ELF Hobby FM20A & FM30A ESC USER MANUAL

SPECIFICATION
MODEL : FM30A
Continuous Working current: 30A
Input Voltage: NiMh 6 – 12 cells
                        Li Ion / Li Poly : 2 – 3 cells
BEC current : 2A (max)
Weight: 25g

MAIN FUNCTIONS:
1. Safety mode: the motor will not start no matter what the position of the control stick when switched on the RC unit.
2. Brake setting : on/off
3. Three point battery type and low voltage selection
4. Software reversion of motor rotation direction
5. Low current protection: ignore/reduce power/shut off
6. Temperature protection: reduce power when the temperature reaches 120°C
7. PWM frequency : 8Khz/16Khz
8. RPM setting : 20000RPM/50000RPM

PROGARMMING PROCEDURE:
The FM30A has eight programmable features, and will automatically step through each feature in order as shown below. It is **not necessary** to wait for the ESC to step through all eight programmable features unless you wish to change the setting of the last feature.
Each programmable feature has its own distinguishing series of audible tones.
Selecting/changing features is accomplished by moving the TX's throttle stick in conjunction with certain tones that are emitted by the ESC. Anytime a programmable feature has been set the ESC will memorize the setting until it's changed again manually. Before entering the programming mode, remove the propeller from the motor and make sure the battery is disconnected from the ESC. It's a good idea to read through all steps below BEFORE attempting to program your ESC. **IMPORTANT!! It's critical to remember that only ONE programmable feature can be adjusted at a time.** To change more than one programmable feature, after changing the first feature you must disconnect the battery from the ESC, reconnect the battery, then re-start the programming mode below to change the next programmable feature. It will be necessary to repeat this process for each programming change that you wish to make

1. Turn the transmitter's power switch to "ON."

2. Move the TX's throttle stick to FULL throttle.

3. Connect the battery to the ESC. After a 5 second delay 4 tones will sound "_ _ -- " to indicate the programming mode has been entered. The ESC will automatically begin scrolling through all of the programmable features in this order: brake > battery type > reverse rotation > soft start > Under voltage > timing > switching frequency > restore defaults > Active RPM control. Follow the points below to change any of these features.

3. **BRAKE**: To change the brake setting, simply pull the throttle stick to minimum within five seconds of hearing the programming tones noted in step 3 above. This will change the state of the brake setting - if the brake was on this will turn it off, and vice-versa. You can determine which setting is active by listening to the arming tone. One tone indicates that the brake is enabled, and two tones indicates that the brake is disabled. To CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step **2** above.

4. BATTERY TYPE: The ESC will automatically sound three different series of tones to indicate the three battery type settings as shown below. If you do NOT wish to change the battery setting wait after the "●●●" tones sound and the ESC will automatically skip to the reverse rotation feature below. To CHANGE the battery type, move the throttle stick to minimum when you hear the tones that match the setting you wish to have. For example, to set for a "2-cell Li-Po" battery wait until the tones for NiCd batteries have ended, then when 2 short tones sound repeatedly " " move the Tx throttle stick to minimum position. The ESC will then sound a single tone " "to indicate the new setting was accepted, and the ESC is now armed and ready for operation. To CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step **2** above. **WARNING:** Failure to set the proper battery type will likely result in unwanted operation and/or damage to your battery.

Battery Type (voltage cut off)

NiCad	● ● ● ● ●
2 cell lipo	●● ●● ●● ●● ●●
3 cell lipo	●● ● ●●● ●●● ●●● ●●●

5. REVERSE ROTATION: The ESC will sound a series of tones as shown below to indicate the direction of motor rotation can be reversed. If you do NOT wish to change the direction of rotation wait 5 seconds after these tones sound and skip to the soft-start feature below. To CHANGE the direction of motor rotation, move the throttle stick to minimum when you hear these tones. The ESC will sound " _ " to indicate the new setting was accepted, and the ESC is now armed and ready for operation. To CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step 2 above. **Note:** It may be necessary to reverse a motor's rotation when using a gear drive.

Rotation Reverse : Reverse motor Rotation

♪ ♪ ♪ ♪ ♪

6. SOFT-START: The ESC will sound two different series of tones to indicate the two soft-start settings as shown below. If you do NOT wish to change the soft-start setting wait 5 seconds after the " ♪♪♪♪♪ " tones sound and skip to the low voltage indication feature below. To CHANGE the soft-start setting, move the throttle stick to minimum when you hear the tones which match the setting you wish to have. The ESC will sound " _ " to indicate the new setting was accepted, and the ESC is now armed and ready for operation. To CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step 2 above. **Note:** It's often recommended to enable the soft-start feature when using the motor with a gear drive, to help prevent breakage of the gears as the motor begins rotation (especially when a large diameter prop is being used). Enabling the soft-start feature is optional when not using a gear drive, but can be used as a safety precaution.
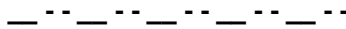
Soft Start :

