

### *Thank You*

Thank you for purchasing the easiest to use electric propulsion system available today. This “American Made” hardware has been manufactured from the same materials, and designed by the same engineers that routinely supply motors to power machinery, steer missiles and provide thrust to deep sea submersibles. This is a miniaturization of the same technology that allowed the “University of Michigan” to win the 1990 “Sunrayce” (solar powered electric cars from Epcot Center, FL. to the G.M Tech Center, Detroit, Mi.)

 **Please read these instructions before hooking up your motor, batteries and controller.**

Since this controller uses a microprocessor, no setup or tuning is required. Every time your transmitter is turned on and the system battery connected, the built in microprocessor automatically calibrates to the received signal from the radio receiver.

- **To obtain maximum throttle stick control range, preset your transmitter every time you fly as follows:**

**Set the throttle stick to the low speed end of travel (bottom)**

**Set the throttle trim to its mid position (full down will be the motor brake)**

**Turn on the transmitter, the receiver and then the controller, in that order!**

**Wait 0.5 to 1 sec. The microprocessor is now calibrated to your radio system.**

**Now Fly and enjoy hassle free electric power.**

These Instructions apply to Models *Maxμ35B-21* and *Maxμ35C-21* controllers.

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Obviously you can't fly without first installing the equipment. This is where the **important stuff starts**☺

The *Maxμ35B/C-21* controller is equipped with a 3Amp “Battery Eliminator Circuit”, meaning that you do not need a separate receiver battery pack. This feature is selected by a jumper on the controller. To insure power to the receiver, a separate input wire is provided **which must be connected to the + battery power (14 cells max.)**. This wire should be connected on the battery side of the fuse (**Don't fly without a fuse**) (Refer to the wiring diagram) We recommend the “Sermos Fuse and Charging Jack” and a 30 Amp automotive ATO style fuse. (this can be used as an arming “switch”)

However, if you choose to use a separate receiver battery pack, then remove the BEC select jumper. (**but connect the small red wire to + battery (14 cells max.) to power the motor controller.**)

**Plug the Speed Controller servo connector into the receiver throttle channel slot (Futaba channel 3 - Rev).**

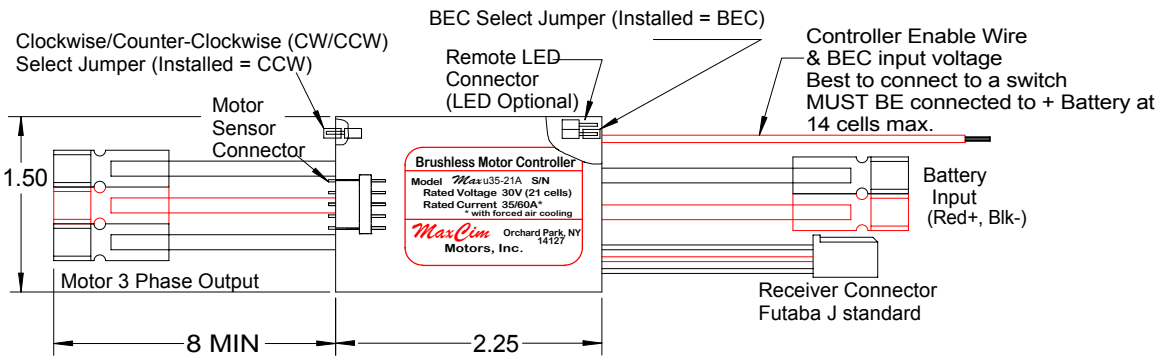
The *Maxμ35B/C-21* controller is equipped with a “Motor Rotation Direction” jumper. The factory setup is for direct tractor drive prop applications (Counter-Clock-Wise (CCW) Rotation). For ordinary gearboxes, or pusher applications, the motor rotation direction can be reversed by **removing** the installed jumper.

The *Maxμ35B/C-21* controller will power other “Hall Effect Sensor” equipped brushless dc motors. If the other brushless motor doesn't run or runs poorly, **CALL. It will not drive** brush type motors. Please don't try, you will likely cause smoke to leak!

