

VoltMagic lets you configure the battery voltage monitor for your particular battery. During normal operation the LEDs will indicate current battery voltage, plus record low voltage spikes (PLV) and/or radio glitches that occur. The objective of proper installation is for the LEDs to reflect the status of your system as follows:

**RED (blinking or solid) = Warning — voltage low.**

**YELLOW (blinking or solid) = Caution — voltage lower than normal.**

**GREEN blinking = Glitch count (LED 1) or PLV values approaching the yellow level (LED 5).**

**GREEN solid = Normal (voltage displayed).**

**CAUTION:** Do not connect to over 8.7 volts—damage may result.

1. **Connect the attached lead**, just like a servo, to the receiver. (Wire colors: brown is equivalent to black, and orange is equivalent to white.) A “Y” harness may be used if there is not a spare channel on the receiver. If a “Y” harness is used, connect it to a channel with low current draw. When configuring VoltMagic for failsafe detection on PCM receivers, using a separate channel is advised since its failsafe position will be adjusted for VoltMagic. VoltMagic can also be plugged into a socket that does not have a channel signal (such as one for a DSC) or connected directly to a battery (such as a LiPoly). Naturally, if VoltMagic is connected without a channel signal, glitch/failsafe detection is disabled and you will have to plug it somewhere with a channel signal temporarily to change the configuration (in step 3).

Refer to **Table 1** on the reverse side of this sheet for the configuration choices. Configuration STEPS 2 and 3 are also in a convenient flowchart in the **Quick Configuration Guide**.

2. **Glitch or PCM Failsafe Detection:** Glitch detection checks if signals from the receiver fall outside the normal range of pulse widths. Failsafe Detection (for PCM receivers only) checks if the signals from the receiver are at maximum high or low, which is the failsafe position to set for the channel connected to VoltMagic. The receiver will apply this failsafe position signal when the radio signal is lost. As a side note, we recommend that you check that the throttle channel failsafe is set to idle. See your transmitter manual for specific procedures to set failsafe positions.
  - a. **For Glitch detection only:** Set the transmitter ATVs (end points) to > 85% for the channel connected to VoltMagic, then SKIP to STEP 2e below.
  - b. **For PCM Failsafe only:** Set the ATVs (end points) to maximum (typically 140% for Futaba or 150% for JR) for the channel connected to VoltMagic. (This is necessary in order to actually set the failsafe to full high or low in the next step.)
  - c. Set the failsafe position for the channel to full high or low (i.e. the switch or control full one way or the other).
  - d. Reduce the ATVs to 85%, which will keep a failsafe from being accidentally detected by moving the switch/control for the channel. Note that changing the ATVs does not affect your previously saved failsafe position.
  - e. Continuously toggle the channel connected to VoltMagic back and forth **quickly during the first 3 seconds after power up until green LED 1 starts blinking** (LED 1 blinks continuously during configuration).
  - f. If the red LED already indicates the desired mode (it will be off for glitch or on for failsafe as you cycle through the voltage range choices listed in **Table 1**), skip to **Set Voltage Range, STEP 3b**.
  - g. Toggle the channel slowly to step through the choices. Find the last two choices in the cycle (see Table 1), which display red LED 8 either off for glitch or on for failsafe (plus the last saved voltage range choice). If you go past, just keep toggling until the last two choices come around again.
  - h. TURN OFF the receiver to save your selection (after 20 seconds of inactivity, the previous configuration is restored).
3. **Set Voltage Range:** See **Table 1** and choose a voltage range. The second column in **Table 1** shows the LEDs that are lit during configuration when that particular range is selected. To enter configuration, your transmitter ATVs for the channel connected to VoltMagic should be about 85% (or more if not using PCM failsafe detection).
  - a. Continuously toggle the channel connected to VoltMagic back and forth **quickly during the first 3 seconds after power up until green LED 1 starts blinking** (LED 1 blinks continuously during configuration).
  - b. Toggle the channel slowly to step through the choices (see **Table 1**, column 2 on reverse side), then stop when the desired LED configuration is reached (if you go past, just keep toggling until your choice comes around again). Note that while configuring voltage ranges, the red LED shows the current glitch or failsafe mode
  - c. TURN OFF the receiver to save your selection (after 20 seconds of inactivity, the previous configuration is restored).
4. **To test glitch or failsafe detection**, turn on the transmitter and receiver for longer than one minute, then turn the transmitter off and back on. Green LED 1 should blink (see the Operation Guide). (If PCM failsafe detection doesn't work at first, try setting the failsafe again to the opposite extreme.)
5. **Mount VoltMagic** by applying double-stick tape to the back. Mount away from engine exhaust, preferably where it can be seen in a hover or slow fly-by. For mounting inside a fuselage, cut a slot for viewing the LEDs.
6. See the **Operation Guide** for specifics on reading the LEDs.

