



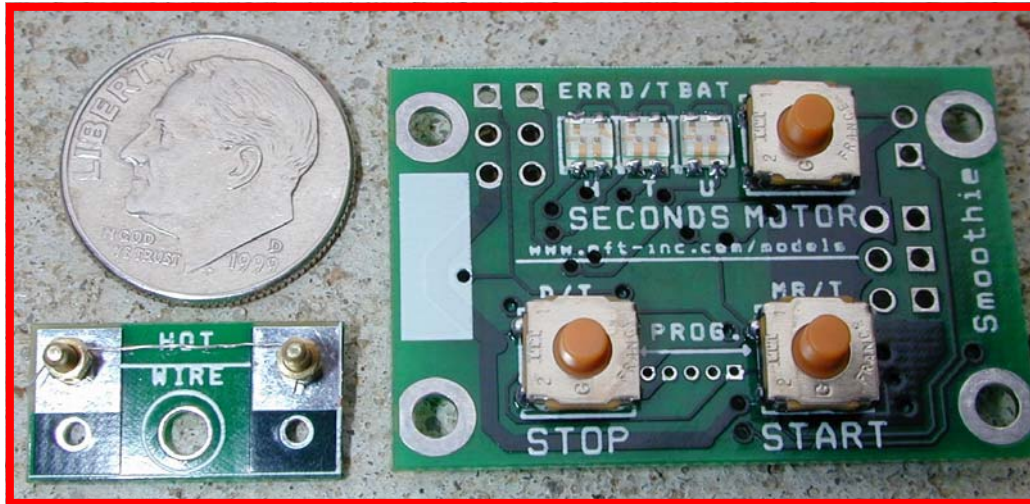
EF TECHNOLOGIES, INC.

TOP QUALITY MODEL AIRCRAFT EQUIPMENT

WWW.EFT-INC.COM/MODELS

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"The Smoothie"



DIGITAL FREE FLIGHT CONTROLLER/TIMER Operating Instructions

**information subject to change without notice*

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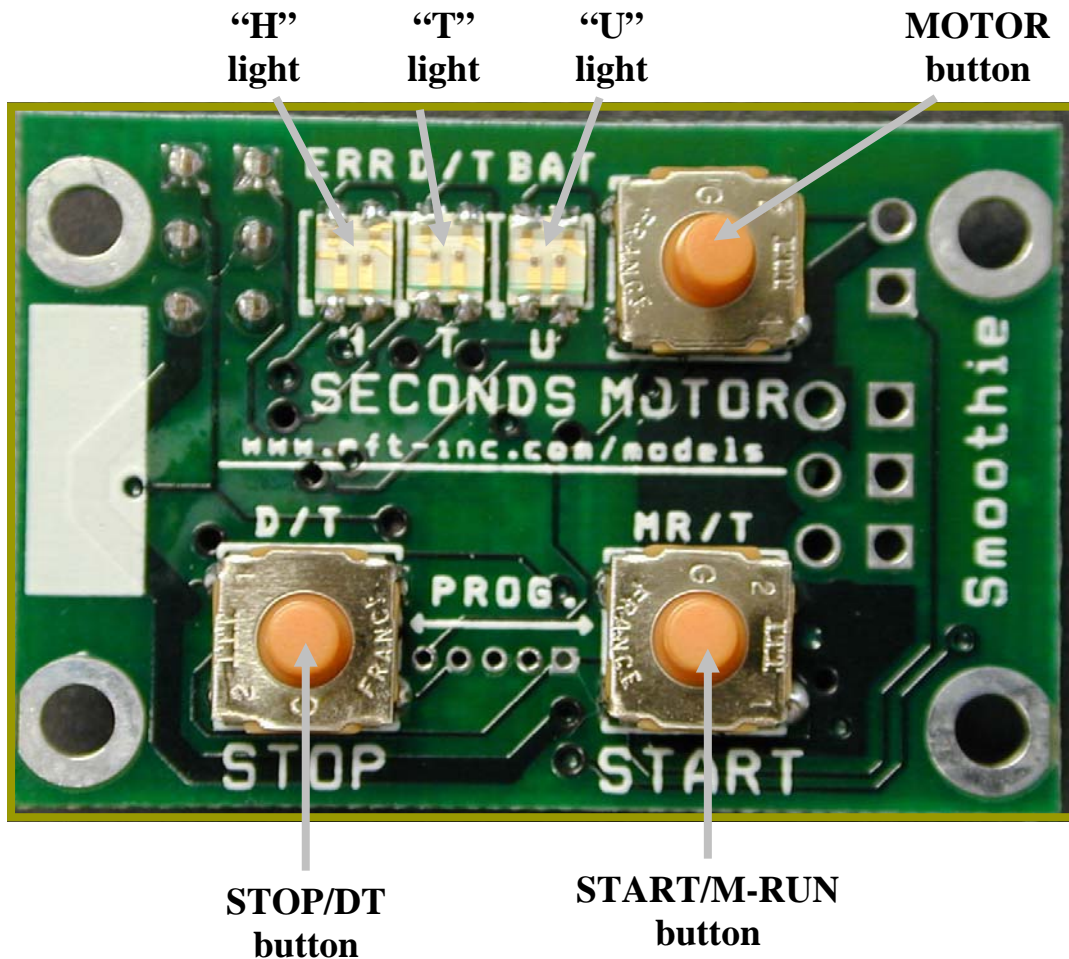
INTRODUCTION

