



# BlueJay User Guide

## WARNING

- **Modifying the Motor Controller parameters can damage equipment, property and cause INJURY/DEATH to yourself/others.**
- **Modifications may VOID your WARRANTY**
- **Factory/Dealer settings should only be performed by trained technicians**

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Questions? Feedback? Send email to: [BlueJayTuning@gmail.com](mailto:BlueJayTuning@gmail.com)

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# What BlueJay Does

BlueJay is a simplified performance tuning application for motor controllers used in electric golf carts and utility vehicles. BlueJay automatically detects your controller, saves and restores settings, and makes motor tuning simple - even for beginners.

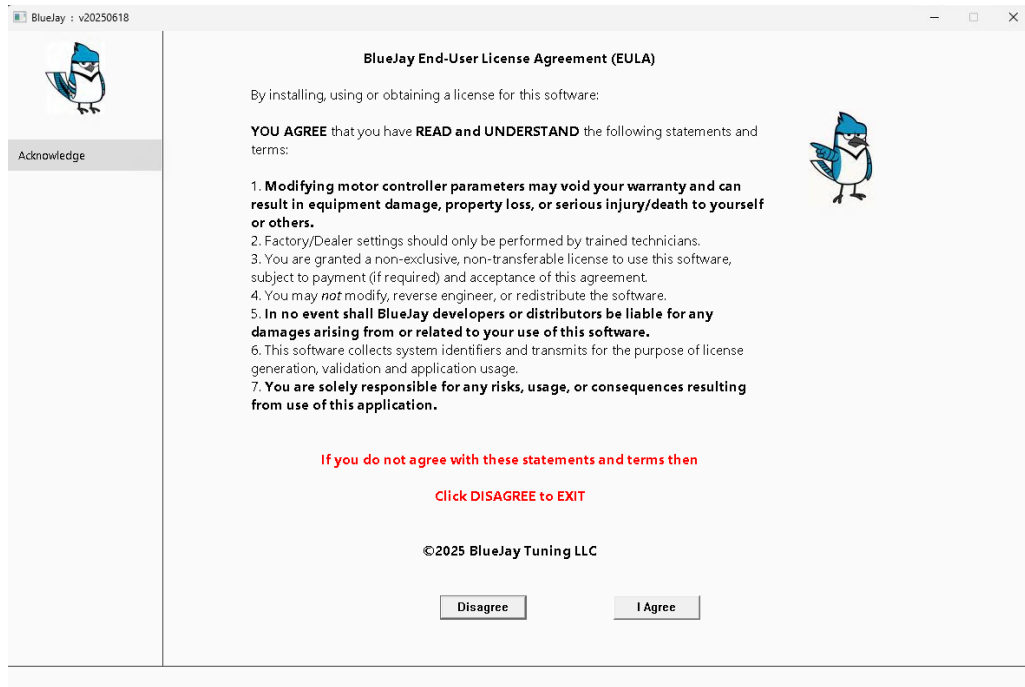
Get the latest version: <https://bluejaytuning.lizard43.com>

- **Automatic controller detection:** BlueJay queries your connected controller to detect the brand/model/type
- **One application for many controllers.** No manual guesswork of which Chinese OEM tuning application to use
- **Highlights the most important and commonly adjusted tuning parameters,** making them quick and intuitive to edit.
- **Save and Restore:** Snapshot your current configuration or roll back to a known-good one
- **Supports tuning profiles,** including:
  - Sporty and Fast
  - Casual About Town
  - Hill Climber
  - Many other community supported
- Fully **English interface** with simple and clear parameter descriptions

BlueJay works with a wide range of vehicles using compatible AC motor controllers, including Advanced EV, Bintelli, Coleman, Denago, Evolution / HDK, ExCar, EZKruiser, Gotraxe, Gorilla, Moto Electric, Icon, PDG, Racka, Spartan, Tao, Many others with FJ, EV48-400-C and Tercel/LVTong controllers!

# Getting Started

BlueJay has an easy all-English installation. Just run the BlueJay Windows setup and double-click the BlueJay desktop shortcut.



# EULA End-User License Agreement

Before you can use BlueJay, you must review and agree to the EULA.

**If you disagree with these statement and terms, simply click the Disagree button and don't use BlueJay.**

If you do agree to the EULA statement and terms, click Agree button and BlueJay will begin.

## Licensing

BlueJay is NOT a free application.

Once you agree to the EULA, BlueJay will generate a unique code for your PC. Send that code to [BlueJayTuning@gmail.com](mailto:BlueJayTuning@gmail.com) and obtain a license.

After you have received a license from BlueJay, restart BlueJay and click the “Retry”



# Communications

BlueJay communicates to your controller via a USB cable. The cable is specific to your controller brand/model/type so you must first identify your controller. The easiest is to go to:

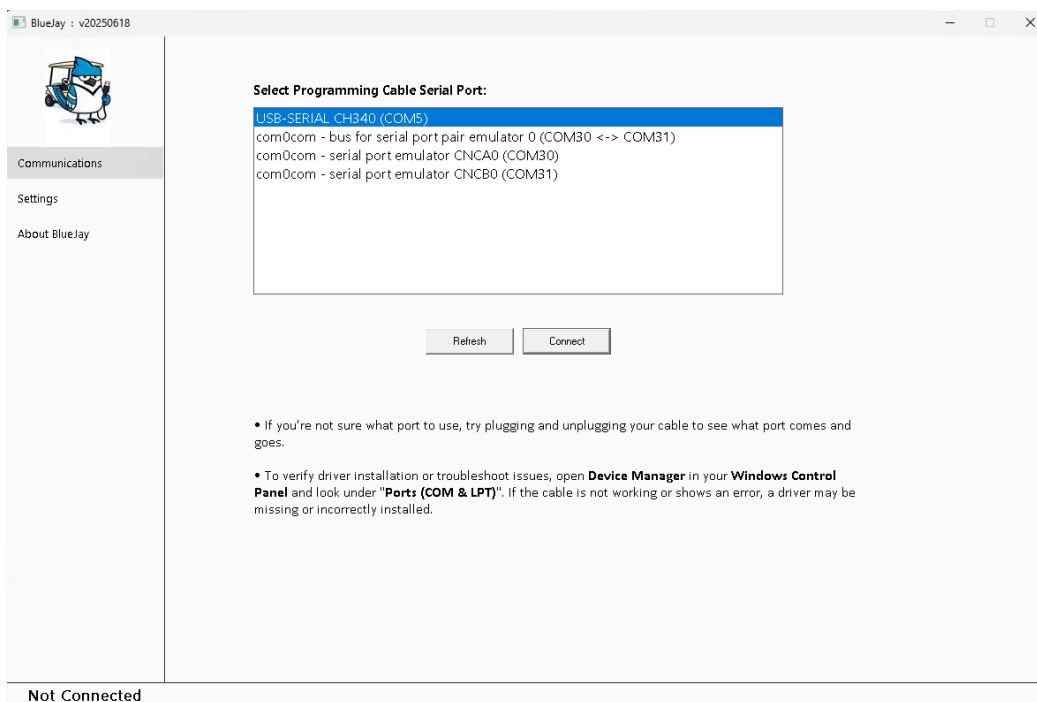
<https://www.cartcables.com/pages/controller-id-guides>

You can purchase a cable for your controller from Cart Cables or eBay or other sources.

