Liberty's Gears ECU

Information

How to Use

Wiring Instructions

Programming Instructions

Troubleshooting Tips

Information:

What is it?

The Liberty ECU is a standalone ECU that allows the user to control the transmission shift points by RPM and time delays. It also gives you the option to lock up your torque converter based off of time delay and RPM while in a designated gear. The advantage of being able to control the lock up in such a way is that you are only dependent on a time delay only once you are in a certain gear. Say you have to pedal the car in 1st gear while you have the car geared for the lock up to come on in 2nd gear. When controlling the lock up with an engine management system, you are confined to a set total delay number that doesn't take into consideration not making a perfect run. Controlling the lock up through our ECU allows that pedaling in 1st gear to not affect the lock up coming on at the designated time within 2nd gear. We also incorporated a safety feature that allows the user to set a minimum RPM to where lock up will shut off, and then a specified RPM that will bring it back on. This helps to keep the motor from being lugged down too hard during a less ideal pass.

How does it work?

The ECU is wired to your tachometer in order to read the engine RPMs. The sequence is started by the release of a trans brake button or clutch. Once the sequence starts, it first looks for the time delay, then the designated shift RPM at each shift. If you are using our lock up option, the sequence looks for the gear chosen on our programming page and once in that gear it will also look for the time delay then RPM to bring in the lock up command.

Can this be used with my engine management system?

Yes, our complete ECU setup also works well with all engine management systems. It is very common to use our ECU setup as a sequencer where a single output is sent to the manual push button on our system to send the signal for each shift from your engine management system. Our ECU does require a hot signal. If your system requires a ground signal, wiring in a relay will work fine.

What if I don't want the ECU box?

      If you choose to use our electric shifter components without our ECU box, it does require an individual output for each shift from your engine management system. Our transmission does require each signal to be held during the entire time each gear is being utilized until a gear change, where that signal may then be turned off. For example, the signal for 1st gear must be held on until the signal to shift into 2nd gear is sent, at which point the 1st gear signal must be dropped. The valve stack can be triggered either hot or ground and anywhere between 9 and 20V. Keep in mind you will also need a way to manually shift while doing a burnout. We also recommend adding an additional shifting point after shifting into high gear that will come in before the finish line to exhaust the pressure from high gear. This will allow the car to go into neural as you lift after the finish. Otherwise you will have to manually exhaust the transmission at the end of the run.

How to Use:

Turning the controller on –

1. The controller can only be turned on and the shift sequence started when there is power to the ECU and the toggle is positioned on to put the transmission into gear. The toggle is either "neutral/off" or "on" (on being into 1st gear).
2. Once the ECU has power and the transmission is in gear, the designated "START UP RPM" must be reached, then the trans brake button released. This starts the sequence.

Doing a burnout –

1. Once the controller is turned on and the car is in gear, use the manual push button to shift through your burnout. As long as you do not reach the designated starting RPM and press/release the trans brake button, the sequence will not start.
2. If you have a clutch, you will have to wire in a "race/burnout switch" using the spare wire of our harness that will allow you to do your burnout while manually shifting without starting your sequence.
3. To back up, the transmission must be cleared by shifting all the way through to a neutral gear or by flipping the toggle back to neutral. If manual reverse, the lever can be pulled back while in neutral. If pneumatic reverse, use your reverse button. If you are getting a deadheading sensation and the transmission does not want to engage reverse, blip the trans brake to stop the input from spinning freely and try again.

Staging –

1. Turn the controller and put the car into gear. Stage as you normally would. Press/hold the trans brake button once staged. The car must reach the "START UP RPM" set in the program before/while the trans brake button is released to start the sequence.
2. This is the same concept for a clutch as the clutch will act like the trans brake button.