The Smoothie™ is a small, microprocessor based multifunction device designed to give FF modelers precise control of motor run and flight times. Some models include a speed control for brushed motors. It is available in different configurations, based on aircraft you are using.

General Specifications

Size	.975" x 1.46"
Weight	2.5 to 3.1 grams depending on options
Battery voltage	3V to 12.6V
DT RMS output voltage	2.2V
DT output maximum current	2A
Servo output	1ms to 2ms at a 20ms frame rate
Servo drive voltage	Battery voltage of 1 LIPO cell or 5V if external speed control is used.
Motor PWM frequency	30 kHz
Motor max current	2A for small electric or 10A for large electric

Controls



NORMAL MODE

When power is applied to **The Smoothie™** will automatically enter the Normal Mode of operation. The unit will begin by displaying the *MOTOR RUN TIME* (if equipped) in **GREEN**, using the three LEDs (see page 9 for an explanation of how the time is displayed). If the unit is not equipped with a *MOTOR RUN TIME* then the *D/T* will be displayed in **RED** using the three LEDs. If the unit is equipped with a *MOTOR RUN TIME* and a *D/T*, pressing the **STOP/DT button** will cause **The Smoothie™** to toggle the display back and forth between the two.

See page 4 for instructions regarding how to adjust the *MOTOR RUN TIME* and the *D/T*.

See page 8 for a graphical view of what happens during a typical flight.

Beginning a Flight

In order to begin a flight, press and hold the **START/M-RUN button** for a few seconds to arm the system. **The Smoothie™** will display three flashing **GREEN** LEDs when the system is armed. When the **START/M-RUN button** is released three things may happen:

1. The *D/T* will begin.
2. (if equipped) the *MOTOR RUN TIMER* will begin.
3. (if equipped) the motor will begin running at the pre-set level.

The **START/M-RUN button** should be released as the aircraft is launched.

After the *MOTOR RUN TIMER* (if equipped) expires the motor will be shut off. After the *D/T* expires, the Dethermalization output will be activated. After the aircraft is retrieved, press the **START/M-RUN button** to return to the Normal Mode.

In the event of a bad launch or other problem, at any time during the flight, the **STOP/DT button** can be pressed to stop the motor, cancel the flight and return **The Smoothie™** to the Normal Mode.

Errors

There are two types of errors that can be displayed by **The Smoothie™**. When an error is received, one of the lights will toggle between **RED** and **GREEN**. **The Smoothie™** will not allow a flight to begin if it has received an error.

Battery Voltage Low

If equipped with the low battery detection option, the DDT will estimate the state of charge of up to a 3 LIPO cell pack. The unit will automatically detect the number of cells in the pack and determine whether the pack's charge is low. If a battery low condition is detected, the **“U” Light** will toggle between **RED** and **GREEN**. To fix this error either charge the battery pack or replace it.

Motor Time > D/T

For all flights, the *MOTOR RUN TIME* must always be less than or equal to the *D/T*. If the *MOTOR RUN TIME* is greater than the *D/T*, the **“T” Light** will toggle between **RED** and **GREEN**. To fix the error, enter Program Mode 1 and adjust the *D/T*, the *MOTOR RUN TIME* or both.

