Pixie-7P™

By **Castle Creations™**

Programmable Sub Micro Digital Motor Control

1.0 Features of the *Pixie-7P*:

- **Microprocessor controlled**
- **Low Resistance (.007 ohms)**
- **High rate (2800 Hz) switching (PWM)**
- **Up to 7 Amps continuous current (with proper air flow)**
- **High Output (1.2amp) Battery Eliminator Circuit (BEC) provides power to receiver and servos - eliminates separate receiver battery**
- **Three to six cells with three micro servos**
- **Up to eight cells with two micro servos**
- **Eighteen cells MAX with BEC disabled**
- **Programmable LV cutoff (none, 3.5v, 4.7v*, 6.0v or 8.0v)**
- **Programmable motor cutoff – hard with reset* or soft**
- **Programmable throttle range – auto-calibrating* or fixed end points**
- **Safe "power on" arming program ensures motor will not accidentally turn on**
- **Low torque "soft start" prevents damage to fragile gearboxes**
- **Auto shut down when signal is lost or radio interference becomes severe**
- **Rugged surface mount construction**

* Initial factory settings

2.0 Wiring Your *Pixie-7P*:

Tools required:

Wire cutters   Wire strippers (optional)
Soldering Iron (25-40 watts - Do not use a soldering "gun")

Parts required:

Solder (rosin core "electronic" solder - do not use acid core "plumbers" solder)
Battery connector

2.1 Adding the Battery Connector

The battery connector is attached to the side of the controller with black and red wires. Cut the wires to the length you require on the battery side. Strip off of the wire insulation to expose just enough wire to attach the battery connector. (Note: if you do not have a pair of wire strippers, you can use a modeling knife to carefully cut through the insulation around the wire. Then the insulation should easily pull off the wire.) Attach the battery connector to the wires ENSURING THAT THE POLARITY (red wire to battery red wire, black wire to battery black wire) IS CORRECT, following the instructions for the battery connector.

2.2 Attaching the Motor Leads

The motor is connected to the side of the controller with red and white wires. Cut the wires to the length you require on the motor side. Strip the wire insulation to expose just enough wire to solder the wires to the motor terminals. (Note: If you do not have a pair of wire strippers, you can use a modeling knife to carefully cut through the insulation around the wire. Then the insulation should easily pull off the wire). There should be a '+' symbol or a RED DOT on the end of your motor which indicates which terminal must be connected to the RED wire. Connect the other terminal to the white wire. A fuse (5-10 amps) may be connected inline in either the white or red power wire. A fuse is recommended for the safest operation. **DO NOT PLACE A FUSE IN THE CIRCUIT BETWEEN THE BATTERY AND SPEED CONTROL. YOU COULD LOSE CONTROL OF THE MODEL.**

Align the wires carefully and solder to the motor terminals. Ensure that all connections (battery and motor) are correctly polarized.

IMPORTANT NOTE: YOU MUST BE SURE THAT ALL CONNECTIONS ARE CORRECT WHEN CONNECTING THE SPEED CONTROL. Incorrectly connecting the speed control could cause permanent damage to the controller.
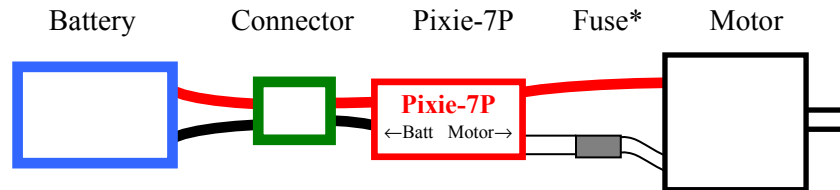

Fig 1: System power wiring diagram   * Suggested 5-10 Amp (if installed)

2.3 Connecting the Receiver

AirTronics systems require a minor change to the wiring in the receiver connector supplied with the speed controller. Reverse the red (power) and brown (ground) wires in the connector plug so that the plug is orange/brown/red. Use a knife blade to lift the retention tabs on the connector plug to remove the red and brown wires. Insert the wires back into the plug and press down the retention tab.