The *Maxμ35B/C-21* controller has an LED (light emitting diode) to indicate “On” and to assist in trouble-shooting. A remote LED connection is provide for your convenience. Please order the “Remote LED” option.

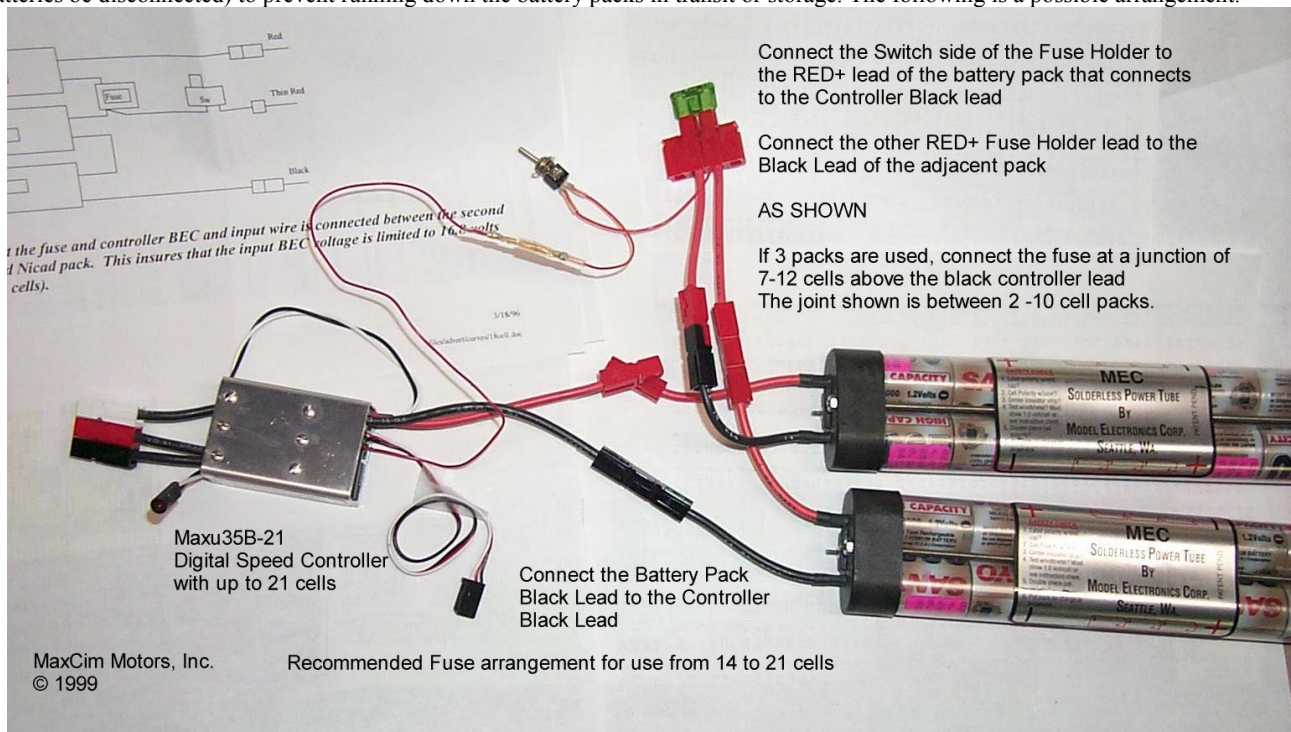
Through the use of the “Current Limiting” feature of the controller, the LED can be used to assist in selection of a prop/cell combination at the limit of the available controller power for aggressive flying situations.

An optional “Electronic Reversing Switch” is available that allows reversal of the motor rotation direction from a transmitter switched channel.



**Remember:** The BEC/Controller Power Input Wire MUST be connected to the + battery wire but at 14 cells max. If you use 15-21 cells, tap the BEC/Controller wire into the harness at up to 14 cells. **DO NOT CHARGE batteries with the controller connected!**

It is suggested that this wire have a connector (Sermos® style) and be connected to the battery side of an automotive style 30 Amp fuse. This insures that the receiver will continue to receive voltage even after the fuse blows! This wire should contain a switch (or the batteries be disconnected) to prevent running down the battery packs in transit or storage. The following is a possible arrangement.



