

The BangShift Billy Installation Manual v1.7

Read this manual carefully before starting installation.



CALIFORNIA PROP 65 WARNING



WARNING: These products can expose you to chemicals including Chromium, Lead, Lead Compounds, Nickel (Metallic), Nickel Compounds, Diisonyl and Di(2-ethylhexyl) Phthalates (DEHP)(DINP) which are known to the State of California to cause cancer or birth defects or other reproductive harm. **For more information, visit www.P65warnings.ca.gov.**



Table of Contents

Getting Started.....	3
Hydraulic Components Install.....	4
The BangShift Billy App.....	5
Bluetooth Controller and Wiring Installation.....	8
Basic Operation.....	10
Install for Carburetor & OEM ECU Setup.....	11
Install for Holley ECU.....	12
Good to Know.....	15
Troubleshooting Guide.....	17
Clutch Tuning Guide.....	19



Getting Started

Please take a few moments to review this manual thoroughly before you begin work. Make a quick parts check to ensure your kit is complete. The parts list is below. This installation manual can also be found on our website: www.BangShiftBilly.com

Parts included:

1. Hydraulic Manifold & Cartridge Assembly
 - Manifold (1)
 - -4 AN fittings (2)
 - Cartridge (1)
 - Solenoid (1)
2. Bluetooth Controller (1)
3. Wiring Harness (1)
4. Bleeder Kit (1)

Parts you WILL need:

1. -4 AN lines to go from clutch master cylinder to manifold and from manifold to hydraulic release bearing or slave
2. High quality adjustable clutch switch, if car is not equipped with an OEM switch.
Suggested one below
 - a. Omron D4C-1620
3. Electrical connectors

Parts you MAY need:

1. Relay- for use in factory ECU car with OEM clutch switch
2. Normally closed (NC) push button for Master switch



Hydraulic Components Install:

1. Determine best mounting location for manifold/cartridge. Away from hot exhaust components. Keep in mind you will have to run the wired connection to the cartridge. It is 4' long.
2. Remove original or factory installed hydraulic line for clutch.
3. Install -4 hydraulic line, customer supplied, to Port 1 on the manifold and to the clutch master cylinder.
4. Install -4 hydraulic line, customer supplied, to Port 2 on manifold and route to hydraulic release bearing (HRB) or slave cylinder.

To Clutch
Release
(Slave or HRB)



To Clutch Master
Cylinder

5. Bleed clutch using included Bleeder Kit with the included instructions. If you have a preferred method other than the Bleeder Kit, use that.
6. Ensure clutch operates normally



The BangShift Billy App:

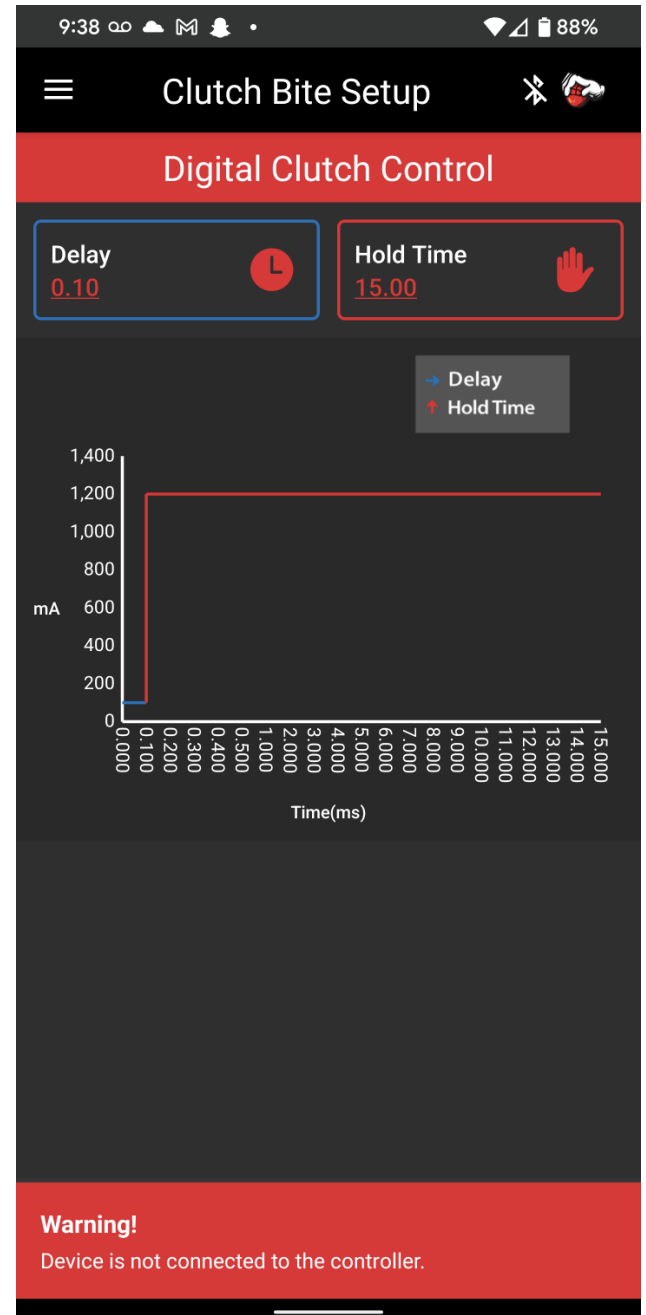
You will need to download “The BangShift Billy” app from either Google Play or Apple App Store.



Android 12 or higher
iOS 15 or higher

Welcome to the Clutch Bite Setup. On this screen you will determine your baseline settings. With your car jacked up so you can rotate the rear tires, engine off, key on, set the car up for launch in gear. Simulate launching the car with an initial Delay setting of 0.010. This delay time is how long the clutch pedal travels after releasing the clutch switch before the Digital Clutch Controller “catches” the clutch and the Hold Time is how long it holds it there. Get out of the car or have a helper and attempt to rotate the tires. If you can, then the clutch has not yet reached the Bite point. Increase the Delay time in 0.005 increments until you can’t turn the tires. This is the Bite Point. Make sure you hold the clutch/switch down for at least as long as the Hold Time is set for or the delay will not be accurate.