## USB Device Drivers

Most cables require a Windows Device Driver to be installed. If you purchased from Cart Cables, go here to find the appropriate driver:

<https://www.cartcables.com/pages/drivers>



Once you've installed the cable's device driver, you need to select the associated serial COM Port and click Connect

## Controller Probing

BlueJay will identify your connected controller using the selections in the Settings section.

Once identified, BlueJay will query tuning parameters and load the Tuning tables.

If BlueJay can't identify your controller:

- Make sure your cart is powered on. The controller must have power in order to communicate
- Make sure that you installed your cable's device driver
- Make sure your controller is supported by BlueJay
- Check the FAQs found at:  
<https://bluejaytuning.lizard43.com/faqs.html>

## Saving

### IMPORTANT!

Before making ANY changes to your controller's tuning, you should save a snapshot that can be used to recover if ever needed.

After making tuning changes, you should save again to a different filename, being careful not to overwrite previous save snapshots..

By default, BlueJay will save in your Windows APPDATA\BlueJay folder, using the controller's name:

- FJ/backups
- EV48-400-C/backups
- etc

The suggested save filename contains the controller name and today's date/time. You can edit the location and name as needed.

The saved files are text files and can be examined using a text editor like Notepad but DO NOT make changes to the saved files or they will not be able to be reloaded at a later time.



# Loading

You can load 2 types of files into BlueJay:

- Backups
- Profiles

## Backups

Backups are files that you previously saved and you now want to restore your controller to that previous parameter configuration.

You must only load backup files for your connected controller brand/model/type (example: only FJ for an FJ; not a EV48-400-C into a Tercel controller, etc).

By default, BlueJay will save in your Windows APPDATA\BlueJay folder, using the controller's name:

- FJ/backups
- EV48-400-C/backups
- etc

After loading, the Tuning tables will highlight any changes in yellow. This indicates differences of your current controller's configuration and what was in the loaded file.

- **Review the changes and ask yourself “do these make sense?”**
- **DO NOT write parameters that look wrong or out of normal.**
- **Be safe, be smart!**

You can make further edits as needed before writing to the controller or you can discard the changes.

To actually write the changes to your controller, you **MUST** press the Write button.

**You can abandon any changes by clicking the Reset button.**

## Reset

You can abandon any changes loaded or manually edited by clicking the Reset button. After confirming that you want to discard changes, the controller will be read and the current configuration will be displayed in the tuning tables.

## Profiles

Profiles are files that contain **suggested or community suggested** parameter settings. These will only change a handful or so of tuning parameters to make your cart faster/sportier, better with hill or smooth about town.

You must only load profile files for your connected controller brand/model/type (example: only FJ for an FJ; not a EV48-400-C into a Tercel controller, etc).

By default, BlueJay will look for profile files in the folder of the BlueJay.exe and in the controller's named folder (example FJ, EV-48-400-C, etc).

After loading, the Tuning tables will highlight any changes in yellow. This indicates differences of your current controller's configuration and what was in the loaded file.

- **Review the changes and ask yourself “do these make sense?”**
- **DO NOT write parameters that look wrong or out of normal.**
- **Be safe, be smart!**

You can make further edits as needed before writing to the controller or you can discard the changes.

To actually write the changes to your controller, you **MUST** press the Write button.

You can abandon any changes by clicking the Reset button.

# Tuning

This section describes generic motor controller tuning. Refer to your specific controller brand/model/type in the Appendixes.

- Appendix A - Fanji Technology (FJ) / FJ Controlling Co., Ltd
- Appendix B - EV48-400-C
- Appendix C – Tercel/LVTong

Tuning is not complicated but it does come with risks that **MUST** be understood and accepted:

- **Modifying the Motor Controller parameters can damage equipment, property and cause INJURY/DEATH to yourself/others.**
- **Modifications may VOID your WARRANTY**
- **Factory/Dealer settings should only be performed by trained technicians**

In BlueJay, use the Tuning page to review, edit, write, save, load parameters.

BlueJay : v20250711

**Tuning** Sink Info

Parameter Name	Value	Set	Unit	Min	Max
<b>Speed Control</b>					
Motor Maximum Speed	6000	6000	RPM	0	8000
Forward High Gear Max Speed	5300	5300	RPM	0	6000
Forward Slow Gear Max Speed	2650	2650	RPM	0	6000
Reverse Max Speed	1500	1500	RPM	0	6000
<b>Acceleration/Deceleration</b>					
Forward Acceleration 0->500 RPM	25	25	RPM/S	0	100
Forward Acceleration 500->1000 RPM	13	13	RPM/S	0	100
Forward Acceleration 1000->2000 RPM	13	13	RPM/S	0	100
Forward Acceleration 2000->3000 RPM	13	13	RPM/S	0	100
Forward Acceleration 3000->4000 RPM	13	13	RPM/S	0	100
Forward Acceleration 4000->5000 RPM	13	13	RPM/S	0	100
Forward Acceleration 5000->MAX RPM	13	13	RPM/S	0	100
Forward Deceleration MAX->5000 RPM	6	6	RPM/S	0	100
Forward Deceleration 5000->4000 RPM	6	6	RPM/S	0	100
Forward Deceleration 4000->3000 RPM	5	5	RPM/S	0	100
Forward Deceleration 3000->2000 RPM	5	5	RPM/S	0	100
Forward Deceleration 2000->1000 RPM	4	4	RPM/S	0	100
Forward Deceleration 1000->500 RPM	4	4	RPM/S	0	100
Forward Deceleration 500->0 RPM	4	4	RPM/S	0	100
Reverse Acceleration	6	6	RPM/S	0	100
Reverse Deceleration	6	6	RPM/S	0	100
<b>Torque</b>					
Driving Torque Factor 0->500 RPM	100	100	%	0	100
Driving Torque Factor 500->1000 RPM	85	85	%	0	100
Driving Torque Factor 1000->1500 RPM	67	67	%	0	100
Driving Torque Factor 1500->2000 RPM	55	55	%	0	100
Driving Torque Factor 2000->2500 RPM	53	53	%	0	100
Driving Torque Factor 2500->3000 RPM	51	51	%	0	100
Driving Torque Factor 3000->MAX RPM	47	47	%	0	100
Regenerative Torque Factor MAX->5000 RPM	34	34	%	0	100
Regenerative Torque Factor 5000->4000 RPM	20	20	%	0	100

Save Load Reset Write

Connected EV48-400-C Controller

**Before you make any changes, you should make a backup of the current parameters by clicking the Save button.**

To change a parameter, double-click on the the “set” cell of the parameter row. Make sure your change is between the valid min and max for that parameter. After editing, the “set” cell will highlight in yellow to show that it has changed.