“MaxCim advice for users”:

Check the LED (See **page 4 for Red LED functions**) (it is located above the remote LED connector pins) for indications of current limiting. On the test stand or other controlled, safe condition, (where the LED can be seen without coming close to the prop) run the motor *slowly* up to speed, checking the LED as the throttle is advanced. If the LED is *steadily On* while the throttle is in the Power-on range, then current limiting *IS* being applied. The prop load characteristics can be checked by slowly advancing the throttle while watching the LED. If it starts to come on, and the throttle is not fully up, the motor/controller is too heavily loaded, reduce the cell count, or prop pitch, or diameter.

(If you prop for lower peak currents, this will not apply to you.)

If at full throttle on the bench 60+A is drawn with no current-limiting light on when the controller is cold, you can expect to see the LED light up and the current to drop in a very short time *without* good air flow over the controller. Since there is hysteresis in the current limiting, if the throttle is backed off to get out of current limiting, it is possible to re-approach high currents until the limit is reached again.

It is suggested to not prop the motor to limit current under cold bench testing, since it will likely be current limited in the air when hot and performance will deteriorate.

The *Max15* 35B/C-21 controller includes “State of the art”, “Auto - Phase - Advance” software. This automatically adjusts the commutation timing to the most efficient angle for the selected motor rotation direction. The motor end bell position is factory set and must not/need not be adjusted.

**Please DO NOT remove the rear end bell. You will most likely damage something inside. The warranty will not be honored if interior damage is found.**

A convenient *Max15 Series* motor mount kit (P/N G96307-1) is available. It allows easy “Firewall” mounting of the motor..

The motor may be mounted to the aircraft using any of the popular methods, such as “Bob Kopski’s” “Nyrod” clamps, “SonicTronics” electric motor mount, or bolted to a firewall using the 4, #4-40 tapped holes on the front end bell. If you use these holes, the screws **must not** screw into the face more than ¼”.

Screws which are too long will contact the stator coils and cause a fatal short. This is not repairable, so please be careful.

Gearboxes provide a means to obtain significant performance improvement over direct drive. They allow you to turn a much larger prop at lower current, while operating the motor nearer its peak efficiency rpm.

The gears are supplied prelubed with a Teflon® filled synthetic grease. A small vial of special teflon gear lube is available from us.

The *Max15 Series* motors are manufactured with a .1872 dia. (3/16”) shaft. **It is important to use a properly fitted prop driver** to prevent vibration damage to the motor and/or aircraft. Our prop driver is CNC machined to very close tolerances to provide the recommended shaft fit. It is suggested that you apply a drop of 222, or 242 Loctite to each of the setscrews when installing the prop driver on the motor shaft.

**Important:** Installation in the model should be carefully planned to provide **Air-cooling Flow** to the **Controller, Batteries, and Motor**. Always provide an opening in the cowl to allow air to flow into the fuselage. It is equally important to provide an air exit hole **Larger** than the inlet to let hot air out. You will realize more efficiency (longer flights) by cooling the system components, remember watts= $I^2R$  and as R increases due to temperature, so does the **Lost** power.

The controller should be mounted **uncovered** in free air. It is **not necessary or advised** to wrap the controller in foam or a plastic bag. Velcro tape attached to the **thin** aluminum cover is recommended for fastening to the fuselage. In no case should the thick aluminum cover be used for mounting, this is the FET heat sink and **must be** mounted free and clear in the cooling air.

The controller **MUST NOT** be mounted by clamping it across the thickness dimension using screws, TY- wraps or other clamping means.

Please do not mount the controller such that a constant pull force is exerted on the lead wires. Although they are sturdily attached, they are not meant to deal with a constant force.