Connect the receiver lead (the three color wires with a connector on the end) to the throttle channel on your receiver (usually channel 3). Do not connect a battery to the receiver, as the Pixie-7P will supply power to the receiver and servos through the receiver connector. If you are using more than eight cells, you will need to use a separate receiver battery. See the section 4.0 (under the heading BEC) for instructions on disabling the BEC to use a separate receiver battery.

ALWAYS PERFORM A RANGE CHECK BEFORE FLYING WITH ANY NEW SPEED CONTROLLER! PERFORM YOUR RANGE CHECK AT FULL THROTTLE, HALF THROTTLE AND NO THROTTLE.

3.0 Flying with Your *Pixie-7P*:

Initialization sequence:

1. Connect the speed controller receiver connector to the proper channel on your receiver (usually channel 3)
2. Turn on your transmitter.
3. Connect the main power battery to the speed controller. The motor will emit a single beep.
4. The speed controller will remain disarmed (will not operate) until it sees more than 1 1/2 seconds of "OFF" throttle. Move the throttle arm to the lowest position on your transmitter; wait at least 1 1/2 seconds. The motor will emit two beeps when armed and the LED will flash slowly. Test the controller to make sure that the throttle operates.
5. Go fly!
6. If the BEC cutoff occurs before you land, you may restart the motor and use low throttle if necessary by moving the throttle stick all the way down (to the off position) and then throttling back up. BEC cutoff will occur again if the voltage drops too low.

4.0 Using the Features of Your *Pixie-7P*

Auto-calibrating Throttle Range – The throttle range is auto-calibrated to the transmitter in use to insure maximum throttle steps.

BEC - The BEC power is supplied to the receiver and servos through the receiver connector wires. If you wish to disable the BEC and use a separate receiver battery (required for more than eight cells), you must first cut the red wire in the trio of receiver wires. Simply use a pair of wire cutters to remove a short section of the red wire near the receiver connector, and be sure to insulate the cut wire with a bit of electrical tape. Or remove the pin from the connector (pry the retaining tab up, remove the pin, and insulate the pin with electrical tape.) Then you may safely use a battery with your receiver.

Fixed Throttle Range – Fixed throttle range sets the throttle to 1.25 to 1.75 ms fixed.

Hard Cutoff – Hard motor cutoff will occur when the input battery voltage drops below the programmed voltage for more than one half second. Once motor cutoff has occurred, moving the throttle to the full off position can rearm the controller. This will allow restart of the motor at low throttle after cutoff has occurred.
WARNING! Restarting of the motor may drain the battery to the point where the radio receiver will stop operating, resulting in a loss of control of the model.

Losses of Transmitter Signal, or excessive radio noise cutoff - Motor cutoff will also occur if the signal from the transmitter is lost, or if the radio noise becomes excessive. After radio connection has been reestablished, moving the throttle to the braking position (full off) can restart the motor.

Programming Mode – The Pixie-7P is already programmed from the factory for: a) 4.7v cutoff, b) a hard cutoff with reset and c) auto calibrating throttle end points. To change any or all of these settings follow the programming instructions beginning in section 7.0.

Safe Power Up - The Safe Power up feature is a "finger saver", designed to prevent the motor from starting accidentally on power up. To arm the controller, the transmitter stick must be held in the "OFF" position (all the way down) for at least one and a half seconds. Until the controller is armed, it will not provide any power to the motor, regardless of where the throttle stick on your transmitter is positioned. Before flying your model, be sure to "blip" the throttle to ensure that the controller is armed.

Soft Cutoff - Soft Cutoff reduces the throttle level to keep the voltage at or near the programmed cutoff voltage level.