WARNING: Do **NOT** press the clutch back in when the controller is holding the clutch during the Hold Time. If you do, you can blow out the seals in the HRB and or damage the diaphragm spring because it will receive a double pump and overextend the assembly. Understand this and don’t do it!



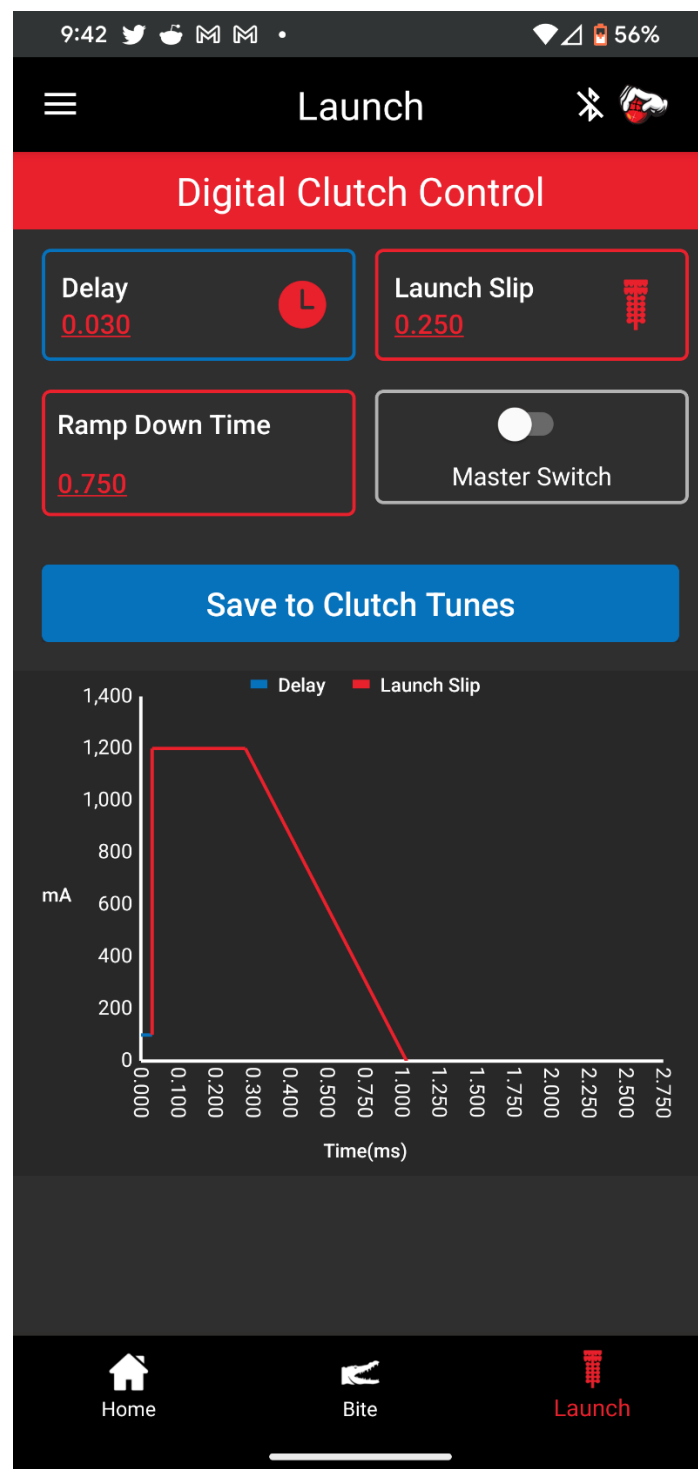
Welcome to the Launch Builder. With this screen you will dial in the slip of the clutch for the perfect launch. The delay value you found on the Clutch Bite Setup screen will carry over to this screen. To begin, add 0.020 seconds to the value. Example:

Clutch Bite Setup 0.010
 +0.020

Launch Builder 0.030

Set the Launch Slip to 0.250 seconds and the Ramp Down Time to 0.750. Go launch the car. Conservative here is best to get things close. 3000 to 4000 rpm is a good starting point. If the car spins the tires immediately reduce the Delay time by 0.005 and try again. If it is slipping too much, increase the Delay 0.005 and try again.

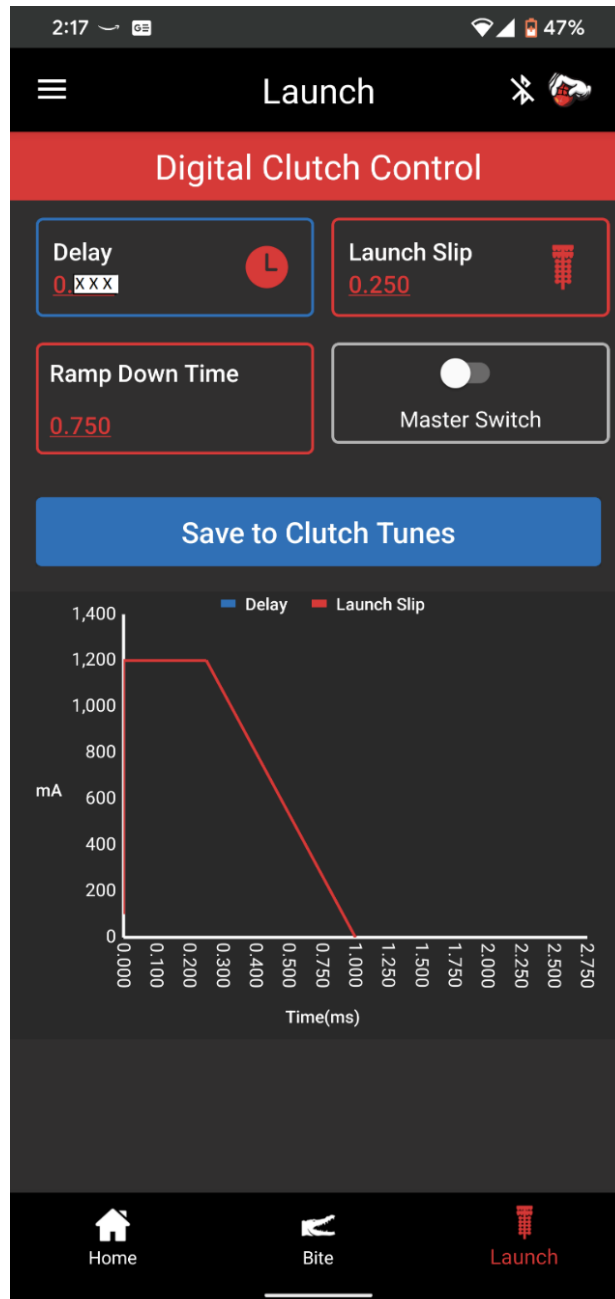
Note- Make sure you are holding the clutch/switch down for at least as long as the Launch Slip you have selected or the delay will not be accurate. This includes The Bite screen also.