**Changes are not written to the connected controller until you click the Write button.**

**If you want to discard changes before writing, click the Reset button.**

You can return to a previous saved state by clicking the Load button and choosing a previously saved file for the connected controller. After loading, differences from the current state and the loaded files will be highlighted in yellow. Be sure to review both the Tuning and Sink tables to see changes. Changes are not actually written to the controller until you click the Write button.

Common tuning areas are:

- Speed
- Acceleration/Deceleration
- Torque
- Everything else aka Kitchen Sink

## Speed

Speed tuning controls how fast the golf cart can travel under various conditions. This involves adjusting the maximum motor RPM, forward RPM is Low and High gear, reverse RPM in Low and High gear. Go to the Appendix for your controller to see the specific parameters.

## Acceleration/Deceleration

Acceleration and deceleration tuning determine how quickly the cart speeds up or slows down. This is managed by ramp rate settings in the controller. A smoother, slower acceleration may be ideal for comfort and safety, while a sharper ramp gives a snappier, sportier feel.

Deceleration tuning can also affect how aggressively the cart slows down when throttle is released - important for both driving feel and regenerative braking behavior (if supported).

Go to the Appendix for your controller to see the specific parameters.

## **Torque**

Torque is the rotational force that the motor produces to turn the shaft. Think of it like how hard you twist a wrench - torque is that "twisting" force. Torque tuning affects how well the cart can climb hills, carry loads, or launch from a stop. Torque can be mapped across multiple ranges (low-RPM vs. high-RPM) or split between driving torque and regenerative torque. Adjusting torque levels can help balance power, hill climbing, efficiency, and battery life.

Go to the Appendix for your controller to see the specific parameters.

## **Everything Else (The Kitchen Sink)**

This catch-all category includes all the less-obvious but available tuning options. The experienced/advanced tuner will find useful but uncommon tuning parameters here.

Go to the Appendix for your controller to see the specific parameters.

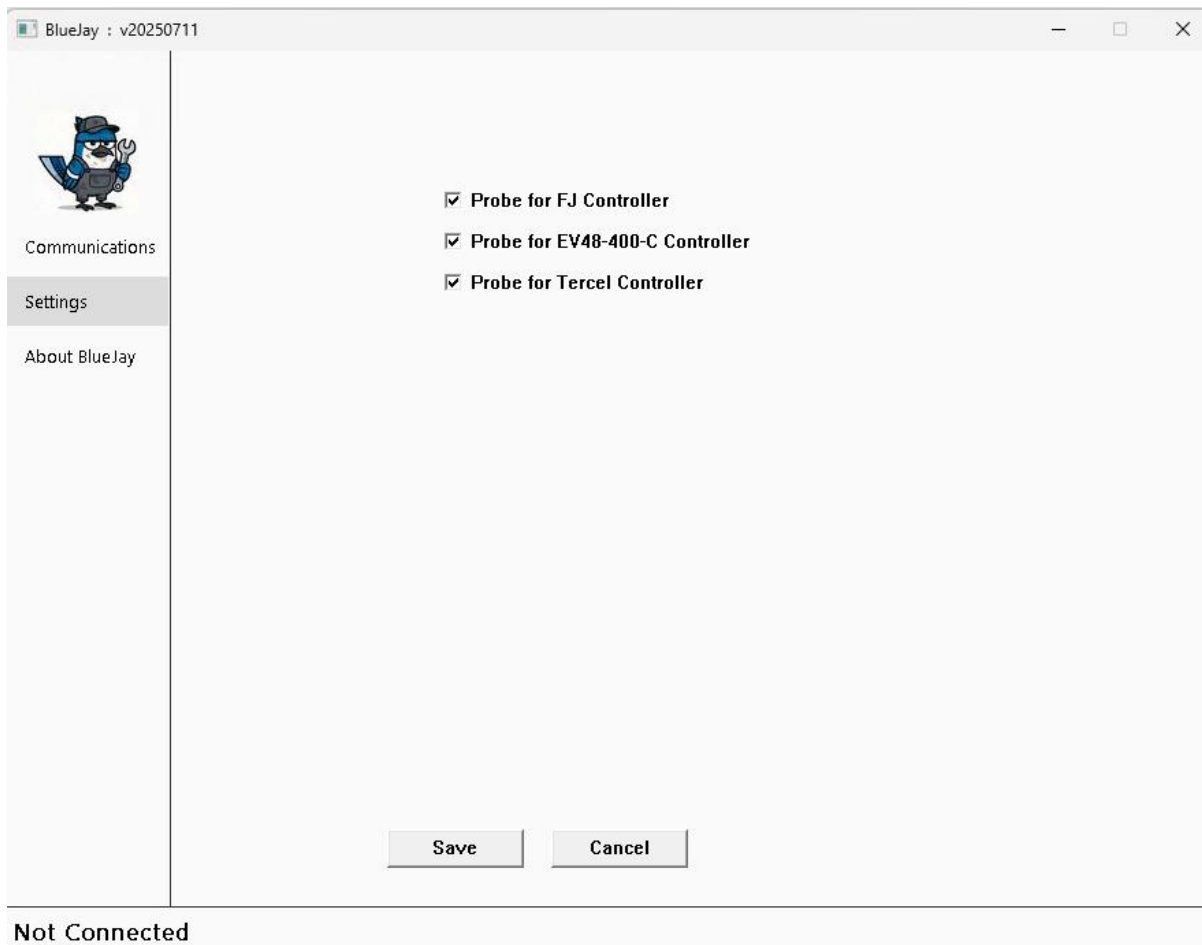
# Settings

By default, BlueJay is configured to probe for all supported controllers.

To save time, you may want it look for your controllers.

Click the Setting selection on the left side and then check/uncheck the controllers that you want.

Be sure to click Save if you make changes to the settings.



# Trouble Shooting

## BlueJay can't identify controller

- Make sure your cart is powered on. The controller must have power in order to communicate
- Make sure that you installed your cable's device driver
  - Most cables require a Windows Device Driver to be installed. If you purchased from Cart Cables, go here to find the appropriate driver:
    - <https://www.cartcables.com/pages/drivers>
- Make sure your controller is supported by BlueJay.
  - Identify your controller brand/model/type here:
    - <https://www.cartcables.com/pages/controller-id-guides>

## Can't edit a parameter

- Make sure you are double-clicking the “set” cell of the parameter row.
- Grey Parameter rows are read-only and can not be edited.