PROGRAM MODE 1

Program Mode 1 is used to enter and save the *D/T*, the *MOTOR RUN TIME* (if equipped) and the *MOTOR SPEED* (if equipped). Enter the Program Mode by holding the **START/M-RUN button** and the **STOP/DT button** down at the same time for a few seconds. **The Smoothie™** will indicate that it has been placed in Program Mode by continually flashing all three **RED lights**. Once in program mode **The Smoothie™** is ready to receive data. To exit the Program Mode without making changes, simply remove power from **The Smoothie™** and then reapply it. The following sections explain how to set each parameter from the Program Mode.

Set The D/T

All **Smoothie™** models are equipped with a flight timer. While in Program Mode, set the *D/T* by pressing the **STOP/DT button**.

The **“H” light** will illuminate solid **RED** indicating that **The Smoothie™** is ready to accept the hundreds digit of the *D/T*. Press the **STOP/DT button** once for each hundred seconds in the *D/T*. Each time the button is pressed the **“H” light** will flash. When finished, press the **START/M-RUN button**.

The **“T” light** will illuminate solid **RED** indicating that **The Smoothie™** is now ready to accept the tens digit of the *D/T*. Press the **STOP/DT button** once for each ten seconds in the *D/T*. Each time the button is pressed the **“T” light** will flash. When finished, press the **START/M-RUN button**.

The **“U” light** will illuminate solid **RED** indicating that **The Smoothie™** is now ready to accept the units digit of the *D/T*. Press the **STOP/DT button** once for each unit seconds in the *D/T*. Each time the button is pressed the **“U” light** will flash. When finished, press the **START/M-RUN button**.

The value will be saved in memory and **The Smoothie™** will return to the Normal Mode and flash the newly entered *D/T*. The following example illustrates how to enter a *D/T* of 123 seconds.

Entering a D/T of 123 seconds.				
TASK	BUTTONS	“H” Light	“T” Light	“U” Light
Enter Program Mode.	START and STOP buttons.	Flash RED	Flash RED	Flash RED
Select <i>D/T</i> .	STOP/DT button.	Solid RED	OFF	OFF
Enter the Hundreds.	STOP/DT button once.	1 Flash RED	OFF	OFF
Accept the Hundreds.	START/M-RUN button.	OFF	Solid RED	OFF
Enter the Tens.	STOP/DT button twice.	OFF	2 Flashes RED	OFF
Accept the Tens.	START/M-RUN button.	OFF	OFF	Solid RED
Enter the Units.	STOP/DT button three times.	OFF	OFF	3 Flashes RED
Accept the Units.	START/M-RUN button.	Lights will begin flashing 123 seconds in RED . See page 9.		

Set The Motor Run Time (if equipped)

Some models are equipped with a motor run timer. While in Program Mode, set the *MOTOR RUN TIME* by pressing the **START/M-RUN button**. Essentially, entering the *MOTOR RUN TIME* is accomplished in the same way that the *D/T* is entered. The only real difference is the color of the lights.

The **“H” light** will illuminate solid **GREEN** indicating that **The Smoothie™** is ready to accept the hundreds digit of the *MOTOR RUN TIME*. Press the **STOP/DT button** once for each hundred seconds in the *MOTOR RUN TIME*. Each time the button is pressed the **“H” light** will flash. When finished, press the **START/M-RUN button**.

The **“T” light** will illuminate solid **GREEN** indicating that **The Smoothie™** is now ready to accept the tens digit of the *MOTOR RUN TIME*. Press the **STOP/DT button** once for each ten seconds in the *MOTOR RUN TIME*. Each time the button is pressed the **“T” light** will flash. When finished, press the **START/M-RUN button**.

The **“U” light** will illuminate solid **GREEN** indicating that **The Smoothie™** is now ready to accept the units digit of the *MOTOR RUN TIME*. Press the **STOP/FT button** once for each unit seconds in the *MOTOR RUN TIME*. Each time the button is pressed the **“U” light** will flash. When finished, press the **START/M-RUN button**.