Beginner Settings:

1. The following settings EXCEPT for the Delay value are a good starting point.

*Note- The Delay is particular to every vehicle and all attempts must be made to find the Delay starting point by using the Bite screen setup as described previously.



2.



Bluetooth Controller and Wiring Installation:

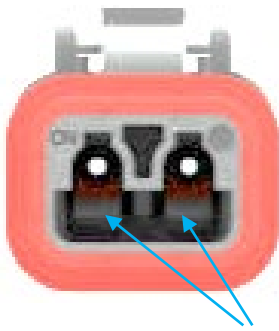
1. Find a mounting location for the controller. Ideally one where you can see the LEDs to ensure connectivity and programming changes via upload status. Do not mount the controller under the hood or near hot components.
2. Keep in mind the pigtail for the solenoid for the hydraulic cartridge is 4' long and is already pinned for use.
3. The other wires are 3' long with bare ends for you to make your connections and cut to length needed.
4. Wires to be connected are labeled:
 - a. TBSB 12v: Red power lead, to be connected to key-on 12-volt source
 - b. TBSB GROUND: Black ground to be connected to good chassis ground
 - c. TBSB TRIGGER: Blue to be connected to a 12-volt source that turns off when the clutch pedal is just released. Additional details on this to follow.
 - d. Optional - TBSB Master: Green wire, this allows the use of a master switch to enable the controller. To use this, it must be wired to a 12v source. The switch needs to be placed between the 12v power source and the controller. If using this feature, you must also enable the "Master Switch" found on the Launch screen in the app. Once this is done you can switch ON the operation of the Clutch Controller using a momentary switch, like a trans brake button, without interrupting the 12v Red power wire. In order to do this, you would push the clutch all the way to activate the 12 volt signal to the trigger wire, press and release the Master button and the controller is ready to launch. It will not activate again unless the Master is pressed again and the clutch is pressed to activate the 12 volt signal to the trigger wire.
 - e. Optional - TBSB 12v OUT: Orange. This provides a 12-volt source when the controller is active. Use it to run various items like: indicator light, 2 step control, nitrous, etc. Keep in mind this is not a high amp output but can be used to trigger relays, etc.



- f. Gray wires in sleeving- To be routed and plugged into solenoid on the hydraulic cartridge. For easier installation you may un-pin the wires in the plug end connector for easier routing through a smaller firewall hole. Removal of pins is as follows:



Remove end cap, pry off with small screwdriver.



Retention tabs

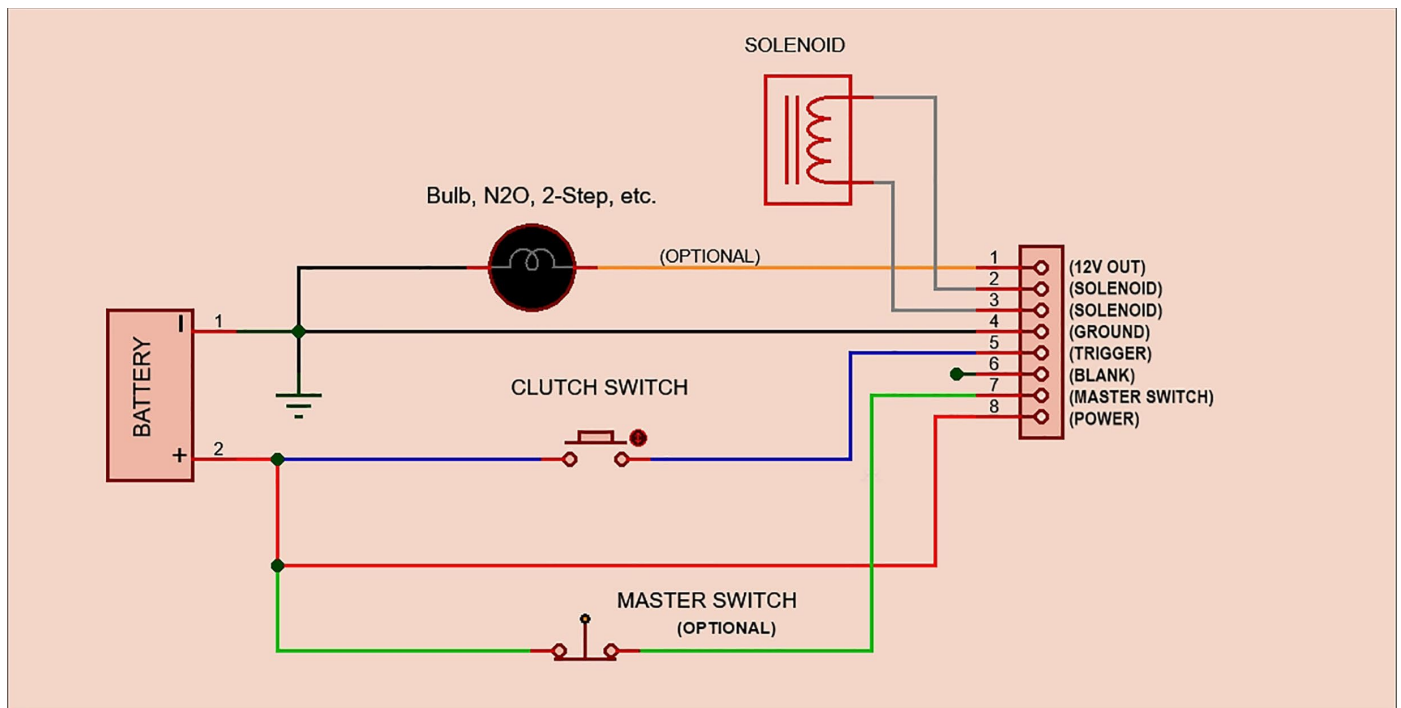
With a small screwdriver gently push the pin retention tabs down so the pin can be removed. Pull them out the back. To re-install just push the pin in until it clicks. Re-install Wedgeloock.