## Won't load backup

- Make sure you are loading the correct controller brand/model/type
- Make sure you haven't hand edited the backup file

## Won't load profile

- Make sure you are loading the correct controller brand/model/type
- Make sure you have the parameter named spelled correctly
- Make sure the parameter value is within min/max range

## Something Else

- Send email describing issue to: [BlueJayTuning@gmail.com](mailto:BlueJayTuning@gmail.com)

## FAQs

An updated list of FAQs can be found at: <https://bluejaytuning.lizard43.com/faqs.html>

### Why isn't BlueJay free?

Since the OEM controller programs like GEF12Host or Fj Programming tool are free, why isn't BlueJay also free?

- Actually those OEMs programs are NOT free. They are licensed applications that have been pirated and copied onto various download sites.
- BlueJay is supported multi-controller application that provides many features that the OEMs applications do not, such as:
  - Save/Restore
  - Profiles
  - User Guide
  - Every common tuning parameter defined and described in the User Guide
  - Email application support, bug fixes, new versions

### Where can I find the latest BlueJay version?

- Go to: <https://bluejay.lizard43.com>

### Where can I find a list of reported bugs?

- Go to: <https://bluejay.lizard43.com>
- Report bugs to: [BlueJayTuning@gmail.com](mailto:BlueJayTuning@gmail.com)

### Will you give me personal support to tune my controller?

- No, we offer application support via email and bug fix support but we cannot tell you what parameter values to use for tuning your controller.
- Read the user manual for general guidance
  - There is NOT a one size fits all. Use caution and intelligence
- Get community support by posting tuning questions for the various Golf / Utility Cart forums and sites.



## Appendix A - Fanji Technology (FJ) / FJ Controlling Co., Ltd

BlueJay can auto-detect FJ controllers. The FJ S1 series are AC motor controllers used in many commodity golf carts such as Evolution/HDK, Tao, Denago, PDG, EZKruiser, Racka, Coleman, Gotraxx, Gorilla and others.

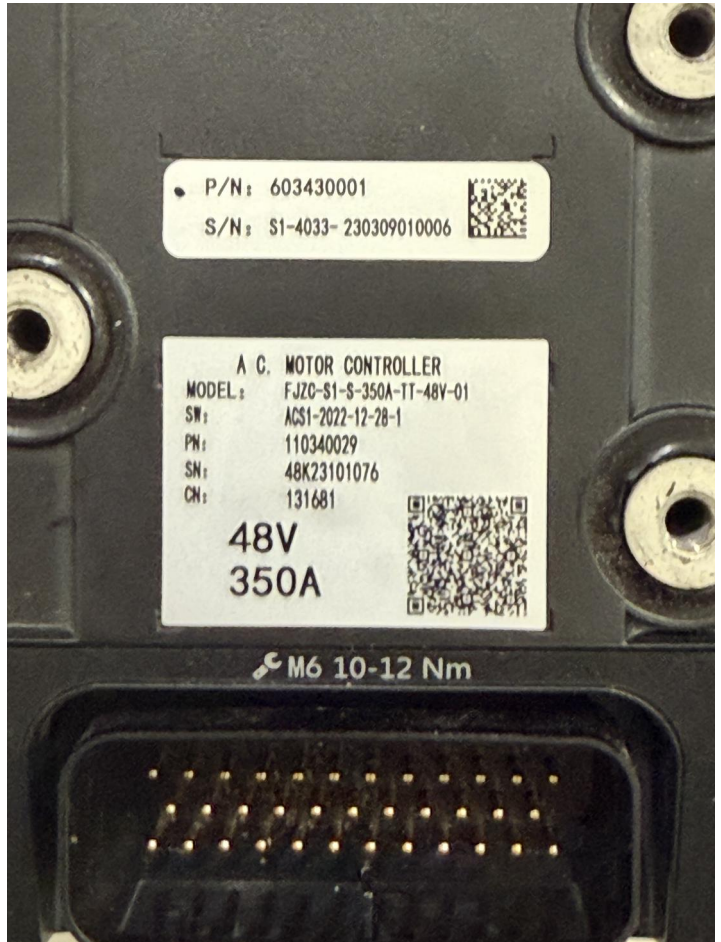


Common models include:

- EV48-400
- EV48-400-A
- FJ 350A
- FJZC-S1-350A
- FJZC-S1-350A-TT-48V-01
- FJZC-S1-001-WHL-48V-06
- etc

The FJ G1 series also are showing up on some carts such as Denago. The G1 controllers have not been examined by us but they do appear to follow the same S1 communication protocol

- FJZC-G1-001-TT-48V-02
- FJZC-G1-001-BK-48V-02
- FJZC-G1-001-BK-72V-01
- etc



A 4-pin square programming port located beneath the fuse block in the battery bay allows for customization and tuning of vehicle settings.

To connect and program the FJ controller, you'll need:

- A programming cable such as the [CartCables](#) CC-CBL-EVO2SE



## FJ Tuning

Tuning is not complicated but it does come with risks that MUST be understood and accepted:

- **Modifying the Motor Controller parameters can damage equipment, property and cause INJURY/DEATH to yourself/others.**
- **Modifications may VOID your WARRANTY**
- **Factory/Dealer settings should only be performed by trained technicians**

This section discusses an approach to performance tuning. What values do you want to tune your cart? It depends on what you want. There is not a one size fits all.

- Don't just enter numbers that someone told you about
- Look at your existing values
- Determine your goals
- Make small changes
- Test with caution

Common tuning areas are:

- Speed
- Acceleration/Deceleration
- Torque

**BlueJay slightly renames some of the OEM parameters in an attempt to simply and make their purpose more clear.**

Go to the following section FJ Parameters for a list and description of all parameters that BlueJay supports.

### Speed

In the Tuning tab, set "P Maximum Forward Speed (RPM)" to be whatever safe max RPM you want up to 6000 RPM.

Your FJ S1 controller will have its "gear mode" system parameter set to "partition". This means that you tune 7 "partitions"/"zones" related to speed, acceleration, deceleration and torque.

In the 1-7 speed partition entries, enter a max rpm desired at each "zone". You want this to be mostly linear so the speed ramps up smooth and continuous. An easy method is divide your divide "P Maximum Forward Speed (RPM)" by 7 and enter the multiples something like:

	Partition 1	Partition 2	Partition 3	Partition 4	Partition 5	Partition 6	Partition 7
Max RPM 4000	571	1143	1714	2286	2857	3429	4000
Max RPM 4500	643	1286	1929	2571	3214	3857	4500
Max RPM 5000	714	1429	2143	2857	3571	4286	5000
Max RPM 5500	786	1571	2357	3143	3929	4714	5500
Max RPM 6000	857	1714	2571	3429	4286	5143	6000

Now that you defined the max rpm in each speed partition, you'll want to set a plan on how to get there by adjusting the acceleration partitions.

## Acceleration/Deceleration

The acceleration partitions tells the controller how quickly in rpm/s that you want to get from one partition to the next.