The value will be saved in memory and **The Smoothie™** will return to the Normal Mode and flash the newly entered *MOTOR RUN TIME*. The following example illustrates how to enter a *MOTOR RUN TIME* of 60 seconds.

Entering a Motor Run Time of 60 seconds.				
TASK	BUTTONS	“H” Light	“T” Light	“U” Light
Enter Program Mode.	START and STOP buttons.	Flash RED	Flash RED	Flash RED
Select <i>MOTOR RUN TIME</i> .	START/M-RUN button.	Solid GREEN	OFF	OFF
Enter the Hundreds.	Do Nothing, 60 seconds has 0 hundreds.	OFF	OFF	OFF
Accept the Hundreds.	START/M-RUN button.	OFF	Solid GREEN	OFF
Enter the Tens.	STOP/DT button 6 times.	OFF	6 Flashes GREEN	OFF
Accept the Tens.	START/M-RUN button.	OFF	OFF	Solid GREEN
Enter the Units.	Do Nothing, 60 seconds has 0 units.	OFF	OFF	OFF
Accept the Units.	START/M-RUN button.	Lights will begin flashing 60 seconds in GREEN . See page 9.		

Set The Motor Speed (if equipped)

The *MOTOR SPEED* is adjusted by actually running the aircraft's motor. Before setting the *MOTOR SPEED*, be sure the motor and all associated hardware are properly attached and the aircraft is in a safe place to minimize the potential for injuring an innocent bystander

The *MOTOR SPEED* is set from Program Mode 1 by pressing and holding the **MOTOR button**.

CAUTION: Pressing the **MOTOR button** will cause the motor to begin operating. Be sure that you have a good grip on the aircraft before pressing the **MOTOR button**. Although the motor will stop running immediately after the **MOTOR button** is released thus preventing a complete fly-away and minimizing the risk of injury to any innocent bystanders your aircraft could potentially be damaged if it gets away

While the motor is running, press the **START/M-RUN button** to increase the *MOTOR SPEED*, press the **STOP/DT button** to decrease the motor speed. The speed will increment and decrement by roughly 5 percent each time the **START/M-RUN button** or the **STOP/DT button** is pressed. When the speed reaches it's maximum (100%), all three lights will turn **RED**. When the speed reaches it's minimum (about 5%)the lights will turn **GREEN**.

When the desired speed is reached, simply release the **MOTOR button**. The motor will stop and the speed will be recorded and used the next time **The Smoothie™** is operated. **The Smoothie™** will then return to the Normal Mode and begin flashing the *MOTOR RUN TIME*.

PROGRAM MODE 2

Program Mode 2 is used to set some of the optional parameters that your particular device may or may not be equipped with. Enter the Program Mode 2 by holding the **MOTOR button** and the **STOP/DT button** down at the same time for a few seconds. **The Smoothie™** will indicate that it has been placed in Program Mode 2 by continually flashing all three **GREEN lights** (remember that Program Mode 1 flashes **RED lights**). Once in Program Mode 2 **The Smoothie™** is ready to receive data. To exit the Program Mode without making changes, simply remove power from **The Smoothie™** and then reapply it. The following sections explain how to set each parameter from the Program Mode 2.

Set the Lost Model Timer

The Lost Model Finder is an option that is available for all Smoothies that use a Hot Wire D/T. It allows you to set another timer that starts after the D/T expires. When the Lost Model Timer expires, The Smoothie will sound a buzzer that is located on the Hot Wire Output Board that will assist you in locating your model. The sounder will continue to beep until you reset the Smoothie or the battery dies.

While in Program Mode 2, set the *Lost Model Timer* by pressing the **STOP/DT button**.

The **“H” light** will illuminate solid **RED** indicating that **The Smoothie™** is ready to accept the hundreds digit of the *Lost Model Timer*. Press the **STOP/DT button** once for each hundred seconds in the *Lost Model Timer*. Each time the button is pressed the **“H” light** will flash. When finished, press the **START/M-RUN button**.