Note: The wires can be on either side when re-installed.



Basic Operation:

When the Digital Clutch Controller is on and programmed it will start its operation when the Blue Trigger wire is de-energized from 12 volts. The controller should see 12 volts to the trigger wire when the clutch is fully depressed, and the vehicle is setup for a launch. When the clutch is released the clutch switch will immediately remove the 12-volt signal to the Trigger wire when the clutch is released. This will initiate the program in the Digital Clutch Controller.



Wiring Schematic

Note: The Master Switch, if used, MUST be a NC (normally closed) pushbutton switch.



Install for Carburetor & OEM ECU Setup:

It is recommended that you use the Master Switch option and run a momentary button in series with the Master wire and a 12-volt power source. The way this works is when the clutch/clutch switch is pressed and sending 12 volts to the Trigger wire you then press and release the Master Switch to arm the controller for launch. When launching the car, the controller would slip the clutch as per your settings. On subsequent shifts down the track, you would not use the Master Switch and therefore the Clutch Controller would not affect the clutch after the launch.

You must determine which side of the OEM clutch switch is powered when the button/clutch is depressed. This is the side that needs to be wired to the relay. Ensure your OEM switch has 12-volts, which is enough to energize the relay.

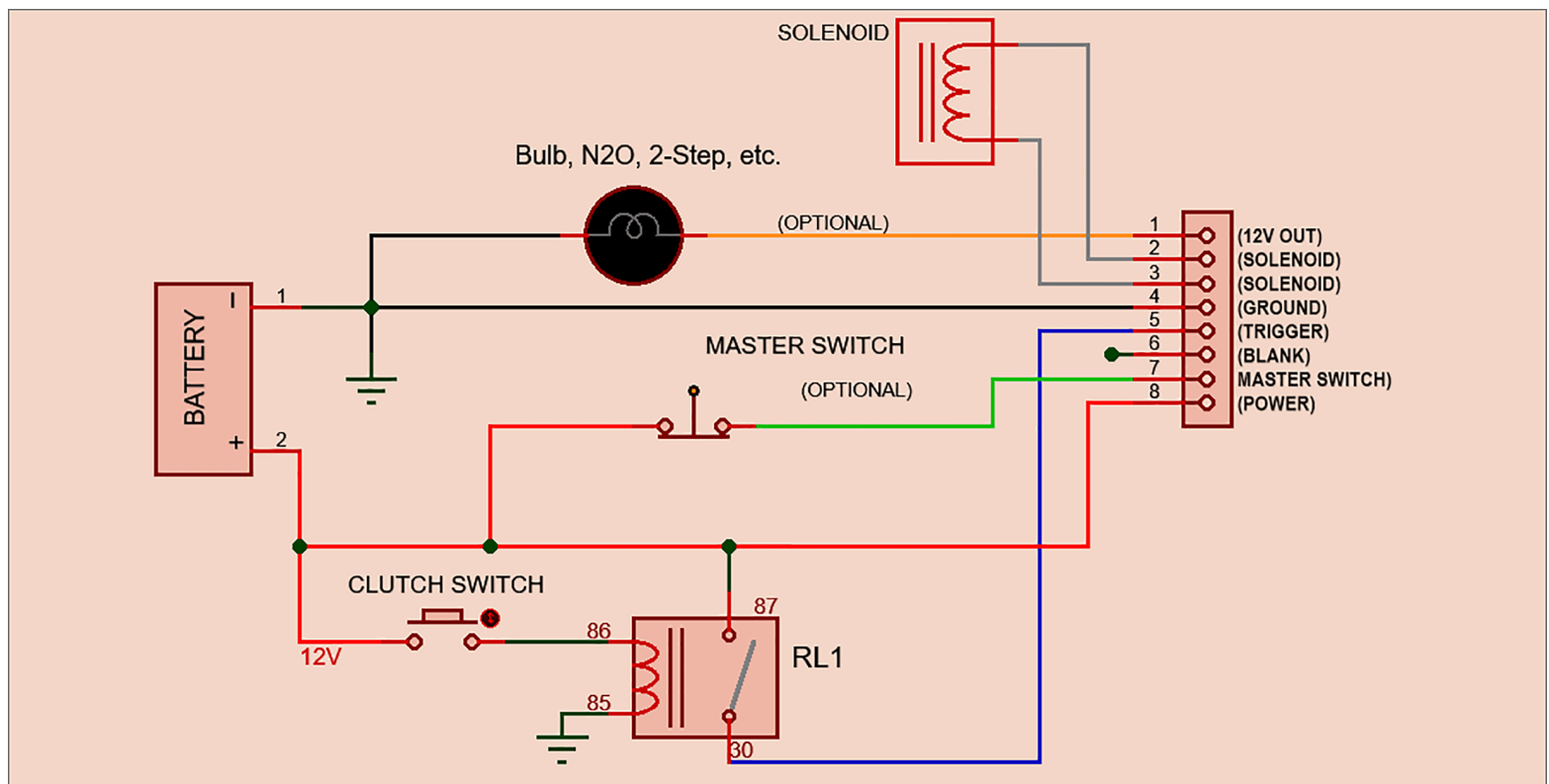


Figure 1.0

Note: The Master Switch, if used, MUST be a NC (normally closed) pushbutton switch.



