Dicktator

Transmission Management System

Accuracy you can depend on

Contents

1. Installation Guide

- Computer Requirements

The PC interface software for tuning the controller requires a PC running Windows:

- XP.
- Windows Vista.
- Windows 7.
- Windows 8.1.
- Windows 10.

Minimum Requirements:

133 MHz processor
16 Mb of RAM memory
20 MB of free Disk space
VGA colour display 800 x 600

Recommended:

Dual-Core 2 G or above processor.
2 Gb of RAM memory
20 MB of free disk space
DVI colour display 1024 x 768

- Installing the PC Interface for Dicktator Transmission Software

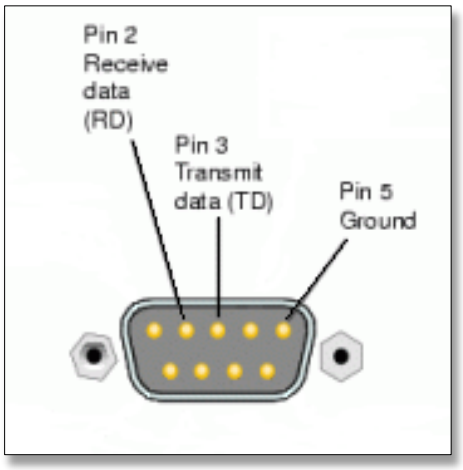
There is no need to install the software. Simply copy the EXE file to you current Dicktator directory. It should be located at C:\Program Files\Dicktator\

If you do not have previous Dicktator software installed, you can manually create the folder.
Right click on the EXE file and press “Send To” Select “Desktop (create shortcut)”
You now have a shortcut on your Desktop.
The Software will use the Dicktator folder to store all relevant setup files, maps and Logs.

- Find the icon to start the Dicktator Transmission Software

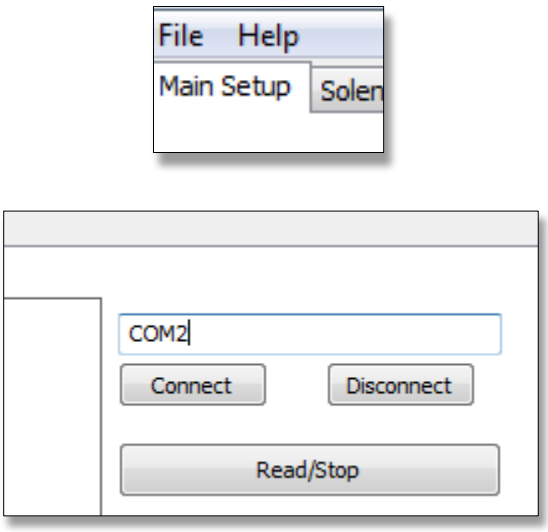
- Connect the Dicktator Transmission Controller to the PC software

All you need is a standard RS232 serial communication cable. If you don’t have a cable and want to make one, it’s still a simple job. You need a male and female DB9 pin connector. Get a 3 core wire and connect pins 2-2, 3-3, 5-5 like in the diagram below.



Once you have your cable, plug it in to the PC and transmission controller. Turn on your ignition and start the PC software. Go to “Main Setup” of the PC interface and enter your COM port, press

“Connect” and “Read/Stop”. You should see the green TPS bar moving when pressing the accelerator pedal.