Wiring Instructions:

The wiring harness consists of the caps for the electric valves, (2) Deutsch connectors to plug into the ECU, and (2) groups of wiring. A 5-speed wiring harness with pneumatic reverse is shown below:
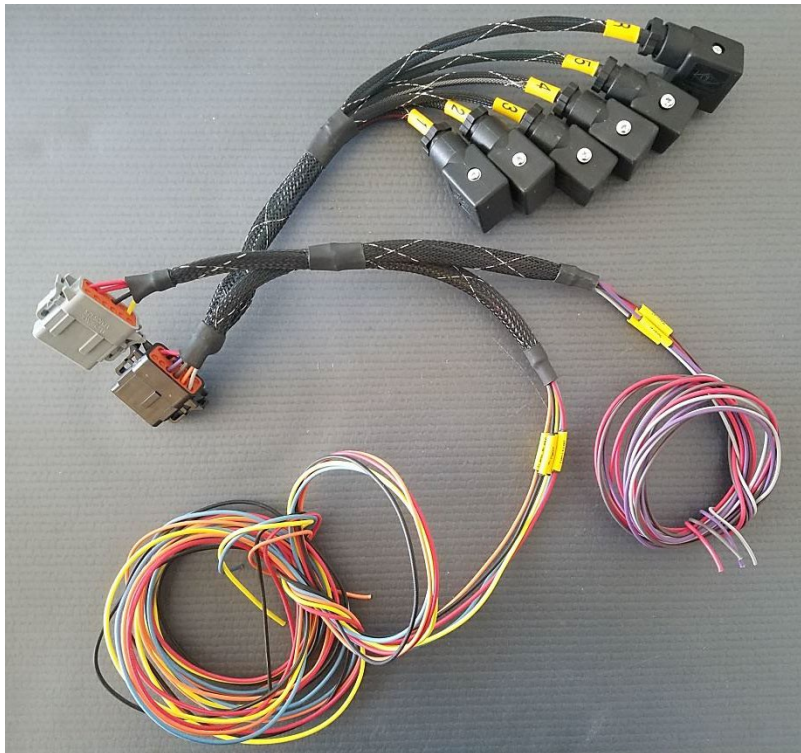
A manual reverse version will look similar, only missing the cap that is labeled "R" and a single wire that is for the pneumatic reverse button described later.

This system functions by switching hot. If any buttons or toggles are wired to switch ground, a relay is required or the system will not function.

Each wire is labeled indicating what it needs to be wired to. The descriptions for each wire are listed below:

- **Trans Brake**: Wires directly to the trans brake button
- **Ground**: Wires directly to a ground location in the car
- **Tach**: Wires to the output of engine RPMs
- **Ignition**: This is the "hot" wire for the ECU system and wires directly to a constant 12 volt current
- **Reverse**: Wires directly to the reverse button. This wire is not included in a manual reverse application. Note the reverse wire may be in either section of wires.

- **Spare**: Wires to a race/burnout switch*
- **Manual**: Wires directly to the manual shift button
- **Toggle**: Wires directly to the toggle used to turn the system on and off
- **Aux Power**: This is the "hot" wire for the toggles and buttons. It has to be wired/looped to each individual toggle and button used

*The spare wire is used to connect an optional race/burnout switch that will disable the automatic shift feature while still being able to manually shift through gears for a burnout. It is recommended for clutch applications only. If the wire is not going to be used, it may be cut off or wound up and placed aside.

If you plan to use our lock up function,

Connector Pin Functions:

- Each connector is a Deutsch sealed connector with 12 optional connections. They are keyed differently so they can only be used in the correct socket.
- The mating connectors are attached to the wiring harness provided with the ECU.
- Below is a schematic of the connectors in the ECU:

Grey Plug   **Black Plug**
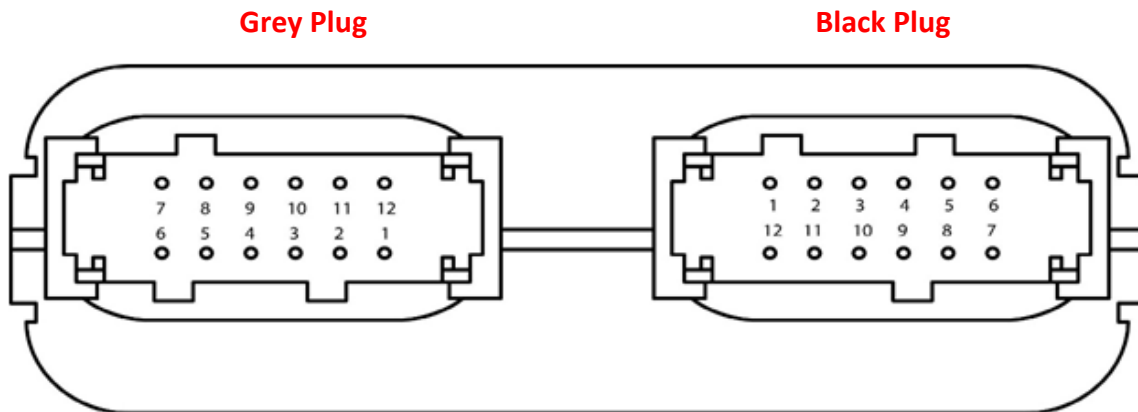
A and B Connector Pin Functions

CONNECTOR 'A' (GRAY)		CONNECTOR 'B' (BLACK)	
Pin 1		Pin 1	+VDC Power Output
Pin 2		Pin 2	Ground Output
Pin 3		Pin 3	
Pin 4		Pin 4	
Pin 5		Pin 5	
Pin 6		Pin 6	
Pin 7	+VDC Input Power	Pin 7	Toggle Output
Pin 8	+VDC Input Power	Pin 8	Trans Brake Output
Pin 9		Pin 9	Manual Push Button Output
Pin 10	Ground Input	Pin 10	Spare Output
Pin 11		Pin 11	
Pin 12	Tach Input	Pin 12	

Liberty's Gears ECU

Programming Instructions:

- To download from our website-
  - Go to libertysgear.com → Forms and Charts → Electronic Shifter Controller listed under Miscellaneous. Clicking on the file will begin an automatic download.
  - http://libertysgears.com/services/forms-and-ratio-charts/
- To download from our flash drive-
  - Insert flash drive into the device you would like the program installed on. Open the flash drive's folder to view the file. The name for the program is **Libertys_Gears_Config Lock Up**. Copy and paste the file to the desired location on your device.
- The program's shortcut icon will look like the following:
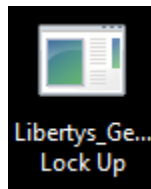
- Open the program by double clicking. The following page will appear:

Liberty's Gears ECU
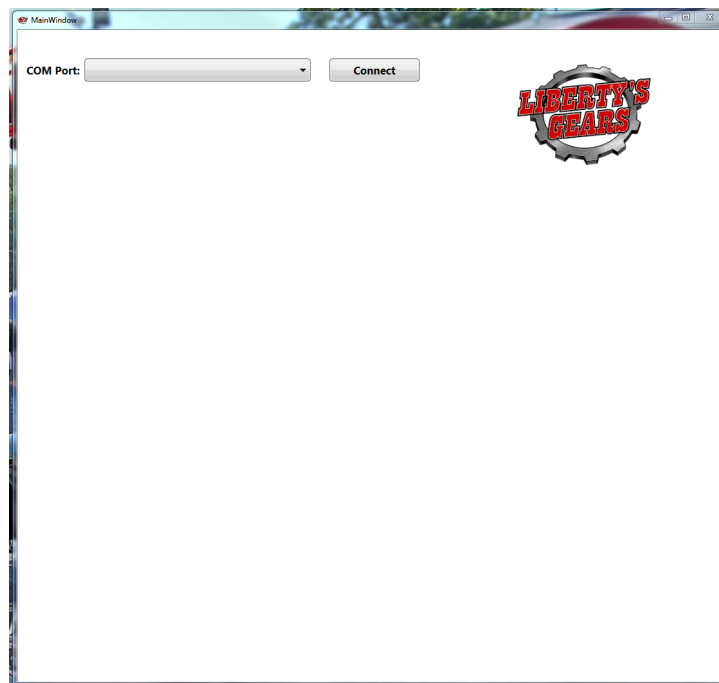
- To set initial parameters-
  - Make sure there is power to the ECU before trying to connect to a computer. Plug in the USB connected to the ECU and open the program. Click on the drop down for the COM Port. Select the option that appears under the drop down. See below. This one is named COM4 but yours may be different.
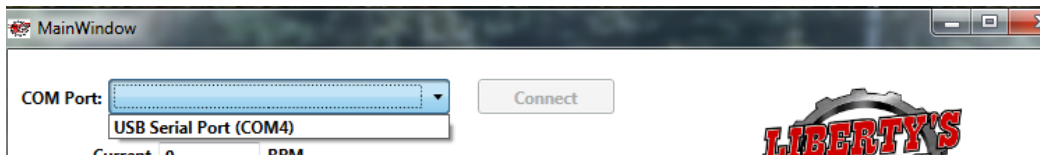
  - Press the connect button to connect the ECU to the program.
  - Fill out the parameters under Net Set Points and NEW START UP RPM circled in red below. We recommend setting an extra gear change that will come on right before the end of your run to exhaust the transmission pneumatically.