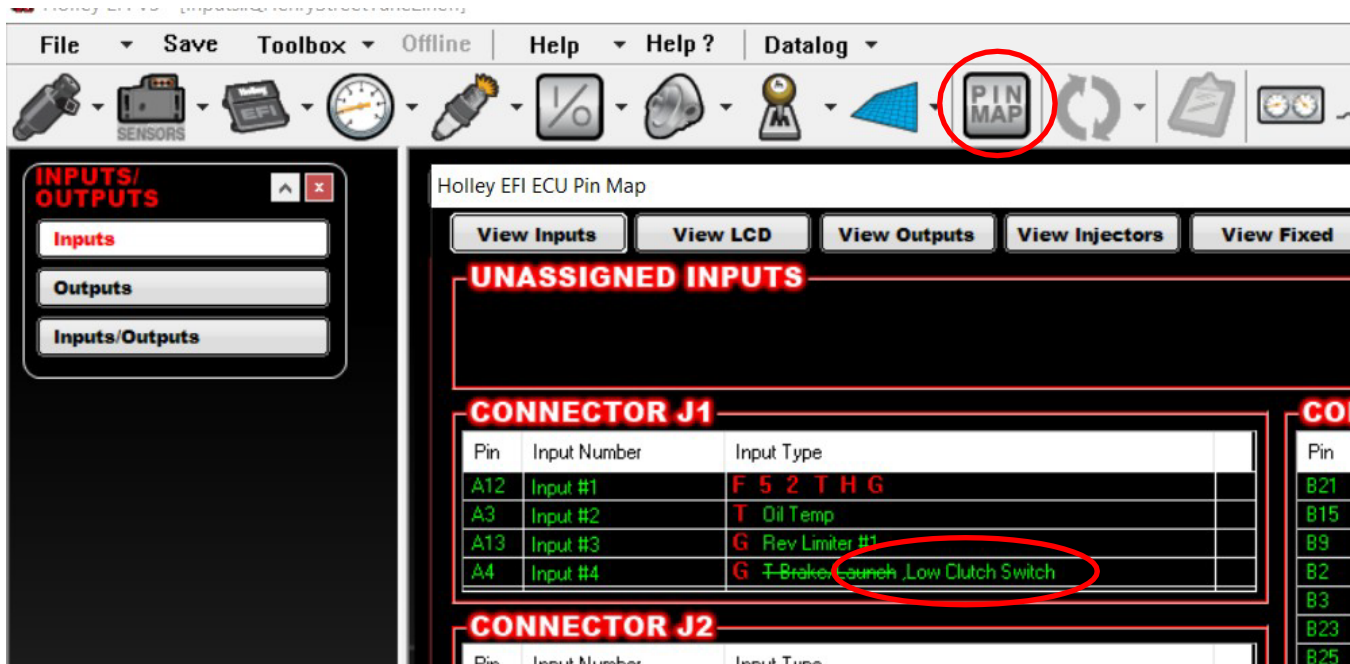
Install for Holley ECU:

Things you will need for this to work:

1. Quality clutch switch that can be adjusted, this is critical! (Some OEM switches will work)
2. On the I/O screen, Setup Clutch Switch in Holley as an Input, “Low Clutch Switch”
3. Enable and select Type as Ground