Example:

- If you set the partitions apart by ~714 RPMs (as in speed example above for 5000 max rpm)
- If you set an acceleration partition to 100 rpm/s, it would take roughly  $714/100 = 7.14$  seconds to get up to speed in that partition.
- Or if you set the acceleration partition to 350 rpm/s, it would take  $714/350 = 2.04$  seconds to get up to speed in that partition

### IMPORTANT!

- Do NOT start with large numbers. Take your existing values and add 10-50 to a partition slowly and test.
- **Too large of values will make your cart dangerous and out of control.**
- Go slow, test.

## Torque

The torque partition is the “muscle” behind your acceleration plan. Each torque partition value limits or defines the force the motor can use to achieve the acceleration plan.

Torque is the rotational force that the motor produces to turn the shaft. Think of it like how hard you twist a wrench — torque is that "twisting" force.

Each torque partition is a value from 10-100 which is the % of max available torque

If you set a high acceleration but a low torque, you might notice the vehicle feels sluggish or lags when climbing or starting under load.

If you set high torque but low acceleration, you'll have more pulling power, but the controller will deliberately slow down how fast you ramp up.

Be conservative at low speed to avoid jerky starts, higher torque at higher speeds when needed for hills or carrying load.

### IMPORTANT!

- Do NOT start with large numbers. Take your existing values and add 5-10 to a partition slowly and test.
- **Too large of values will make your cart dangerous and out of control.**
- Go slow, test.

Deceleration partitions are used to used to slow down the vehicle when the throttle is released. Larger values (rpm/s) represent faster response (strong deceleration feeling), small values (rpm/s) represent slower response (soft deceleration feeling ).

Its recommended to adjust the 1-7 partition deceleration value synchronously otherwise the deceleration process may not be smooth, **you may experience uncomfortable deceleration and eat the windshield.**

## FJ Parameters

BlueJay displays parameters in 2 tuning tables, Tuning and Sink.

- Just because a parameter is in these lists does NOT mean you need to adjust.
- Only change what you need to.
- Change in small increments and test. Go slow, be careful, be smart.

## Tuning List

These are the most common tuning parameters for speed, acceleration/deceleration and torque.

- **Speed Control**
  - P-Maximum Forward Speed
    - Maximum forward RPM in High gear.
      - This is the Motor Maximum Speed.
      - You are never allowed to spin faster than this no matter what.
      - “Partition 7 Speed” parameter should match or be ~5% RPM lower than this value.
    - The ranges for this are 0-6000 RPM
    - See “Partition 7 Speed” parameter below for more words.
  - Partition 1 Speed
    - Maximum forward RPM in Partition 1.

- See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- Partition 2 Speed
  - Maximum forward RPM in Partition 2.
  - See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- Partition 3 Speed
  - Maximum forward RPM in Partition 3.
  - See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- Partition 4 Speed
  - Maximum forward RPM in Partition 4.
  - See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- Partition 5 Speed
  - Maximum forward RPM in Partition 5.
  - See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- Partition 6 Speed
  - Maximum forward RPM in Partition 6.
  - See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- Partition 7 Speed
  - Maximum forward RPM in Partition 7.
    - “Partition 7 Speed” parameter should match or be ~5% RPM lower than “P-Maximum Forward Speed”.
  - If going downhill, heavy load, strong tailwind, slight overrun, the motor can momentarily spin up and attempt go beyond the Motor Maximum Speed limit and then fault out.

- Some controllers don't handle hitting their max rpm very gracefully and can trigger "Over-speed Protection" faults or cause sudden motor braking.
- Unless you are soaking every RPM out of the controller, consider putting Partition 7 Speed about ~5% less than "P-Maximum Forward Speed" value.
- See above Speed paragraph for a discussion on partition and how to calculate values in partitions 1-7
- S-Maximum Forward Speed
  - Maximum forward RPM in Low gear.
  - The ranges for this are 0-6000 RPM
- P-Maximum Reverse Speed
  - Maximum reverse RPM in High gear.
  - The ranges for this are 0-6000 RPM
- S-Maximum Reverse Speed
  - Maximum reverse RPM in Low gear.
  - The ranges for this are 0-6000 RPM
- Motor Minimum Speed
  - Lowest allowed RPM
  - The ranges for this are 0-6000 RPM
- P-Forward Acceleration
  - Maximum forward acceleration in High gear
  - The ranges for this are 100-2000 RPM/S
- P-Reverse Acceleration
  - Maximum reverse acceleration in High gear
  - The ranges for this are 100-2000 RPM/S

## **Sink List**

These are other important tuning parameters that may be useful to advanced/experienced tuners.

## Appendix B - EV48-400-C

BlueJay auto-detects Evolution EV48-400-C controllers. The EV48-400-C is an AC motor controller used in some Evolution Electric Vehicles, specifically designed for models like the Classic 2/4 Plus, Forester 4/6 Plus, D5 carts and others.

### 2.04.1319

EV48-400-C  
EVOLUTION 400AAC  
controller

APPLY TO CLASSIC 2/4 PLUS  
PROCARRIER 6/8 PLUS FORESTER 4/6  
PLUS TURFMAN 200/800/1000  
All Year Models



2.04.1319 Paired With 4kw AC Motor (without EM Brake)

2.04.1319-1 Paired With 6.3kw AC Motor (without EM Brake)

2.04.1319-2 Paired With 4kw AC Motor (with EM Brake)

2.04.1319-3 Paired With 6.3kw AC Motor (with EM Brake)





A 4-pin square programming port located beneath the fuse block in the battery bay allows for customization and tuning of vehicle settings.

To connect and program the EV48-400-C controller, you'll need:

- A programming cable such as the [CartCables](#) CC-CBL-EVO2SE



## EV48-400-C Tuning

Tuning is not complicated but it does come with risks that MUST be understood and accepted:

- **Modifying the Motor Controller parameters can damage equipment, property and cause INJURY/DEATH to yourself/others.**
- **Modifications may VOID your WARRANTY**
- **Factory/Dealer settings should only be performed by trained technicians**

This section discusses an approach to performance tuning. What values do you use to tune your cart? It depends on what you want. There is not a one size fits all.

- Don't just enter numbers that someone told you about
- Look at your existing values
- Determine your goals
- Make small changes
- Test with caution

Common tuning areas are:

- Speed

- Acceleration/Deceleration
- Torque

**BlueJay slightly renames some of the OEM parameters in an attempt to simply and make their purpose more clear.**

Go to the following section EV48-400-C Parameters for a list and description of all parameters that BlueJay supports.

## **Speed**

Start by setting your motor maximum speed:

- Motor Maximum Speed
  - Maximum RPM in any direction in any gear
  - Range: 0-8000 RPM
    - **The OEM allowed max is 6000 RPM.**
      - **Use extreme caution if exceeding OEM range.**
      - **High RPM can lead to faults and premature motor/controller failures**

Next adjust your “Forward High/Slow Gear Max Speed” - These set how fast the cart can go in High (H) and Slow (S) modes. Both values are capped by whatever you put into Motor Maximum Speed.