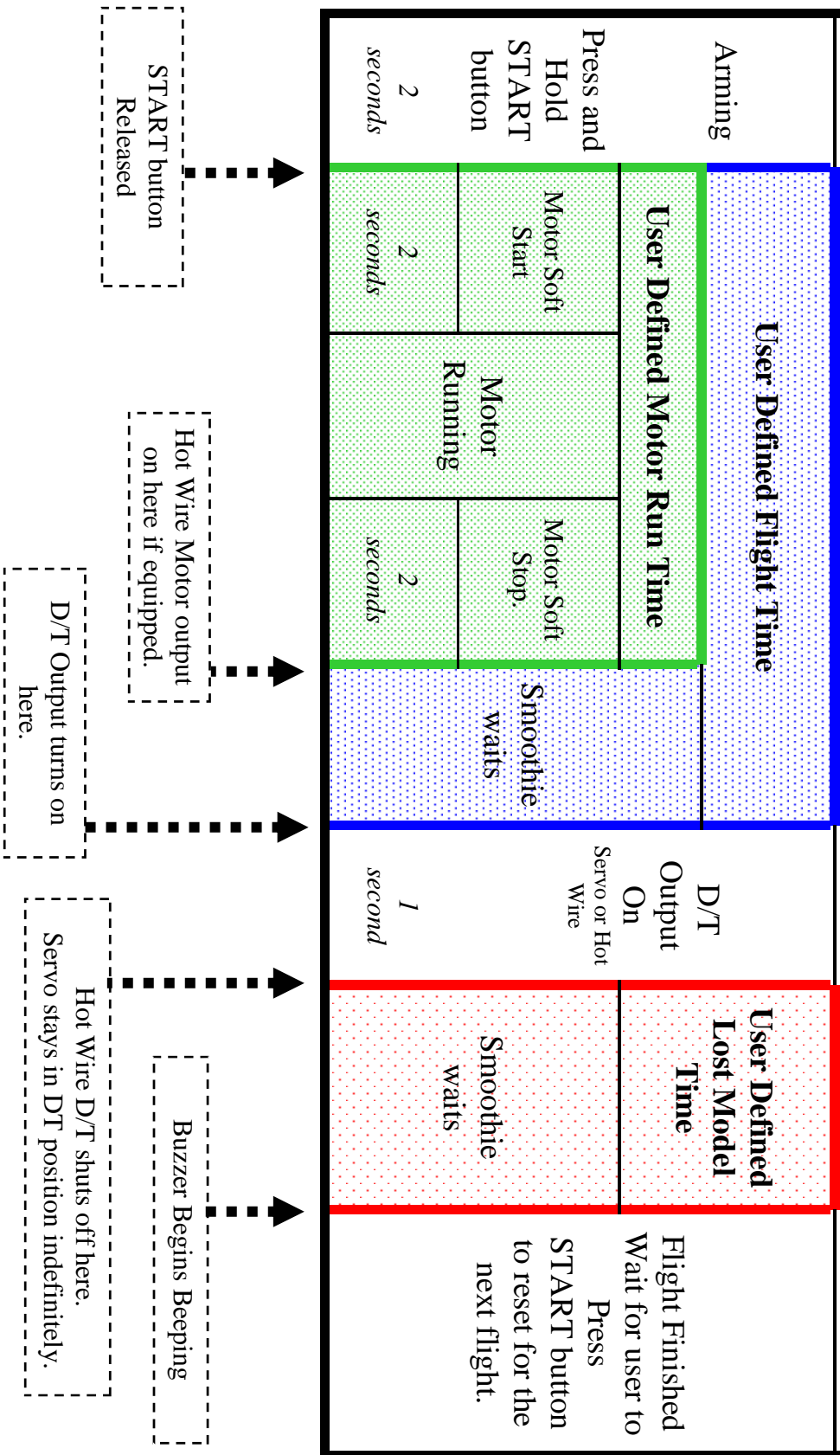
The **“T” light** will illuminate solid **RED** indicating that **The Smoothie™** is now ready to accept the tens digit of the *Lost Model Timer*. Press the **STOP/DT button** once for each ten seconds in the *Lost Model Timer*. Each time the button is pressed the **“T” light** will flash. When finished, press the **START/M-RUN button**.

The **“U” light** will illuminate solid **RED** indicating that **The Smoothie™** is now ready to accept the units digit of the *Lost Model Timer*. Press the **STOP/DT button** once for each unit seconds in the *Lost Model Timer*. Each time the button is pressed the **“U” light** will flash. When finished, press the **START/M-RUN button**.