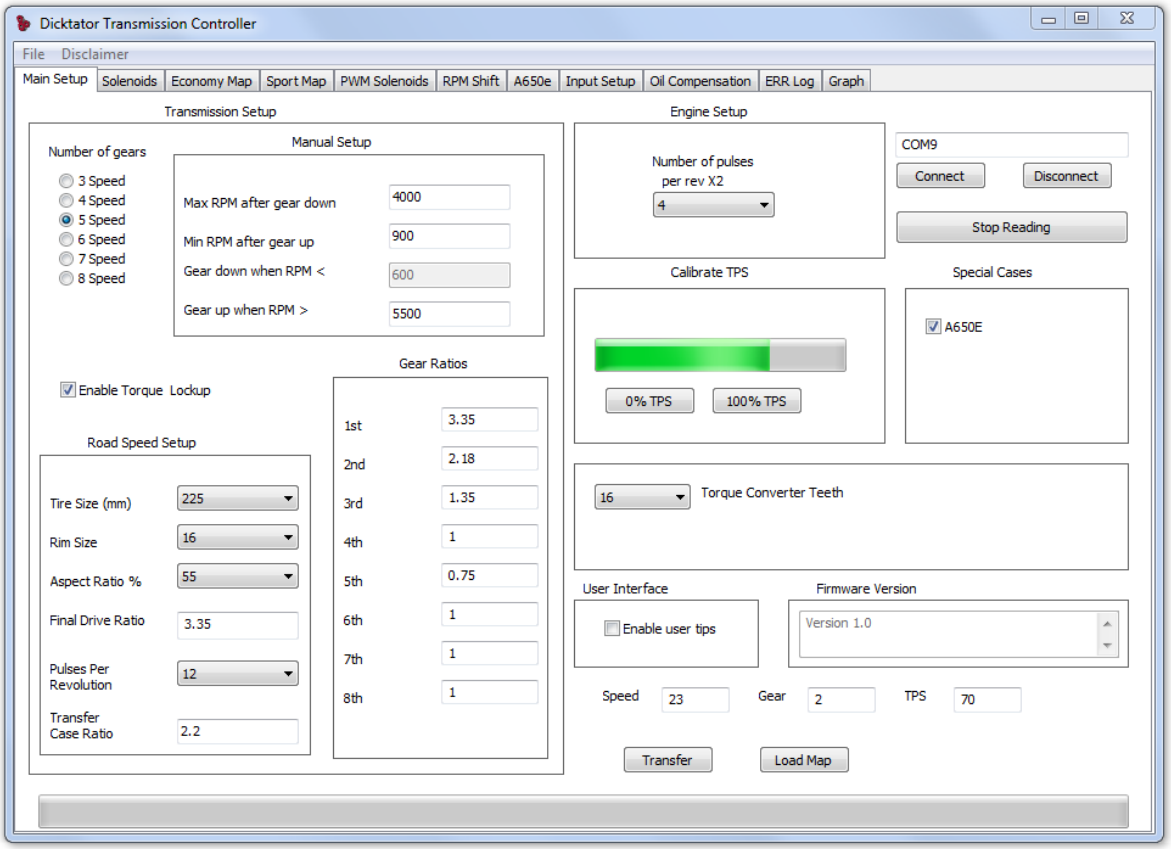
Almost all new Laptop computers come without a “COM” port. The solution is a “USB to Serial converter”. There are various makes on the market. However, ensure than you only use one with a “FTDI “ or “Prolific “ chipset. The most recent drivers for these chips are included on the installation CD. The Prolific driver software looks something like this: “PL2303_Prolific_DriverInstaller_v1.14.0_20160802.exe”. When you are using a Prolific cable on a WIN 7 PC and the communication is problematic, try the following procedure:
Right click on the “exe” file, Select “Properties”, choose the “Compatibility” tab on top. Select the “Run this program with compatibility mode for:” check box. Select “WINDOWS XP” and reinstall the driver.

Once the drivers are installed and the cable is ready to use, right click on the “Computer” icon, select “Manage”, then select “Device Manager” and look for “Ports (COM & LPT)”. You will find the number of your communication port. The number must be used for the COM port setting in the PC software.

2. Using the PC Software

- Initial Setup of the transmission controller

Start up the transmission controller PC interface software, connect it to the transmission controller and turn the ignition on. Go to the Main Setup page. Here you tell the transmission controller the important settings it needs to work with your type of transmission. Here is a description of all the settings.