- Forward High Gear Max Speed
- Forward Slow Gear Max Speed

### ***Set Forward High Gear Max Speed LESS than Motor Maximum Speed?***

- Consider setting Forward High Gear Max about 5% less than Motor Maximum Speed
  - Example: If you set Motor Maximum Speed to 6000 RPM and Forward High Gear Max Speed to 5700 rpm, you'll leave a ~5% "emergency headroom".
- **Why NOT** set Motor Maximum Speed and Forward High Gear Speed to the same value
  - Some controllers (including EV48-400-C) don't handle hitting their max rpm very gracefully - it can trigger "Over-speed Protection" faults or cause sudden motor braking.
  - Motor Maximum Speed is the absolute hardware/software ceiling. You are never allowed to spin faster than this - no matter what.

- Forward High Gear Max Speed is a targeted performance setting. This is the normal 'full throttle' behavior for everyday use.
- If going downhill, heavy load, strong tailwind, slight overrun, **the motor can momentarily spin up crashing into the Motor Maximum Speed limit and fault out.**

### ***Or Match Forward High Gear Max Speed to Motor Maximum Speed?***

- If you want every possible RPM out of the motor (racing, timed event, crazy top speed cart).
- If you are certain you will never coast or over-speed downhill into a fault.
- If you are maximizing efficiency and minimizing motor margin for maximum range.

Next set your cart's Reverse Max Speed.

- This should be a conservative value, around 1000 RPM

### **Acceleration/Deceleration**

Now that you've set your max forward and reverse RPM, you'll want to make a plan on how to get to those speeds. The 400-C divides forward acceleration/deceleration into 7 "partitions each. These acceleration parameters tell the controller how quickly in RPMs per second that you want to get from one partition to the next.

While the range for these are 0-100 and your existing numbers may look low, **Do NOT change immediately to large numbers!**

Take your existing values and add 5-10 to a partition slowly and test.

- Too large will make your cart dangerous and out of control.
- **Don't be stupid. Go slow, test.**

The deceleration partitions will use your motor to slow your cart down when your foot is off the accelerator pedal and you transition from one partition to the next.

Take your existing values and add/subtract 1-2 to a partition slowly and test.

- Too large of number here will slow your cart aggressively and you'll eat your windshield.
- **Don't be stupid. Go slow, test.**

## Torque

The torque is the “muscle” behind the acceleration plan. Each torque partition value limits or defines the force the motor can use to achieve the acceleration plan.

Torque is the rotational force that the motor produces to turn the shaft. Think of it like how hard you twist a wrench - torque is that "twisting" force.

There's two types of torque to discuss:

- Driving Torque
  - This refers to the motor operating as a motor, i.e., driving the vehicle forward or backward using electrical energy drawn from the battery.
  - The Driving Torque Factor in this mode limits how much driving torque the motor can produce at specific RPMs.
- Regenerative Torque
  - This is when the motor operates as a generator, i.e., converting kinetic energy back into electrical energy to recharge the battery (regenerative braking).
  - The Regenerative Torque Factor in this mode limits how much braking torque can be applied by regenerative braking at specific RPMs.

The 400-C divides forward driving/regenerative torque into 7/6 “partitions, where each torque partition is a value from 0-100 which is the % of max available torque

- If you set a high acceleration but a low torque, you might notice the vehicle feels sluggish or lags when climbing or starting under load.
- If you set high torque but low acceleration, you'll have more pulling power, but the controller will deliberately slow down how fast you ramp up.
- Be conservative at low speed to avoid jerky starts, higher torque at higher speeds when needed for hills or carrying load.

**Like acceleration, do NOT start with large torque numbers!**

Take your existing values and add 5-10 to a partition slowly and test.

- Too large will make your cart dangerous and out of control.
- **Don't be stupid. Go slow, test.**

## EV48-400-C Parameters

BlueJay displays tuning parameters in 2 tuning tables, Tuning and Sink

- Just because a parameter is in these lists does NOT mean you need to adjust.
- Only change what you need to.
- Change in small increments and test. Go slow, be careful, be smart.

## Tuning List

These are the most common tuning parameters for speed, acceleration/deceleration and torque.

### ***Speed Control***

- Motor Maximum Speed
  - Maximum RPM in any direction in any gear
  - Range: 0-8000 RPM
    - The OEM allowed max is 6000 RPM. Use extreme caution if exceeding OEM range.
  - Setting Motor Maximum Speed changes the max range for Forward High Gear Max Speed, Forward Slow Gear Max Speed, Reverse Max Speed
- Forward High Gear Max Speed
  - Maximum Forward RPM in High gear.
    - See above discussion for what you want to set here.
  - The range for this are 0-Motor Maximum Speed RPM
    - The OEM allowed max is 6000 RPM. Use extreme caution if exceeding OEM range.
- Forward Slow Gear Max Speed
  - Maximum Forward RPM in Slow gear.
  - Range: 0-Motor Maximum Speed RPM
    - The OEM allowed max is 6000 RPM. Use extreme caution if exceeding OEM range.

- Reverse Max Speed
  - Maximum Reverse RPM in ANY gear.
  - Range: 0-Motor Maximum Speed RPM
    - The OEM allowed max is 6000 RPM. Use extreme caution if exceeding OEM range.

### ***Acceleration/Deceleration***

- Forward Acceleration 0 → 500 RPM
  - Acceleration when RPM is in between 0 and 500 RPM
  - Range: 0-100 RPMs per second
- Forward Acceleration 500 → 1000 RPM
  - Acceleration when RPM is between 500 and 1000 RPM
  - Range: 0-100 RPMs per second
- Forward Acceleration 1000 → 2000 RPM
  - Acceleration when RPM is between 1000 and 2000 RPM
  - Range: 0-100 RPMs per second
- Forward Acceleration 2000 → 3000 RPM
  - Acceleration when RPM is between 2000 and 3000 RPM
  - Range: 0-100 RPMs per second
- Forward Acceleration 3000 → 4000 RPM
  - Acceleration when RPM is between 3000 and 4000 RPM
  - Range: 0-100 RPMs per second

- Forward Acceleration 4000 → 5000 RPM
  - Acceleration when RPM is between 4000 and 5000 RPM
  - Range: 0-100 RPMs per second
  
- Forward Acceleration 5000 → MAX RPM
  - Acceleration when RPM is in between 5000 and Motor Maximum Speed RPM
  - Range: 0-100 RPMs per second
  
- Forward Deceleration MAX → 5000 RPM
  - Acceleration when RPM is between Motor Maximum Speed and 5000 RPM
  - Range: 0-100 RPMs per second
  
- Forward Deceleration 5000 → 4000 RPM
  - Acceleration when RPM is in between 5000 and 4000 RPM
  - Range: 0-100 RPMs per second
  
- Forward Deceleration 4000 → 3000 RPM
  - Acceleration when RPM is between 4000 and 3000 RPM
  - Range: 0-100 RPMs per second
  