Liberty's Gears ECU
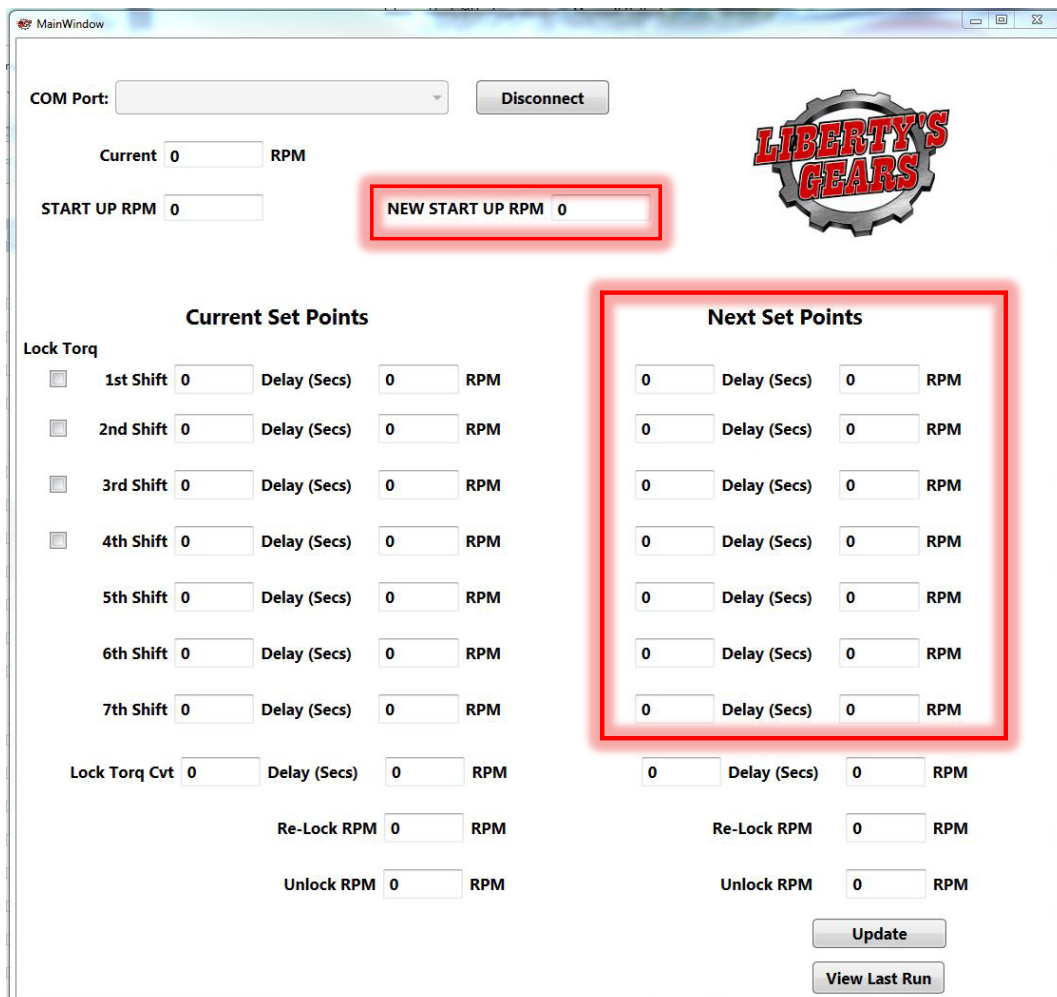
- o If you are using our lock up option, also fill in the delay and RPM for the Lock Torq Cvt row and select which gear you want the lock up to come on in. The top box is 1st gear and they go down to 4th gear. The re-lock and unlock RPMs allows you to set a safety window that your converter will unlock and re-lock if you go below that RPM range. The fields to fill out only for lock up units are circled below.