### VoltMagic Features

**Battery Voltage Indication** — 12 accurate range selections for the LEDs.

**Peak Low Voltage (PLV)** — Captures momentary low voltages hundreds of times each second.

**Glitch and Failsafe Counting** — Selectable PPM glitch or PCM failsafe counting.

**Data Logger** — PLV and Glitches/Failsafes, play back after power off.

**Application** — Battery types: 4 or 5-cell NiMh/NiCd or 2-cell Lithium/LiPoly plus monitoring of voltage regulators.

**Connector** — Universal (Futaba, JR, Z)

**High Accuracy** — Calibrated within 0.015 vdc

**TABLE 1: Voltage Ranges + Glitch or Failsafe Mode** -- In order of appearance during configuration.

✓ Note: The default range 3 is usually a conservative four-cell choice. Ranges 2 and 6 are also common choices.

| Voltage Range for LED's 1 – 8<br>Glitch Mode (last two choices) | Configuration LED Display                  | Typical Applications                                  |
|---|--|---|
| 1. 5.30 volts – 4.60 volts *                                    | Green LED 5                                | 4-cell NiCd, micro & standard servos                  |
| 2. 5.40 volts – 4.70 volts *                                    | Green LED 4                                | 4-cell NiMh/NiCd, standard, coreless & digital servos |
| 3. 5.50 volts – 4.80 volts * (Default)                          | Green LED 3                                | 4-cell NiMh/NiCd, coreless & digital servos           |
| 4. 5.60 volts – 4.90 volts *                                    | Green LED 2                                | 4-cell NiMh, coreless & digital servos, HV cells      |
| 5. 6.50 volts – 5.80 volts *                                    | Green LED 5 + Yellow LED 6                 | 5-cell NiCd, micro & standard servos                  |
| 6. 6.60 volts – 5.90 volts *                                    | Green LED 4 + Yellow LED 6                 | 5-cell NiMh/NiCd, standard, coreless & digital servos |
| 7. 6.70 volts – 6.00 volts *                                    | Green LED 3 + Yellow LED 6                 | 5-cell NiMh/NiCd, coreless & digital servos           |
| 8. 6.80 volts – 6.10 volts *                                    | Green LED 2 + Yellow LED 6                 | 5-cell NiMh, coreless & digital servos, HV cells      |
| 9. 7.70 volts – 7.00 volts *                                    | Green LED 5 + Yellow LED 7                 | 2-cell Lithium/LiPoly                                 |
| 10. 7.80 volts – 7.10 volts *                                   | Green LED 4 + Yellow LED 7                 | 2-cell Lithium/LiPoly                                 |
| 11. 7.90 volts – 7.20 volts *                                   | Green LED 3 + Yellow LED 7                 | 2-cell Lithium/LiPoly                                 |
| 12. 8.00 volts – 7.30 volts *                                   | Green LED 2 + Yellow LED 7                 | 2-cell Lithium/LiPoly                                 |
| Glitch (Default)  | Saved voltage range + Red LED 8 <b>OFF</b> | PPM Glitch Mode                                       |
| Failsafe  | Saved voltage range + Red LED 8 <b>ON</b>  | PCM Failsafe Mode                                     |

\* The 8 LEDs each represent a 0.10 volt increment of the range. Voltage listed is the median. For example, in the first range, yellow LED 7 is on between 4.75 and 4.65, and red LED 8 is on with less than 4.65 volts. A deadband dampens changes between LEDs.

### TIPS AND TROUBLESHOOTING

When to charge a battery will depend on battery characteristics, amperage, flight duration, etc. Using battery load, discharge, or capacity test instruments, in addition to VoltMagic, is good practice. With VoltMagic connected at the receiver, even momentary low voltage due to switches, servos and wiring can be detected, as well as low voltage due to the battery. Early detection can warn you when the safety margin for voltage is too small, and before that margin is used up. Generally, radio gear performance can degrade below 4.3 vdc, and peak lows below 1.05 volts per cell with NiCd or NiMh are not normal. Check your radio manual or contact the manufacturer for specifics. (For example, at [www.futabarc.com/faq/faq-receivers.html](http://www.futabarc.com/faq/faq-receivers.html), Futaba says that 4.0 vdc is an absolute minimum, with performance degraded as voltage falls under 4.3 - April, 2005).

It is often normal to have PLV in the yellow or green zone when the battery is about due for charging. However, if the battery charge is normal but the PLV is low (e.g. red LED 8 is blinking), the problem may be with the battery, switch, servos, wiring, connections, etc. Note that high current (digital) servos require a suitable battery and switch harness to avoid severe peak low voltages.

If there are excessive glitches or failsafes, it may be helpful to use VoltMagic as a diagnostic tool on the ground while range checking. Problems with the transmitter, receiver, or antenna usually can be detected without the engine or motor running. When excessive glitches only occur with an engine or motor running, look for something related such as bearings or faulty motor noise suppression.

### LIABILITY EXCLUSION AND SAFETY

Never turn off your brain and rely solely on this device. Observe safe practices concerning your particular model. Always perform an appropriate pre-flight check. As manufacturers, we are not in a position to ensure the proper methods of operation when installing, testing, or using this product, nor can we assure the fitness of this product for your particular application. For these reasons, the manufacturer does not accept any liability for loss, damage, or injury connected with this product. By using VoltMagic, you agree to this.