**RED LED Functions: Both normal and Fault indications are visible**

LED Status	Condition Description	Resolution
LED remains unlit	No power to the Enable/BEC wire	Connect 7-22v +DC with respect to Motor Power Negative
<b>LED blinks 3X on wakeup, goes out briefly, then stays on bright. LED goes out when the throttle is advanced.</b>	<b>NORMAL</b> Bootup condition – <b>READY To Run.</b>	Advance the throttle to run the motor.
LED blinks 3X on wakeup, but remains unlit regardless of throttle input, and the motor will not run.	Input Pulse is missing.	Connect the Receiver Connector to a 17-200 Hz pulse source, i.e. make sure it’s plugged into the receiver.
LED blinks 3X on wakeup, goes out briefly, then stays on bright. LED stays on when the throttle is advanced.	Missing Hall Sensor (HED) feedback	Make sure the red 5 pin connector is seated in the controller. Check for broken wires. Turn shaft a partial turn – if the motor tries

		to start, an HED connection is bad. Return for repair.
LED Blinks 3X, then 4X Repetitively	Too low a voltage on the Enable wire	Ensure that the voltage is within the Enable Wire limits of 7-22v DC. Internal Power Supply failure - return for repair.
LED Blinks 3X, then 3X Repetitively	Too high a voltage on the Enable wire	
LED Blinks 3X, then 2X Repetitively	Input Pulse absent, or out of range	Connect servo lead to a receiver or PWM source. Ensure that the BEC jumper is present if there is no external receiver battery.
LED blinks 3X on wakeup, then flashes a count of 5,6,or 7 pulses repetitively	Failed output FET or the output lead is shorted to a current source or internal drive failure	Disconnect the outputs, reset the unit, and if the problem persists, send the unit for repair. Call for an RMA
LED blinks a count of 1 pulse repetitively as soon as the throttle setting is moved up.	Bad state detected from HED (Hall Effect Device)(motor rotor position) sensors, or sensors are not connected.	Connect the HED sensors lead from the motor, reset the unit, and if the problem persists send the motor and controller for repair. Call for an RMA
Motor coasts down while running and then the LED blinks a count of 1 pulse repetitively.	Bad state detected from HED. Loose connection, vibration problem with HEDs. Possible electrical noise on HED leads.	Tap on the motor to reproduce, move the wires while running. If reproducible, send the motor for repair. Call for an RMA. If electrical noise, ensure the HED ground (black) is isolated from the motor case. Twist or shield the HED wires.
LED is lit, the motor coasts when full throttle is applied	Operating Input Pulse width is too long or too short, creating an error detection condition	Ensure that input pulse width is within the "Operating Input Pulse Width" range. Some RC computer radios may need the "Throttle Volume" adjusted.
LED is off, the motor coasts to a stop	Operating Input Pulse missing for >5 sec and is still missing	Restore the pulse input and ensure that it is at a zero throttle (neutral) value. The LED should light indicating that the unit is ready for normal operation.
LED is blinking rapidly but dimly, the motor coasts to a stop	Operating Input Pulse missing for >5 sec., is present now, but not at a Neutral (zero throttle) setting	Restore the pulse input to a neutral value. The LED should light indicating that the unit is ready for normal operation.
Different motor speed in one direction than other	Motor HED sensor timing is not correctly set	Check motor timing - ensure that the end bell has not been moved from the factory setting.

### Warranty

**MaxCim Motors, Inc.** warrants the motor and controller to be free of defects in workmanship and materials. This warranty extends to the original purchaser for a period of 120 (One Hundred Twenty) days from the date of purchase. This warranty excludes crash damage and user neglect and/or abuse. **MaxCim Motors, Inc.** will repair or replace, at its option, a defective unit within the 120 day period. As a condition of this warranty, the purchaser shall notify **MaxCim Motors, Inc.** in writing of any claimed nonconformance immediately upon discovery. **MaxCim Motors, Inc.** shall not be responsible for any work done or repairs made by others at any time.

Repair services are available for all supplied hardware. Return the unit(s) in the original shipping container for an estimate to repair. For service and technical support contact **MaxCim Motors, Inc.** at (716) 662-5651, M-Sat, 10AM-10PM ET.