The value will be saved in memory and **The Smoothie™** will return to the Normal Mode. The following example illustrates how to enter a *Lost Model Timer* of 600 seconds.

Entering a Lost Model Time of 600 seconds.				
TASK	BUTTONS	“H” Light	“T” Light	“U” Light
Enter Program Mode 2.	MOTOR and STOP buttons.	Flash GREEN	Flash GREEN	Flash GREEN
Select <i>Lost Model Timer</i> .	STOP/DT button.	Solid RED	OFF	OFF
Enter the Hundreds.	STOP/DT button six times.	6 Flashes RED	OFF	OFF
Accept the Hundreds.	START/M-RUN button.	OFF	Solid RED	OFF
Accept the Tens.	START/M-RUN button.	OFF	OFF	Solid RED
Accept the Units.	START/M-RUN button.	Unit will return to Normal Mode		

Timeline of A Typical Flight



- The table above shows a timeline of what happens during a typical flight.
- The timeline shows what happens if all options are installed.
- If your particular **Smoothie** does not have the option, then the applicable section of the timeline is simply cut out.

APPENDIX

Displaying Times Using The Three LEDs

The **Smoothie™** displays all times in seconds using the three **LEDs** located directly above the **STOP/DT button**. The three **LEDs** indicate the hundreds “H”, the tens “T” and the units “U” digits of the time by flashing. It is easiest to illustrate how **The Smoothie™** displays time through an example. Let us consider how **The Smoothie™** would display 123 seconds. Think of the number as having three parts, hundreds tens and units. There is 1 hundred, 2 tens and 3 units in the number 123. The lights would flash in the following sequence to display this number.

1	2	3
Hundreds “H”	Tens “T”	Units “U”
Flash	Flash—Flash	Flash—Flash—Flash

There will be a pause of about one second after the “**U**”light finishes flashing and the sequence will repeat. The lights will flash **RED** when displaying the *D/T* and **GREEN** when displaying the *MOTOR RUN TIME* (if equipped).

Consider these other examples:

60 seconds	0	6	0	Pause and repeat
	“H”	“T”	“U”	
	Nothing	6 Flashes	Nothing	
11 seconds	0	1	1	Pause and repeat
	“H”	“T”	“U”	
	Nothing	1 Flash	1 Flash	
240 seconds	2	4	0	Pause and repeat
	“H”	“T”	“U”	
	2 Flashes	4 Flashes	Nothing	