- o When finished, press the update button in the lower right hand corner of the page. The Current Set Points on the left side of the page should now reflect what was put into the Next Set Points.
- o Once the parameters are displayed under the Current Set Points, the ECU is updated and may be disconnected. Be sure to hit disconnect at the top of the page before unplugging the ECU to avoid any errors.

Liberty's Gears ECU

- To change parameters-
  - Repeat the steps above each time you would like to change the parameters for the ECU.
- View last run-
  - After each run, you can connect your ECU and press the View Last Run button at the bottom right of the program page to see the shifting information from your latest run. It will bring up a page like this:

Shift	Rpm Set Point	Delay Time Set Point	Shift Actual Rpm	Shift Time Elapsed	Time Between Shifts
1	65535	65.535	65535	-0.0001	0
2	65535	65.535	65535	-0.0001	0
3	65535	65.535	65535	-0.0001	0
4	65535	65.535	65535	-0.0001	0
5	65535	65.535	65535	-0.0001	0
6	65535	65.535	65535	-0.0001	0

Save

  - You can then press save in the bottom right corner to save the data in an excel file. It will look like this:

Shift	Rpm Set Point	Delay Time Set	Shift Actual Rpm	Shift Time Elapsed	Time Between Shifts
1	7600	0.75	7657	1.4764	0
2	7800	0.25	7949	2.9796	1.5032
3	7800	0.25	7833	3.6248	0.6452
4	7800	0.25	7837	4.1905	0.5657
5	4000	0.25	7306	4.4432	0.2527
6	0	0	7306	4.4479	0.0047

  - The ECU will only store the previous run information so you have to save it each run to retain the data. Each time you save new data, it will give you the option to append it to a current file or save as a new one so you can stack your runs as desired.

<u>**Troubleshooting Tips:**</u>

My computer is not recognizing that my ECU is plugged in and does not show any COM port options:

- Make sure the ECU has power and there is a red light flashing on top of the ECU.
- Restart the program once the ECU does have power.
- Restart your computer and reload the program.
- Be sure to turn the ECU off and back on before plugging it back into the computer.
- When you connect the ECU USB to the computer a green light should flash momentarily on the clear part of the USB to indicate that it is connected.

Some computers will give a virus warning when downloading the program for the first time. You may have to override the virus scanner and manually click to download anyway. It is possible that you will have to disable your computer's firewall momentarily to download the file. Once the program is downloaded on your computer you should be able to enable your firewall again without future problems.

The ECU may need to install a driver when connecting to your computer for the first time. The computer should automatically do this when plugging in if the computer is connected to the internet. If you do not have an internet connection, you will need to manually install the driver. We are able to send you the driver to install or it has been recently added to the flash drives provided with each ECU.