- Forward Deceleration 4000 → 3000 RPM
  - Acceleration when RPM is between 4000 and 3000 RPM
  - Range: 0-100 RPMs per second
  
- Forward Deceleration 3000 → 2000 RPM
  - Acceleration when RPM is between 3000 and 2000 RPM

- Range: 0-100 RPMs per second
- Forward Deceleration 2000 → 1000 RPM
  - Acceleration when RPM is between 2000 and 1000 RPM
  - Range: 0-100 RPMs per second
- Forward Deceleration 1000 → 0 RPM
  - Acceleration when RPM is between 1000 and 0 RPM
  - Range: 0-100 RPMs per second
- Reverse Acceleration
  - Acceleration when in Reverse direction
  - Range: 0-100 RPMs per second
- Reverse Deceleration
  - Deceleration when in Reverse direction
  - Range: 0-100 RPMs per second

## ***Torque***

- Driving Torque Factor 0 → 500 RPM
  - Motor Driving Torque when RPM is between 0 and 500 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
- Driving Torque Factor 500 → 1000 RPM
  - Motor Driving Torque when RPM is between 500 and 1000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
- Driving Torque Factor 1000 → 1500 RPM



- Motor Driving Torque when RPM is between 1000 and 1500 RPM
- Range: 0-100 % of max available torque, Motor Maximum Torque
  
- Driving Torque Factor 1500 → 2000 RPM
  - Motor Driving Torque when RPM is between 1500 and 2000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
  
- Driving Torque Factor 2000 → 2500 RPM
  - Motor Driving Torque when RPM is between 2000 and 2500 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
  
- Driving Torque Factor 2500 → 3000 RPM
  - Motor Driving Torque when RPM is between 2500 and 3000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
  
- Driving Torque Factor 3000 → MAX RPM
  - Motor Driving Torque when RPM is between 3000 and Motor Maximum Speed
  - Range: 0-100 % of max available torque, Motor Maximum Torque
  
- Regenerative Torque Factor MAX → 5000 RPM
  - Motor Driving Torque when RPM is between Motor Maximum Speed and 5000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
  
- Regenerative Torque Factor 5000 → 4000 RPM
  - Motor Driving Torque when RPM is between 5000 and 4000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque

- Regenerative Torque Factor 4000 → 3000 RPM
  - Motor Driving Torque when RPM is between 4000 and 3000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
- Regenerative Torque Factor 3000 → 2000 RPM
  - Motor Driving Torque when RPM is between 3000 and 2000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
- Regenerative Torque Factor 2000 → 1000 RPM
  - Motor Driving Torque when RPM is between 2000 and 1000 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque
- Regenerative Torque Factor 1000 → 0 RPM
  - Motor Driving Torque when RPM is between 1000 and 0 RPM
  - Range: 0-100 % of max available torque, Motor Maximum Torque

### ***Hill Control***

- Hill Hold Mode
  - Sets how motor behaves when it detects you're on a hill/slope.
  - The 400-C infers in you're on a slope by motor speed, accelerator position, brake signal, direction (forward/reverse) and probably more than anything whether the motor is accelerating or decelerating without torque request.
    - For example:
      - If motor RPM is increasing while accelerator = 0, assume vehicle is rolling downhill
      - If accelerator = 0, brake = off, speed = 0, and a rollback is detected → engage hill hold
  - Range:
    - Holding on the slope

- When you stop on a hill, the motor actively resists rollback.
- Think of it like an automatic hill hold.
- Set Slide Max Motor Speed low (50–100 RPM) so you barely creep, if at all.
- Running down on the slope
  - When you're driving downhill, the motor gently applies regenerative braking.
  - Set Slide Max Motor Speed high (200–400 RPM) so you can roll downhill in a controlled way without freewheeling.
  - Good for mountain courses, long downhill stretches where you'd otherwise have to ride the brake pedal a lot.
- Slide Max Motor Speed
  - Sets how fast the motor is allowed to spin while holding the vehicle on a slope.
  - For example, if set to 300 RPM even if gravity tries to pull you, motor resists enough to stay below 300 RPM.
  - Range: 0-600 RPM
- Slide Kp on the Slope
  - Sets how aggressive or soft the motor correction is while holding.
  - Kp is proportional correction
    - Bigger Kp = harder fight against slope immediately).
  - Range: 0.0-10.0
- Slide Ki on the Slope
  - Sets how aggressive or soft the motor correction is while holding
  - Ki is integral correction (adds up small errors over time to fix drifting).
  - Range: 0.0-1.0

## **Sink List**

## ***Mileage***

- Reduction Ratio
  - The gear ratio between the motor and the drive wheels, through a reduction gearbox or differential. It's sometimes also called the final drive ratio or gear ratio.
  - Range: 0.0-1000.0
- Tire Diameter
  - The tire size in millimeters
  - Range: 0-1000

## ***Temperature***

- Motor Temperature Sensor Type
  - The type of temperature sensor used in the motor
  - Range: Uncheck, PT100, PT1000, KTY84
- Motor Over Temperature Cutback Power
  - The motor temperature in °C at when **exceeded** will cause power to the motor to be reduced
  - Range: 0-160°C
  - Use extreme caution when modifying this parameter as too high of a temperature setting can burn out or motor/controller
- Motor Over Temperature Zero Power
  - The motor temperature in °C at when **exceeded** will cause power to the motor to be cut off.
  - Range: 0-160°C
  - Use extreme caution when modifying this parameter as too high of a temperature setting can burn out or motor/controller
- Controller Over Temperature Cutback Power

- The controller temperature in °C when **exceeded** will cause power to the motor to be reduced
- Range: 0-95°C
- Use extreme caution when modifying this parameter as too high of a temperature setting can burn out or motor/controller
  
- Controller Over Temperature Zero Power
  - The controller temperature in °C when **exceeded** will cause power to the motor to be cut off.
  - Range: 0-95°C
  - Use extreme caution when modifying this parameter as too high of a temperature setting can burn out motor/controller
  
- Controller Under Temperature Cutback Power
  - The controller temperature in °C when **under** will cause power to the motor to be reduced
  - Range: -40-0°C
  - Use extreme caution when modifying this parameter as too high of a temperature setting can burn out or motor/controller
  
- Controller Under Temperature Zero Power
  - The controller temperature in °C when **under** will cause power to the motor to be cut off.
  - Range: -40-0°C
  - Use extreme caution when modifying this parameter as too high of a temperature setting can burn out motor/controller

## ***Accelerator***

- Accelerator Pedal Sensor Type
  - The sensor type used in accelerator box
  - Range: External communication, Analog+Switch, Analog, Switch

- Accelerator Min Value
  - The dead zone of accelerator pedal. When pedal sensor reads this voltage, the motor is at 0 RPM
  - Range: 0-2.0V
- Accelerator Max Value
  - The max of accelerator pedal. When pedal sensor reads this voltage, the motor is at Maximum Motor Speed RPM
  - Range: 2.0-5.0V

### **Motor**

- Motor Maximum Power
  - Max electrical power allowed (W)
  - Range: 0-14000W
- Motor Maximum Torque
  - Max mechanical torque output (Nm)
  - Range: 0-70Nm
- Speed Loop Kp
  - Determines how fast the motor reacts to throttle input or changes in load.
  - Range: 0.0-10.0
- Speed Loop Ki
  - Eliminates steady-state speed error (e.g. cruising up a hill).
  - Range: 0.0-1.0
- CAN Baudrate
  - Controller Area Network (CAN) bus communication baud rate
  - Range: 200KBits/s-1000KBits/s

## Appendix C – Tercel/LVTong

BlueJay can auto-detect a Tercel/LVTong controller. Tercel is an AC motor controller used in Icon Electric Vehicles starting in late 2021/early 2022, some Bintelli, ExCar and Advanced EV.