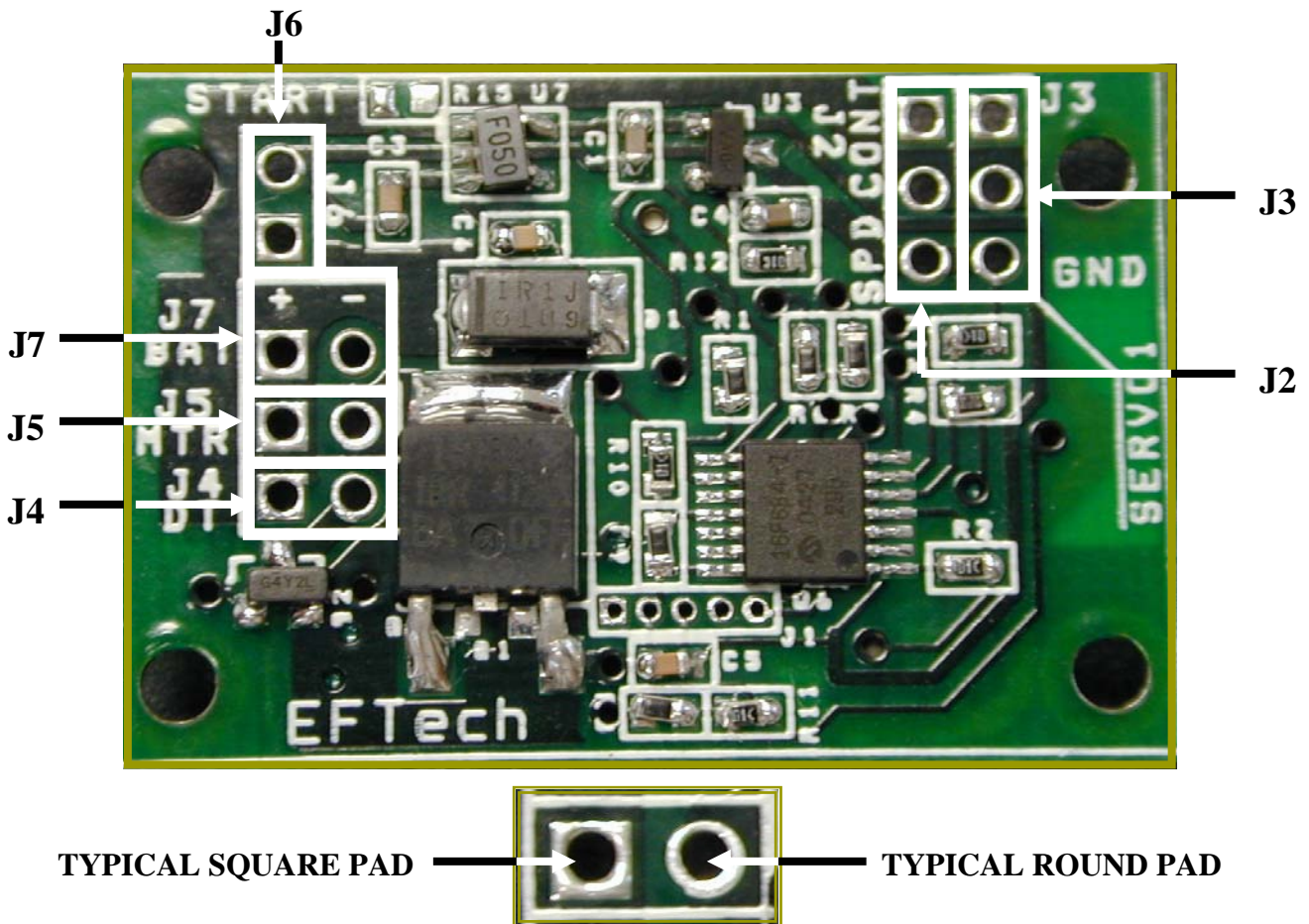
WIRING

Connections to the Smoothie can be made by soldering wires directly to the board or by installing optional connectors.

Jumper Locations

The table below details the functionality of each of the connections on the **Smoothie**. The pictures show the physical locations of the connectors and what is meant by a SQUARE or ROUND PAD

Smoothie Wiring Connections		
CONNECTOR	FUNCTION	COMMENTS
J2.	Speed Control	The speed control supplies power to the Smoothie & Servo. No additional battery is necessary.
J3	Servo.	Servo for D/T and/or Motor Shutoff
J4	DT Hot Wire Output Board	Optional Lost Model Finder
J5.	Motor	Reverse wires to make motor turn in the opposite direction
J6	Remote Start	Connect a normally open pushbutton.
J7	Battery	Square terminal is Plus and round terminal is Minus. Caution the Smoothie will be damaged if this connection is reversed.



Typical Rubber or Brushed Motor Hookup

The following diagram shows how a typical installation for a Rubber Powered or Small Brushed Electric model should look. A Rubber Powered model will not have connection made to J5 unless the Smoothie was purchased with the MRT option.

**The Hot Wire Output Board and the Battery ARE POLARITY SENSITIVE.
Hooking them up backwards will BREAK THE SMOOTHIE.
This damage is not covered under the warranty.
WE WILL KNOW IF YOU DO IT !!!**

CONVENTIONS USED:

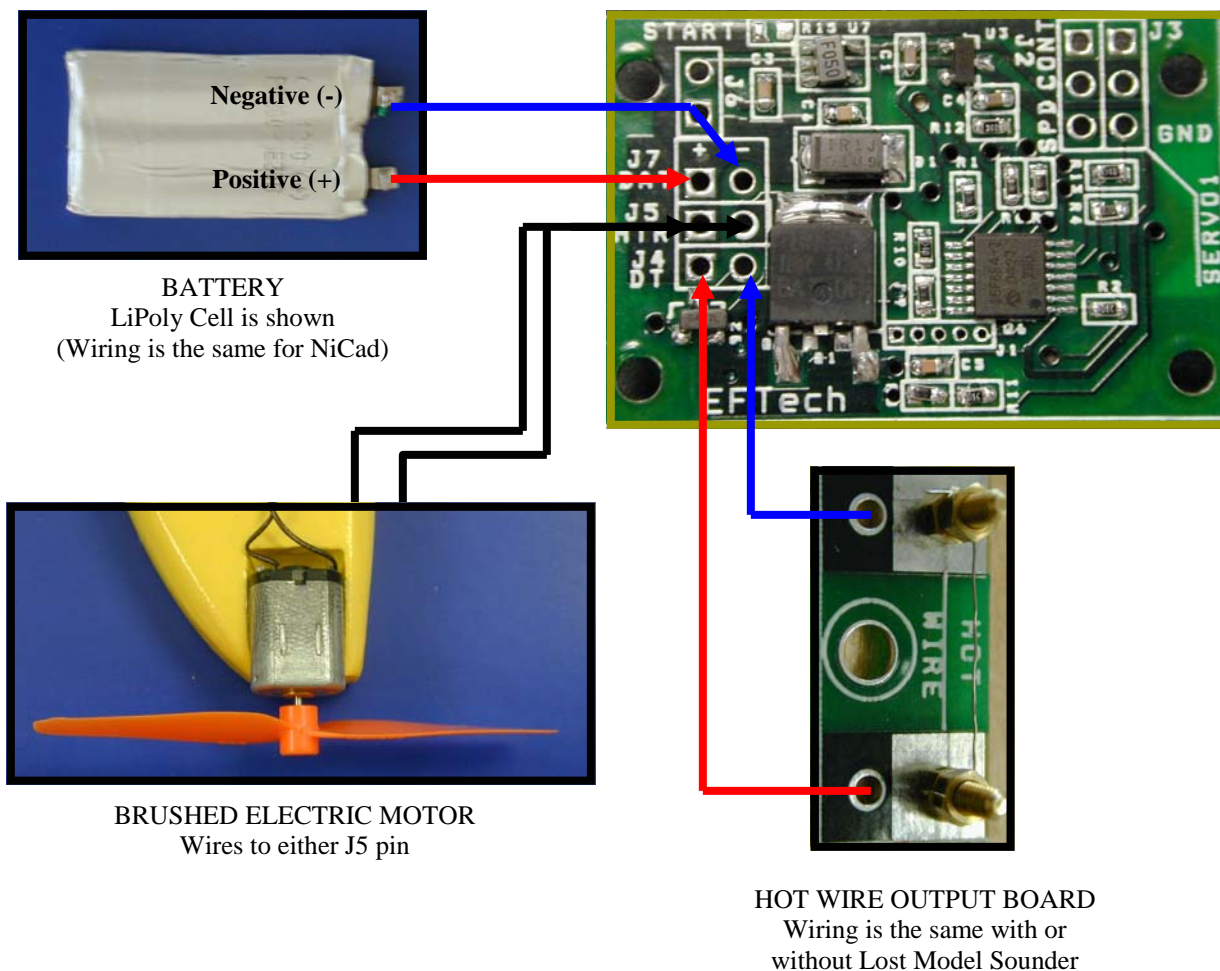
Connections shown with Red lines MUST go to SQUARE pads on the Smoothie.

Connections shown with Blue lines MUST go to ROUND pads on the Smoothie.

Connections shown with Black lines MAY go to either SQUARE or ROUND pads

Remember the Motor IS NOT polarity sensitive, switching the wires will simply switch the direction that the motor rotates. This setup WILL NOT work with a Brushless Motor.

If a rubber unit is equipped with a Hot Wire Output Board for the Motor, hook the it up to J5 in place of the Motor shown below. Use the same wiring scheme shown for the Hot Wire Output Board on J4 for the D/T. Red wire to the square pad and blue wire to the round pad.



Typical High Power Hookup with Servo D/T

The external speed control and servo plug into the vertical pin assemblies in the upper right corner of **The Smoothie** as shown. The speed control plugs into J2 (SPDCONT) and the servo plugs into J3 (SERVO1).

Only servos with the center pin positive can be used with **The Smoothie**. If you want to use a non compatible Airtronic servo you can simply swap the black and red wires in the plug so the center pin is positive.

The top pin is SIGNAL, center pin POSITIVE, and bottom pin NEGATIVE

DO NOT MAKE ANY CONNECTIONS TO J7 OF THE SMOOTHIE