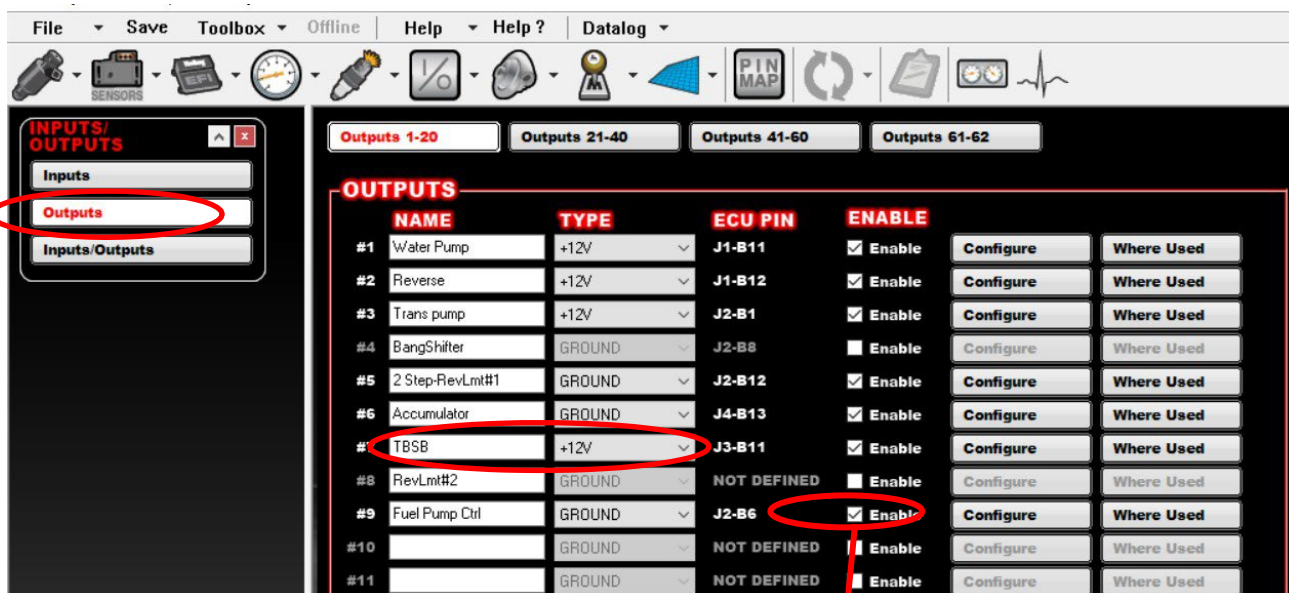


4. On the PIN MAP screen, drag the newly created “Low Clutch Switch” to a Ground capable input.



5. Add OUTPUT to the Output menu. Feel free to abbreviate The BangShift Billy as TBSB.

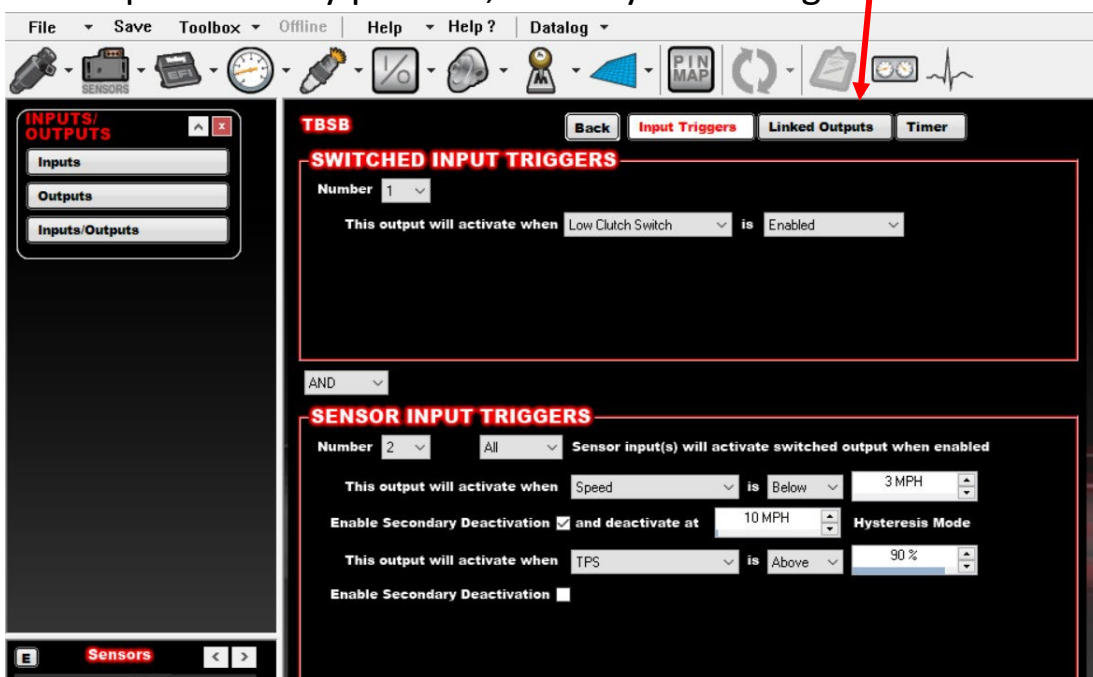
6. Select type as +12v



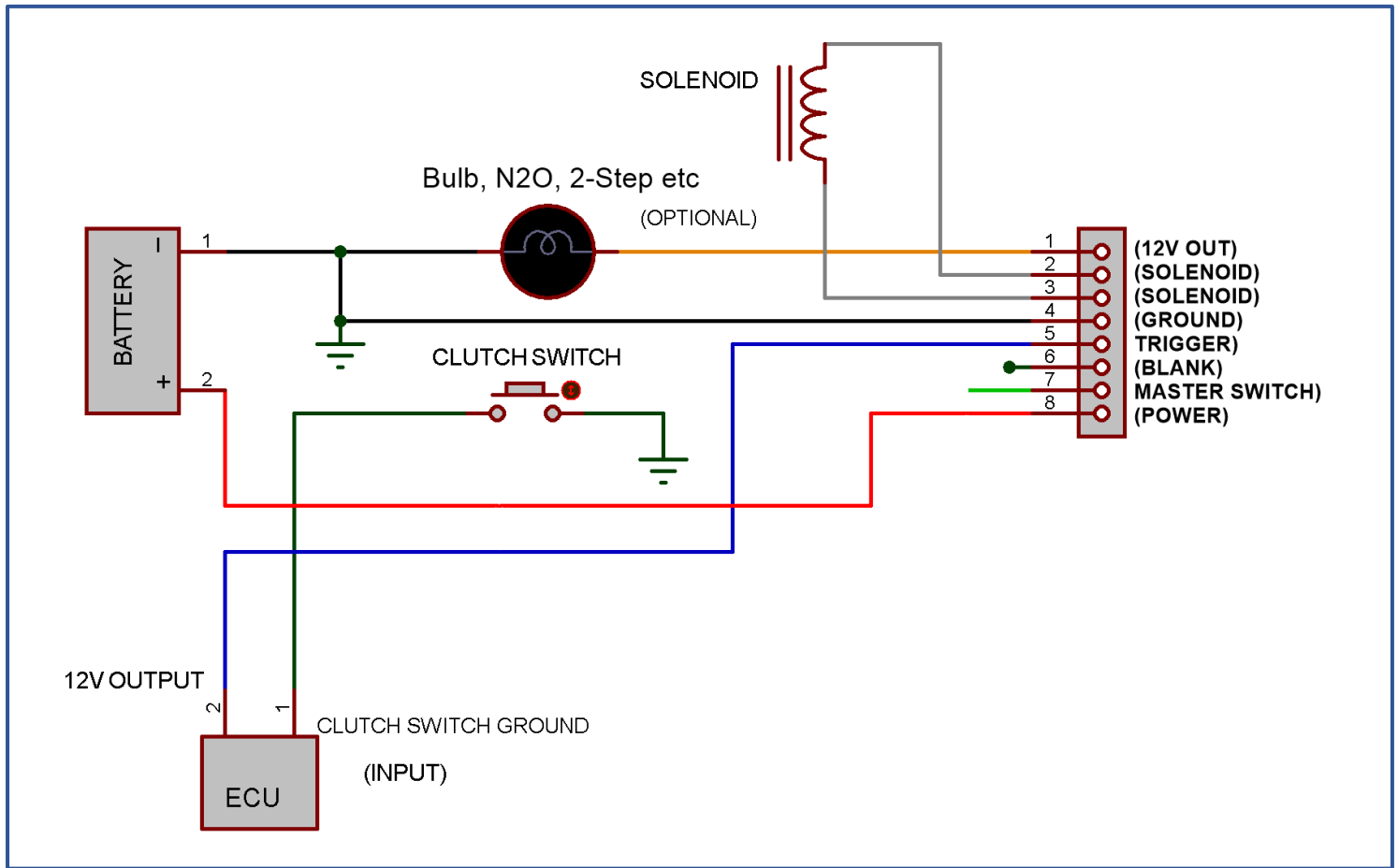
7. Enable

On the Configure selection, setup as shown below. Note: you will need a speed input for the Holley. This could be VSS sensor, GPS, Driveshaft, etc. This will activate TBSB only when the 3 parameters are met:

- Speed is below 3 MPH
- TPS is above 90%
- Clutch pedal is fully pressed, thereby activating the switch.