WARNING! Soft cutoff is not recommended because it is easy to accidentally run the batteries down to a point where the receiver and servos stop responding or battery damage occurs.

5.0 Troubleshooting

Everything is hooked up correctly, the BEC (receiver and servos) works, but the throttle does not work.
The controller is not seeing the one and a half seconds of "dead space" (low throttle) and is not arming. The motor should emit two "beeps" when it arms. Try moving your throttle stick all the way down, and moving the trim all the way down. Wait for a couple of seconds and try the throttle again. If it still does not arm, you may need to reverse the throttle control on your transmitter (see your radio documentation). You may also check to make sure that your endpoint adjustments on your radio (if it has them) are set all the way open.

Every time I throttle all the way up, the controller "cuts off" after a few seconds, even with fresh charged batteries.
The controller will automatically shut down the motor if the battery voltage falls below programmed cutoff voltage for more than a half second. This prevents loss of control caused by low voltage at the receiver. If the cutoff is kicking in with freshly charged batteries, it means that the voltage is dropping very quickly. This is usually an indication of a motor that is drawing too much current for the batteries to handle. Try using a smaller prop on the motor, or using batteries with a higher rating (for example, if you are using 600 AE cells, you might try going to 800 AR cells.)

It is also possible that the microprocessor on the Pixie-7P is being overwhelmed by noise from the motor. This can occur if the motor has no capacitors installed. In most cases the Pixie-7P does not require capacitors to be installed on the motor. However, some motors are extremely noisy electrically, and need to have capacitors installed. If this is the case, add a capacitor across the motor terminals, or even better, add three capacitors: one across the motor terminals, and one from each terminal to the motor case. Capacitors can be purchased from Radio Shack. Be sure to get "ceramic disk" capacitors, in the range of .01uF and .1uf (.047uF being the best choice.) Do not use electrolytic (can style) or tantalum capacitors with a high-rate control.

When everything is all connected and powered on the motor emits continuous "beep" sounds.
The unit is not receiving a signal from the receiver. Make sure the receiver connector is plugged in correctly and plugged into the right channel of your receiver. Rule out the possibility of a faulty receiver.

Nothing seems to work, receiver and servos are dead, and the throttle is dead.
Check all connections to ensure that they are correct, and that the polarity (+/-) connections are correct. Ensure that the battery is not connected to the motor side of the speed controller. If everything is correctly connected, and the receiver and servos still do not work, contact the dealer where you purchased your Pixie-7P or contact **Castle Creations** directly. (See info below)

6.0   Contact/Warranty Information

Your Pixie-7P is warranted for 1 year from date of purchase to be free from manufacturing and component defects. This warranty does not cover abuse, neglect, or damage due to misuse, incorrect wiring, over voltage, or overloading. If you have any questions, comments, or wish to return your Pixie-7P for warranty or after warranty repair/replacement contact **Castle Creations**™ at:

Castle Creations™
402 E. Pendleton Ave .
Wellsville, KS 66092
Tel: (785)883-4519

Email: support@castlecreations.com
Fax: (785)883-4571
http://www.castlecreations.com

7.0   Pixie-7P Programming Features

Programming the Pixie-7P

Programming the Pixie-7P is as simple as answering a few questions. The Pixie-7P asks questions by flashing a setting number, followed by the possible setting values. There are three settings that can be programmed in the Pixie-7P: 1) Cutoff voltage, 2) Cutoff Type, and 3) Throttle Range.

As the programmer, you must answer "yes" or "no" to the setting values as they are presented by the Pixie-7P.   The setting values are "flashed" out by the LED. Answering "no" to a setting value will cause the Pixie-7P to ask for the next value. Answering "yes" to a setting value will store that setting in the Pixie-7Ps permanent memory. After a setting is stored, the Pixie-7P will continue to ask about other settings until all settings have been stored.   NOTE: If you answer "no" to all values for a particular setting, the Pixie-7P will keep whatever value had been previously programmed. Only by answering "yes" to a value will the Pixie-7P store/change that value.