Enabled ♪ ♪ ♪ ♪ ♪

Disable ♫ ♫ ♫ ♫ ♫

7. UNDER VOLTAGE INDICATION: The ESC will sound three different series of tones to indicate the three low voltage indication settings as shown below. If you do NOT wish to change the low voltage indicator setting wait 5 seconds after the " ♪ ♪ ♪ " tones sound and skip to the timing feature below. To CHANGE the low voltage indicator setting, move the throttle stick to minimum when you hear the tones that match the setting you wish to have. The ESC will sound " _ " to indicate the new setting was accepted, and the ESC is now armed and ready for operation. To CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step **2** above. This feature warns you that the battery's voltage has dropped to a dangerously low level. The ESC can be set to give a warning by either reducing or totally cutting throttle. When the throttle change is observed the helicopter should be landed quickly. This feature can also be set to "ignore" so that no indication is given. When the low voltage indication is given the ESC will still deliver power to the receiver and servos to control the Helicopter, and regular throttle control can be regained by cycling the throttle stick to full minimum and back upward, **but the helicopter should be landed quickly before all control is lost.** The voltages at which the low voltage indications will activate are as shown in the **"BATTERY TYPE"**

Under Voltage
    Ignore :   __ - - __ - - __ - - __ - - __ - -
    Reduce power: __ - __ - __ - __ - __ -
    Cut Off: - __ - __ - __ - __ - __

8. TIMING : The ESC will sound three different series of tones to indicate the three timing advancement options as shown below. If you do NOT wish to change the timing setting wait 5 seconds after the tones " ♪ ♪ ♪ " sound and skip to the switching frequency setting below. To CHANGE the timing setting, move the throttle stick to minimum when you hear the tones that match the setting you wish to have. The ESC will sound " _ " to indicate the new setting was accepted, and the ESC is now armed and ready for operation. To CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step **2** above. Selecting the proper timing will help to optimize the overall efficiency of your power system. The "automatic" setting is acceptable for all types of brushless motors. The "soft" setting is for "multi-pole" or "inner-rotating" motors. The "hard" setting is for outrunner type motors.

Timing

    Automatic (7° – 30°)   - - - - -
    Soft : (7 degree)   - - - - - - - - - -
    Hard: (22 – 30 degree)   - - - - - - - - - - - - - - -

9. SWITCHING FREQUENCY: The ESC will sound two different series of tones to indicate the two switching frequency options as shown below. If you do NOT wish to change the switching frequency wait 5 seconds after the tones " " sound and skip ahead to the restore factory default setting below. To CHANGE the switching frequency, move the throttle stick to minimum when you hear the tones that match the setting you wish to have. The ESC will sound " ♪ ♪ ♪ " to indicate the new setting was accepted, and the ESC is now armed and ready for operation. To

CHANGE ANOTHER programmable feature disconnect the battery from the ESC and return to Step **2** above. **Note:** The 8kHz frequency is good for all types of 2-pole and outrunner type motors, and the 16kHz setting is good for "multi-pole" or "inner rotating" motors.

Frequency

8 kHz: ♫ ♫ ♫ ♫ ♫

16 kHz :   ♭ ♭ ♭ ♭ ♭

10. RESTORE FACTORY DEFAULT SETTINGS: The ESC will sound a series of tones to indicate the function for restoring all ESC settings back to the factory defaults. If you do NOT wish to restore all settings back to factory defaults wait 5 seconds after these tones stop and skip ahead to the active RPM control setting below. To CHANGE all settings back to the factory defaults, move the throttle stick to minimum when you hear these tones. The ESC will sound a single tone " _ " to indicate the new setting was accepted, and the ESC is now

Restore Factory Default Setting : ____   ____   ____   ____   ____

11. ACTIVE RPM CONTROL: The ESC will sound three different
series of tones to indicate the four RPM control options as shown below. To CHANGE the RPM control setting, move the throttle stick to minimum when you hear the tones that match the setting you wish to have. The ESC will sound a single tone " _ " to indicate the new setting was accepted. The ESC will now be armed and ready for operation. The active RPM control function is designed for use with small electric helicopters. Selecting the proper RPM maximum control value will help to prevent the ESC from overpowering the model during flight. Refer to your helicopter's instruction manual for a recommended maximum RPM value. Leave this setting "OFF" for model airplanes.

ACTIVE RPM CONTROL

RPM control off   __ - __   __ - __   __ - __   __ - __   __ - __
20,000 RPM   __ - - __   __ - - __   __ - - __   __ - - __   __ - - __
50,000 RPM   __ - - - __   __ - - - __   __ - - - __   __ - - - __   __ - - - __

Factory default settings:

Brake : 0ff
Battery Type: 3 li-poly
Under voltage : Reduce Power
Soft Start : Active
Timing : Auto
Frequency: 8 kHz
Active Control : off