Holley ECU or other aftermarket ECU with 12volt output wiring diagram:



Good to Know

1. The Bite screen works only when your device screen is on, so set the timeout on your device for something longer than 1 minute.
2. When making program changes on the Launch screen the Power LED (green) will flash twice, indicating it has loaded your changes.
3. When the app is connected to the Controller, the Blue LED will be solid, not blinking.
4. The app does not need to be on for the controller to work once you make and load your settings. Note that the default settings are designed to not slip the clutch.
5. Do **NOT** actuate clutch pedal when the controller is controlling the clutch. This is especially important when using the “Clutch Bite Setup” screen. For example, if the controller is holding the release bearing/clutch at a certain point and you press the clutch again it will give the release bearing/slave a double pump and could blowout the seals and damage the diaphragm spring. This is obviously bad.
6. When using the Clutch Controller, it is very important for consistent results that you release/dump the clutch the same every time. The Controller relies on the release of the clutch switch and the unobstructed movement of the clutch pedal, if you are slowing it down with your foot the timing of the Bite Point will be totally different, and the action of the Controller will be inconsistent.
7. The hydraulic portion is compatible with DOT 3, 4 and 5.1 fluid. Do not use with silicone type fluids.
8. As mentioned before, the clutch pedal/switch must be held down for at least as long as the Launch Slip setting (Launch Builder) or Hold Time (Bite Screen) for the Bite Point to be accurate.
9. All wiring for the clutch controller is susceptible to electrical noise. Provide clean power and grounds to the controller. Do not route ANY wiring near ignition wires, alternator or other noise producing components.
10. The controller must be able to “catch” the clutch. For this to happen the ideal engagement point of your clutch should be $\frac{1}{2}$ to $\frac{3}{4}$ of the pedal stroke. If the clutch engages close to the floor it may still work but you, likely, will not be able to find the Bite Point using the Bite screen. If this is the case, you should start with the



Delay set at .010 and the rest of the settings in the Beginner Settings. When you launch the car if the clutch slips too much, increase the Delay time in .005 increments until the tires spin, then back it back down in .001-.002 increments. If it spins initially at .010, back it down in .005 increments. The lowest possible setting is 0.000. If it won't catch the clutch on this setting you will need a smaller diameter clutch master cylinder to increase the pedal stroke length and hence raise the engagement point of your clutch pedal.



Troubleshooting Guide

Problem	Cause	Solution
App won't connect	Communication error between controller and app	Re-start app
Clutch won't fully engage	Clutch pedal was pressed during time when controller was active. This equalized pressure on either side of the cartridge valve.	Open bleeder for clutch line until hydraulic throw out bearing/slave cylinder returns to fully released position
Unable to get clutch to slip no matter how little time (.000) I set on the delay	Controller is not "catching" clutch before it engages.	<ol style="list-style-type: none"> 1. Make sure clutch switch is adjusted to remove 12-volt signal from Trigger wire as soon as the clutch pedal moves off its lower stop. 2. Ensure 12 volts is being sent to the coil, unplug connector, simulate launch, and ensure you are getting 12v at the 2 pins on the plug. 3. Make sure the Launch Slip and Ramp time combined is at least .75 to 1.00 seconds. 4. Ensure ALL air is bled out of hydraulic clutch system 5. Make sure you are holding the clutch/switch for at least as long as the Launch Slip or Hold Time. 6. Install smaller bore clutch master cylinder.
Clutch slips too much	<ol style="list-style-type: none"> 1. Too much heat in organic/ceramic clutch disc. 2. Too little time set in the delay. 3. Launch Slip setting too high 	<ol style="list-style-type: none"> 1. Let clutch cool. 2. Add delay time to the setting, start with .005 increments. 3. Start with Launch Slip and Ramp Down Time combined to be at .75 to 1.00 seconds.



Problem	Cause	Solution
Operation is erratic when 2 step is active	Electrical noise	<ol style="list-style-type: none"> 1. Ensure clean power and ground are provided. 2. Ensure all Digital Clutch Controller wiring is isolated from noisy sources.
Controller won't accept changes from app. (Green power light not flashing with changes)	Controller reset needed	With a paperclip press the reset button, located in the small hole on the cover of the controller. Ensure controller is powered on when pressing the reset button. Restart app.





CLUTCH TUNING GUIDE

Functions to be familiar with:

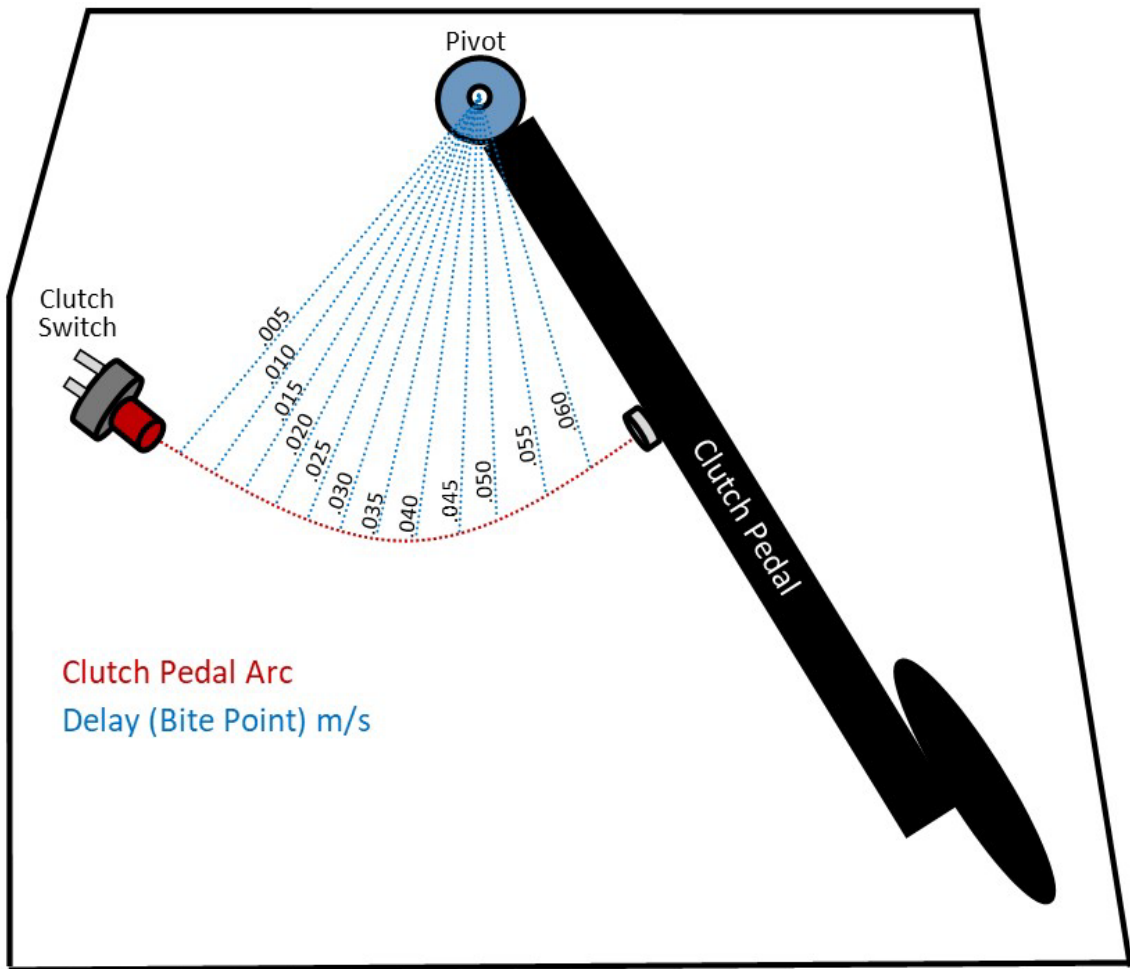
1. Delay- the time from clutch (switch) release and controller interaction with clutch
2. Launch Slip- How long the controller will hold the clutch at the "Bite Point"
3. Ramp Down Time- Gradual release or engagement ramp for the clutch
4. Master Switch- enables the use of a Master arming switch (not required)
5. Save to Clutch Tunes- allows saving clutch tune settings

DELAY

The delay is the time in fractions of a second from when the clutch pedal is released from the lower clutch stop and the required clutch switch to the Bite Point of the clutch. Also think of as the point where the clutch begins to engage or grab.

- Increasing the Delay value will make the clutch hit or Bite HARDER
- Decreasing the Delay value will make the clutch hit or Bite SOFTER





The optimum Bite point is found by using the Bite Screen and adjusting the Delay to find the point in milli-seconds from clutch release to where the clutch begins to engage or Bite. This is done with the drive tires off the ground, engine off, transmission in gear, key on and Clutch Controller active.

- Set Delay to .015
- Setup car for launch and dump the clutch
- Get out and try to turn the tires by hand (car is in gear engine off).
- If you can turn the tires, increase value by .005. Repeat until you feel the clutch beginning to Bite or you can't turn the tires.
- Go to the Launch Builder screen and add approximately .020 to the delay.
- Set the Launch Slip to 0.250 and Ramp Down Time to 0.750
- Test launch the car at a conservative rpm, 3-4000 rpm.



One of two things will happen:

1. The car spins the tires
 - a. Delay is too long, and clutch is too far into the Bite point.
Reduce Delay by .005
 - b. Test Launch again
2. The car leaves too soft, clutch slips too much
 - a. Clutch is not far enough into the Bite point and depending on how soft the launch was. Increase the Delay by .005.
 - b. Test Launch again
3. As you get close to the optimal setting for the surface you are on make final adjustments in .002 to .001 increments.

LAUNCH SLIP

The Launch Slip is how long the Clutch Controller will hold the clutch at the desired Bite Point as determined by the Delay time. The maximum and default value is 2.00 seconds. In most cases this will be too much slip time and will build too much heat in the clutch assembly. It is recommended to start conservative, 0.25 to 0.50 seconds and go up from there.

RAMP DOWN TIME

This allows the clutch to engage over a timed ramp which is necessary for boosted or Nitrous assisted vehicles that are adding power during the time the clutch is being slipped. As power is added more clamp force of the clutch is needed to prevent the engine and available traction from blowing through the clutch. Start conservative, 0.50 to 0.75 seconds and adjust from there.

SAVE TO CLUTCH TUNES

This allows the user to save and name different clutch tune-ups into the app. This is helpful for different racing surfaces, different tire combinations, etc.



IMPORTANT TO KNOW

1. Typically, you only need to use the Bite screen in the beginning when you are determining the Bite point of the clutch. Once you establish the delay value for the Bite point you don't need to go back to the Bite screen. All further changes will be made on the Launch Builder screen.
2. When inputting changes on the Launch Builder screen the green Power LED on the controller will blink 2x's indicating it made the changes. The green Power LED will NOT blink when making changes on the Bite screen.
3. Make sure you are connected to the controller by checking that the blue LED for Bluetooth is solid and not blinking.
4. Your Bite settings will change based on track/surface conditions.
 - a. Prepped track with slicks- Bite time will be a slightly Higher value as there is more traction available and the track will hold more power sooner.
 - b. No-prep or poor prep- Bite time will be smaller value. If the car is spinning the tires the delay time is too aggressive, reduce the delay time in .002 increments until it stops spinning. Note that a high powered car on a no-prep surface may never launch without tire spin, other methods of power reduction will also need to be utilized to achieve a decent launch.