When answering a question, you will need to move the transmitter stick to the yes (full on throttle) position or the no (full off throttle) position and keep it there for about 5 seconds. When the Pixie-7P has accepted your answer, it will flash the LED rapidly. After the LED starts it's rapid flashing, move the throttle stick to the middle position to confirm that you are ready for the Pixie-7P to ask the next question.

8.0   Entering Programming Mode

The Pixie-7P software is designed to make it difficult to *accidentally* enter programming mode, therefore it may seem like a long process to enter programming mode. This is to prevent entering programming mode while preparing to fly or while in flight. To enter programming mode, follow the steps below:

8.1   Verify Normal Operation

If this is the first time the Pixie-7P has been used, it is important to verify that the Pixie-7P operates normally with your transmitter otherwise programming may not function properly. Follow the instructions in section 3.0 Initialization Sequence (steps 1-4). Once you have verified that the Pixie-7P operates normally, proceed to 8.2 below. If the Pixie-7P does not operate properly, see section 5.0, Troubleshooting.

8.2   Enter Programming Mode

8.2.1   Remove battery power from the Pixie-7P.
8.2.2   Move the transmitter stick to the **top** position (normally full "On").
8.2.3   Reconnect battery power to the Pixie-7P.
8.2.4   After approximately 10 seconds, the LED on the Pixie-7P should flash a short, single flash followed by a pause.

Pixie –7P responds: flash – pause

8.2.5   Move your transmitter stick to the **middle** position.
8.2.6   After approximately 5-10 seconds, the LED on the Pixie-7P should flash a short, double flash followed by a pause.

Pixie-7P responds: flash – flash – pause

8.2.7   Move your transmitter stick to the **top** position again.
8.2.8   After approximately 5-10 seconds, the LED on the Pixie-7P should flash a short, triple flash followed by a pause.

Pixie-7P responds: flash – flash – flash – pause

8.2.9   Move your transmitter stick back to the **middle** position again.
8.2.10   After approximately 5-10 seconds, the LED on the Pixie-7P will quickly flash 8-10 times and will then start a flash sequence of a single flash followed by another single flash, followed by a long pause.

Pixie-7P responds: flash-flash-flash-flash-flash-flash-flash-flash-flash
flash – flash – pause

8.2.11   The Pixie-7P is now in programming mode.
8.2.12   Proceed to Section 9.0 – Programming the Pixie-7P

9.0 Programming the Pixie-7P

Important Note: When answering a question, you will need to move the transmitter stick to the yes (full "On" throttle) position or the no (full "Off" throttle) position and keep it there for about 5 seconds. When the Pixie-7P has accepted your answer, it will flash the LED rapidly. After the LED starts it's rapid flashing, move the throttle stick to the middle position to confirm that you are ready for the Pixie-7P to ask the next question.

If you wish to re-program only the cut-off voltage you do not need to continue through the programming steps for the remaining two settings. Once you have programmed the cutoff voltage and the Pixie-7P has confirmed the selection, instead of returning to mid-throttle for the next question, disconnect battery power, re-connect power, and arm the speed control as normal (see Section 3.0).

*Factory default settings are indicated by an asterisk in the option listings below.

9.1 Programming Setting 1 –Cutoff Voltage   NOTE: When setting Lipo cut off voltage follow your battery manufactures recommendations.

