high byte (bits 15-8)
0x03	0XXXXX	Channel mask low byte (bits 7-0)
0x04	0XXXXX	Servo pulse high byte (bits 15-8)
0x05	0XXXXX	Servo pulse low byte (bits 7-0)
.....		repeat for each servo channel until done
0x??	0XXXXX	CRC of channel data.

The CRC is the last byte of the packet. It is a simple 8 bit checksum calculated using the following formula: (HEADER + PACKET ID + MASKH + MASKL + each byte of channel data) XOR 0xFF.

16 bit MASK Definition

Bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Channel:	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

A set bit in the mask represents that the servo channel is present in the data that is being transferred. For example, if the mask is 0x01FF then it means that channels 1, 2, 3, 4, 5, 6, 7, 8, and 9 will be appearing (sequentially) in the stream. If the mask is 0x17F then it means channels 1, 2, 3, 4, 5, 6, 7, and 9 will appear in the stream. Notice channel 8 (bit 7) is missing. Channels are always output in sequential order starting with the lowest channel number first.

An example packet outputting 3 channels (1/2/3) would be:

0xFF,0x55,0x00,0x07,0x05,0xDC,0x05,0xDC,0x05,0xDC,0x01

The checksum is calculated by adding the 10 packet bytes together (which adds up to be 0x3FE), ignoring the upper byte leaves (0xFE). That value XOR'd with 0xFF equals 0x01, which is the checksum.

The channel data represents the servo position in 1us steps. In the above example, the channel data is 0x05DC, which is 1500 in decimal. 1500us is typical servo center. The range allowed is 750us to 2250us (0x2EE to 0x8CA).

During a loss of signal, no data is transferred via the serial bus for that frame.

If you intend to support this data format for your project (commercial or private), please contact us for updates and other information. We would like to help you be successful with your project!

tech@xtremepowersystems.net