A 4-pin square programming port allows for customization and tuning of vehicle settings.

To connect and program the Tercel controller, you'll need:

- a programming cable such as the [CartCables](#) CC-CBL-ICONSE



## Tercel Tuning

Tuning is not complicated but it does come with risks that **MUST** be understood and accepted:

- **Modifying the Motor Controller parameters can damage equipment, property and cause INJURY/DEATH to yourself/others.**
- **Modifications may VOID your WARRANTY**
- **Factory/Dealer settings should only be performed by trained technicians**

This section discusses an approach to performance tuning. Go to the following section Tercel Parameters for a list and description of all parameters that BlueJay supports.

Common tuning areas are:

- Speed
- Acceleration/Deceleration
- Torque

### Note:

- BlueJay's parameter names might be slightly different than the OEM name in an attempt to simply/clarify the parameter's purpose.
- The Tercel Parameter names are prefaced with a group index (example 6.02.20) that is a reference to the same parameter in the OEM software such as ICONLive, LvTongLive, ExCarLive, etc.
- This is an aid to those tuners that are familiar with the OEM software and/or are following forum guidance.

## Speed

The "km/h" parameters are the correct way to set vehicle speed:

- 3.02.01 : High Speed - Forward Max km/h
- 3.02.05 : Low Speed - Forward Max km/h
- 3.02.02 : High Speed - Reverse Max km/h
- 3.02.06 : Low Speed - Reverse Max km/h

### ***But first - Adjust your controller's maximum RPM***

- 2.01.09 : Motor Maximum RPM



Setting that single parameter allows the controller to **automatically adjust** the other important RPM parameters when the corresponding km/h parameter is set.

For example, when you set:

- 3.02.01 : High Speed - Forward Max km/h
  - the controller will calculate and set 6.01.01 : High Speed - Forward Max RPM
- 3.02.05 : Low Speed - Forward Max km/h
  - the controller will calculate and set 6.01.05 : Low Speed - Forward Max RPM
- 3.02.02 : High Speed - Reverse Max km/h
  - the controller will calculate and set 6.01.02 : High Speed - Reverse Max RPM
- 3.02.06 : Low Speed - Reverse Max km/h
  - the controller will calculate and set 6.01.06 : Low Speed - Reverse Max RPM

Remember, you'll enter the speed values in kilometers per hour (km/h). To convert from miles per hour to km/h simply multiply mph by 1.61

Here's a quick table to show common values:

MPH	km/h
5	8.05
10	16.09
15	24.14
20	32.19
25	40.23
30	48.28
35	56.33

## Acceleration/Deceleration

The “6.02.01 : Speed Response Mode” parameter value determines what other parameters you'll adjust for acceleration/deceleration.

### **Simple**

- Set “6.02.01 : Speed Response Mode” to 0
- Simple mode requires only 4 parameters to be adjusted:
  - Acceleration:
    - 06.02.06 : Forward Acceleration Partial Pedal
    - 06.02.12 : Reverse Acceleration Partial Pedal
  - Deceleration
    - 06.02.09 : Forward Deceleration Partial Pedal
    - 06.02.15 : Reverse Deceleration Partial Pedal

### **Complex**

- Set “6.02.01 : Speed Response Mode” to 1
- Complex mode allows much finer tuning and requires a lot of parameters to be adjusted:
  - 06.02.02 : High Point
  - 06.02.03 : Low Point
  - Acceleration:
    - 06.02.04 : High Speed - Forward Acceleration Full Pedal
    - 06.02.05 : Low Speed - Forward Acceleration Full Pedal
    - 06.02.06 : Forward Acceleration Partial Pedal
    - 06.02.10 : High Speed - Reverse Acceleration Full Pedal
    - 06.02.11 : Low Speed - Reverse Acceleration Full Pedal
    - 06.02.12 : Reverse Acceleration Partial Pedal
  - Deceleration
    - 06.02.07 : High Speed - Forward Deceleration Full Pedal
    - 06.02.08 : Low Speed - Forward Deceleration Full Pedal
    - 06.02.09 : Forward Deceleration Partial Pedal

- 06.02.13 : High Speed - Reverse Deceleration Full Pedal
- 06.02.14 : Low Speed - Reverse Deceleration Full Pedal
- 06.02.15 : Reverse Deceleration Partial Pedal

## **Torque**

The torque is the “muscle” behind the acceleration plan. Each torque partition value limits or defines the force the motor can use to achieve the acceleration plan.

Torque is the rotational force that the motor produces to turn the shaft. Think of it like how hard you twist a wrench — torque is that "twisting" force. In an AC motor controller, torque is the result of electromagnetic interaction between the stator (stationary part) and the rotor (spinning part). The controller regulates voltage, current, and frequency to control how much torque the motor generates.

## **Tercel Parameters**

This section describes all parameters that BlueJay supports. Refer to the above Tercel Tuning section for discussion on how they relate and an approach to performance tuning.

BlueJay presents tuning parameters into 2 tuning tables.

- Just because a parameter is in these lists does NOT mean you need to adjust.
- Only change what you need to.
- Change in small increments and test. Go slow, be careful, be smart.

## **Tuning List**

These are the most common tuning parameters for speed, acceleration/deceleration and torque.

### ***Speed Control***

## **Sink List**

These are other important tuning parameters that may be useful to advanced/experienced tuners.

### ***Speed Control***

- 6.01.01 : High Speed - Forward Max RPM

- Maximum forward RPM when in High Speed
- This is set by the controller automatically when you set 3.02.01 : High Speed - Forward Max km/h
  
- 6.01.05 : Low Speed - Forward Max RPM
  - Maximum forward RPM when in Low Speed
  - This is set by the controller automatically when you set 3.02.05 : Low Speed - Forward Max km/h
  
- 6.01.02 : High Speed - Reverse Max RPM
  - Maximum reverse RPM when in High Speed
  - This is set by the controller automatically when you set 3.02.02 : High Speed - Reverse Max km/h

Comments, questions, corrections? Send email to: [BlueJayTuning@gmail.com](mailto:BlueJayTuning@gmail.com)