Option 1: No cutoff voltage   Recommended for use with 3 cell NiCad or NiMH packs
Option 2: 3.5V cutoff voltage   Recommended for use with 4 cell NiCad or NiMH packs
Option 3: 4.7V cutoff voltage*   Recommended for use with 5-8 cell NiCad or NiMH
Option 4: 6.0V cutoff voltage   Recommended for use with 9-12 cell NiCad or NiMH packs, or 2 cell Lithium packs
Option 5: 8.0V cutoff voltage   Recommended for use with 3 cell Lithium packs

Pixie-7P Displays:	Programming Question Asked:	Your Response:	Pixie-7P Action:	Your Action:
1 flash – short pause – 1 flash – long pause	Setting 1 (cutoff voltage), Option 1 (no cutoff)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Cutoff Type (9.2 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next option for this setting
1 flash – short pause – 2 flashes – long pause	Setting 1 (cutoff voltage), Option 2 (3.5V)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Cutoff Type (9.2 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next option for this setting
1 flash – short pause – 3 flashes – long pause	Setting 1 (cutoff voltage), Option 3 (4.7V)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Cutoff Type (9.2 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next option for this setting
1 flash – short pause – 4 flashes – long pause	Setting 1 (cutoff voltage), Option 4 (6.0V)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Cutoff Type (9.2 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next option for this setting
1 flash – short pause – 5 flashes – long pause	Setting 1 (cutoff voltage), Option 5 (8.4V)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Cutoff Type (9.2 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response. Maintains previous setting for cutoff voltage (no change)	Return Tx stick to center and proceed to next setting-Cutoff Type (9.2 below)

9.2 Programming Setting 2 –Cutoff Type

Cutoff describes the way the Pixie-7P handles a low voltage situation. There are two options for cutoff type:

Option 1: Hard cutoff with restart*   Option 2: Soft cutoff

A Hard Cutoff (the default value) will turn off the motor when a low-voltage condition occurs. Moving the throttle stick to the lowest (off) position, and then throttling back up will restart the motor.
A Soft Cutoff reduces the throttle level to keep the voltage at or near the cutoff voltage level. A soft cutoff is not recommended because it is easier to accidentally run the batteries down to a point where the receiver and servos stop responding or battery damage occurs.

Pixie-7P Displays:	Programming Question Asked:	Your Response:	Pixie-7P Action:	Your Action:
2 flashes - short pause –1 flash – long pause	Setting 2 (cutoff type), Option 1 (Hard cutoff)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Throttle Range (9.3 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next option for this setting
2 flashes - short pause – 2 flashes – long pause	Setting 2 (cutoff type), Option 2 (Soft cutoff)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next setting–Throttle Range (9.3 below)
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response. Maintains previous setting for cutoff type (no change).	Return Tx stick to center and proceed to next setting – Throttle Range (9.3 below).

9.3 Programming Setting 3 – Throttle Range

Option 1: Auto throttle calibration*   Recommended for aircraft use
Option 2: Fixed throttle range   Recommended for helicopter use

Auto Throttle Calibration is a feature of the Pixie-7P that automatically adjusts the throttle range to match the range of the transmitter in use. In most cases, Auto Throttle Calibration is desirable, however, in some cases (such as with a helicopter tail rotor control) a fixed throttle response is desirable.

Pixie-7P Displays:	Programming Question Asked:	Your Response:	Pixie-7P Action:	Your Action:
3 flashes - short pause – 1 flash – long pause	Setting 3 (throttle range), Option 1 (auto calibrate)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response. LED remains on to confirm it is ready to be armed.	Programming complete. Proceed to arming section of this User's Guide (section 3) to arm the unit for flight.
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response.	Return Tx stick to center and proceed to next option for this setting
3 flashes - short pause – 2 flashes – long pause	Setting 3 (throttle range), Option 2 (fixed)?	Yes – Throttle stick in up position	Stores selection. Flashes rapidly to confirm receipt of your response. LED remains on to confirm it is ready to be armed.	Programming complete. Proceed to arming section of this User's Guide (section 3) to arm the unit for flight.
		No – Throttle stick in off position	Flashes rapidly to confirm receipt of your response. Maintains previous setting for throttle range (no change). LED remains on to confirm it is ready to be armed.	Programming complete. Proceed to arming section of this User's Guide (section 3) to arm the unit for flight.