- Number of gears:

Select the number of gears for you transmission.

- Enable Torque Lockup:

Make a tick in this box if the torque converter on your transmission has a Lock up function and you wish to use it.

- Road Speed Setup:

- Tire Size (mm) – This is the width of your tire, measured in millimetres.
- Rim Size – This is the diameter of your rim in inches.
- Aspect Ratio % - This is the profile of your tire, measured in percentage
- Final Drive Ratio – This is the gear ratio of your differential
- Pulses Per Revolution – This is the number of teeth on the trigger wheel that supplies the transmission controller the road speed
- Transfer Case Ratio – This is the ratio of your transfer case on 4 x 4 vehicles

- Manual Setup:

  - Maximum RPM after gear down – This is the maximum RPM allowed after a gear down. The Controller calculates what the RPM will be after a gear down before it performs a gear down. It will prevent a gear down if the calculated value exceeds this value.
  - Min RPM after gear up – This is the minimum RPM allowed after a gear up. The Controller calculates what the RPM will be after a gear up before it performs a gear up. It will prevent a gear up if the calculated value is less than this value.
  - Gear down when RPM < – When the RPM is less than this value, the controller will force a gear down.(This feature has not been implemented on this controller)
  - Gear up when RPM > – When the RPM exceeds this value, the controller will force a gear up.

- Gear Ratios:

This is the actual gear ratio for each individual gear. The info can be found inside your owner's manual or on the Internet. The

correct values must be inserted here as these are used to determine RPM after the next shift.

- Engine Setup:

Number of pulses per rev x 2 – This setting is used by the controller to calculate engine RPM. The reason we multiply the number with two, is to make provision for three and five cylinder cars.

- Calibrate TPS:

This is used to calibrate the TPS. Simply press the 0 % TPS when the throttle is fully closed and the 100 % TPS when the throttle is fully opened and the TPS is calibrated.

- Special Cases:

When the A650E tick box is ticked, the controller will apply settings that are unique to the TOYOTA A650E transmission. (In future, more cases will be added)

- Torque Converter Teeth:

This is the number of teeth on the input shaft of the transmission. The correct value is important to ensure smooth and correct shifts.

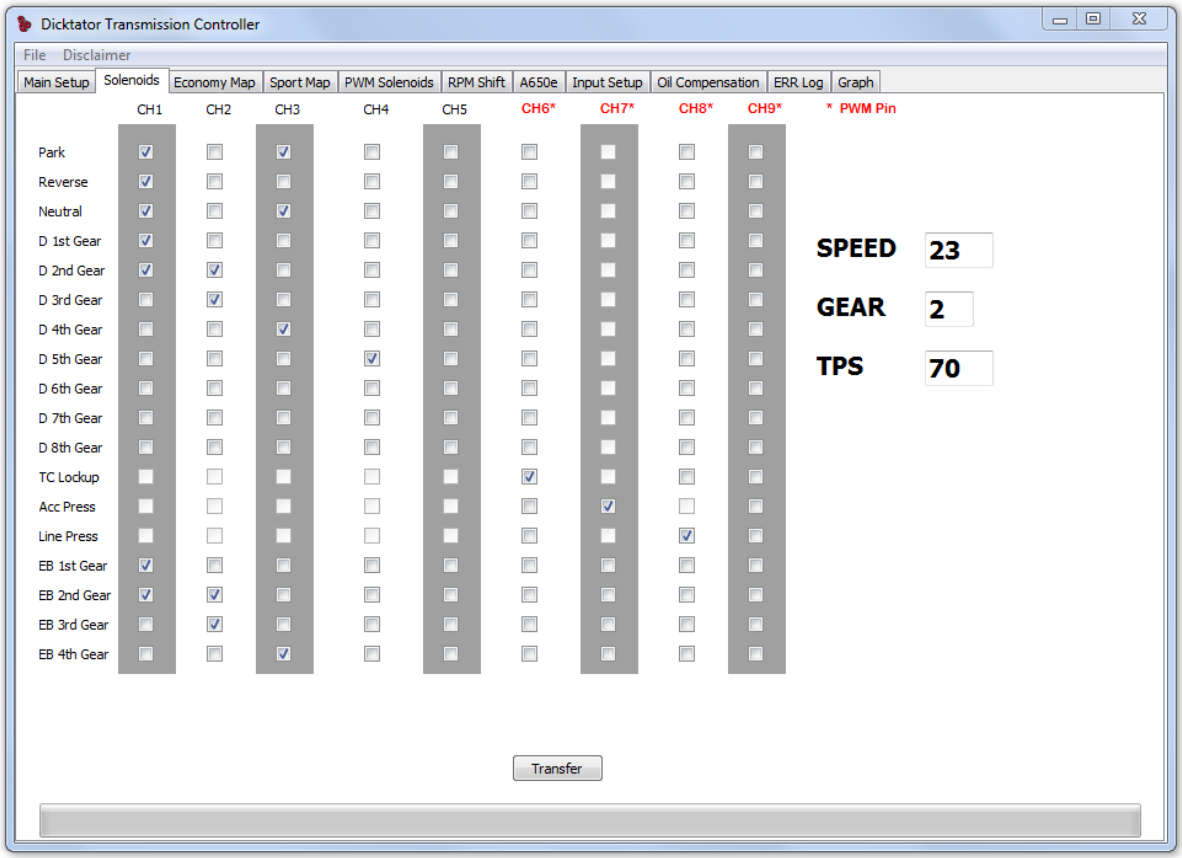
- User Interface:

Enable user tips – When this checkbox is checked, some user tips are shown when you hover over a control with your mouse.

- Firmware Version:

This is the Version of the Firmware that is currently on your transmission controller.

- Solenoids



There are two types of solenoids. Digital On/Off and PWM. Every gear has a specific sequence of solenoids. The last four entries, EB 1st – EB 4th are used when a gear lever is selected to a lower gear. (D4 – D1). Some transmissions have different settings for normal "D" and D4 – D1 to enable engine breaking. If you are going to use the D1 – D4 feature, the tick boxes must be ticked even if the solenoid selection is the same as normal "D".

- On/Off Solenoids:

The On/Off solenoids are used to select a specific gear. There are 5 On/Off solenoids to choose from and they all have a 12V positive output. (Solenoids Channels 1 - 5)

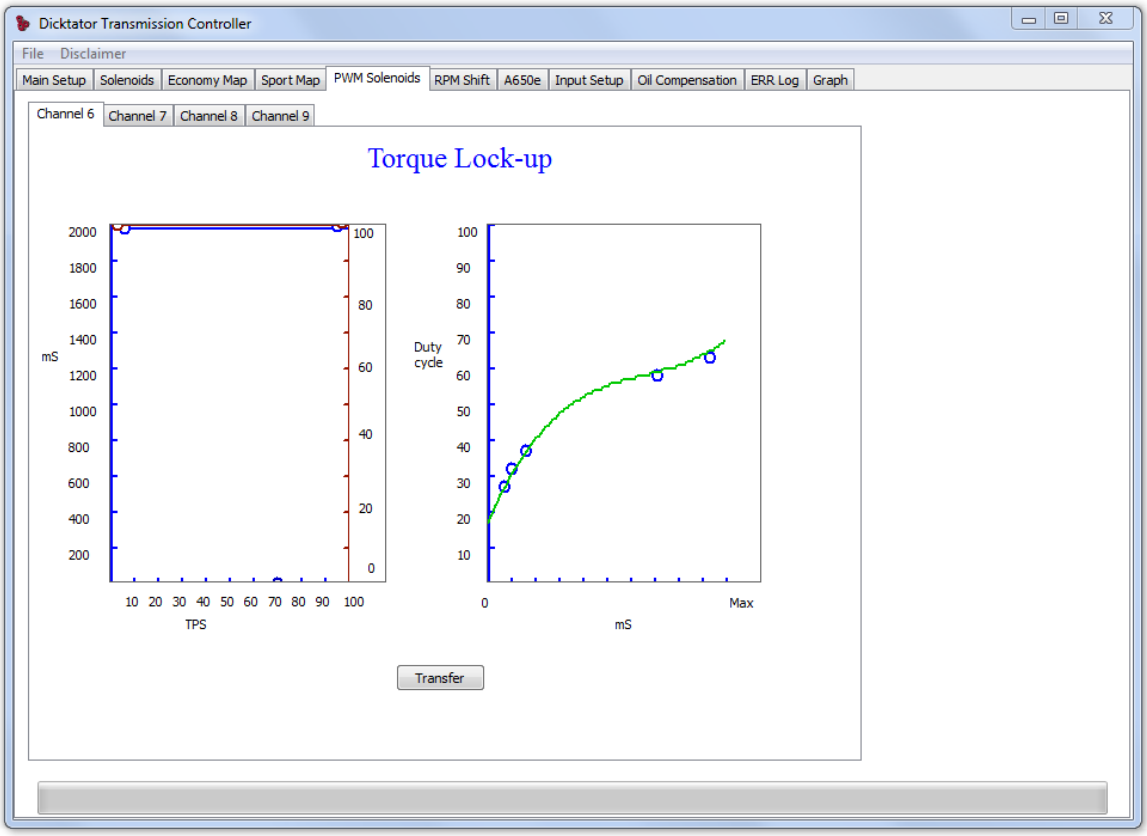
- PWM Solenoids:

There are 4 PWM solenoids. (Solenoids Channels 6 - 9) The PWM solenoids are used to control Line Pressure, Accumulator Pressure and the torque converter Lock-up. They can also be used as a PWM shift solenoid.

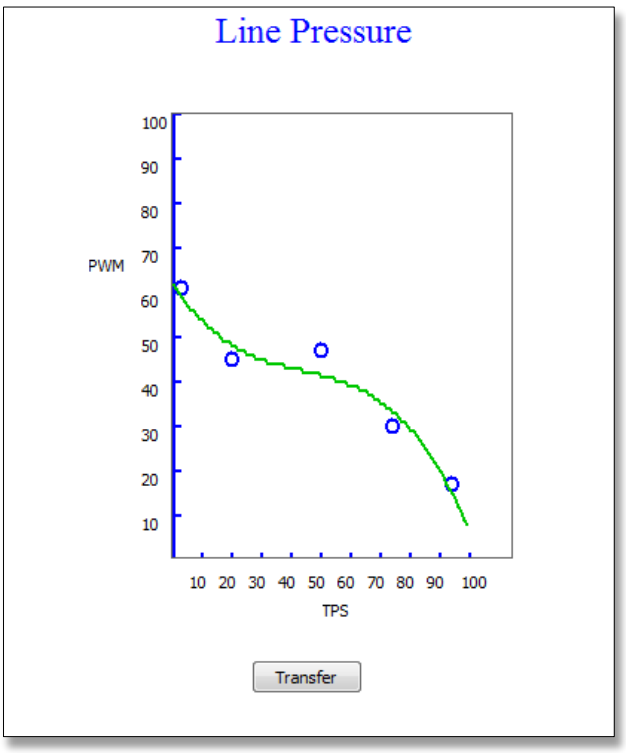
Note that only PWM solenoids can be used for Line Pressure, Accumulator Pressure and the torque converter Lock-up. Also note that channel 9 has not been activated for this controller.

- PWM Solenoids

When you open the PWM Solenoid tab, you will find a tab for every PWM solenoid. Choosing a tab will automatically select a graph according to the selections made on the Solenoids page.



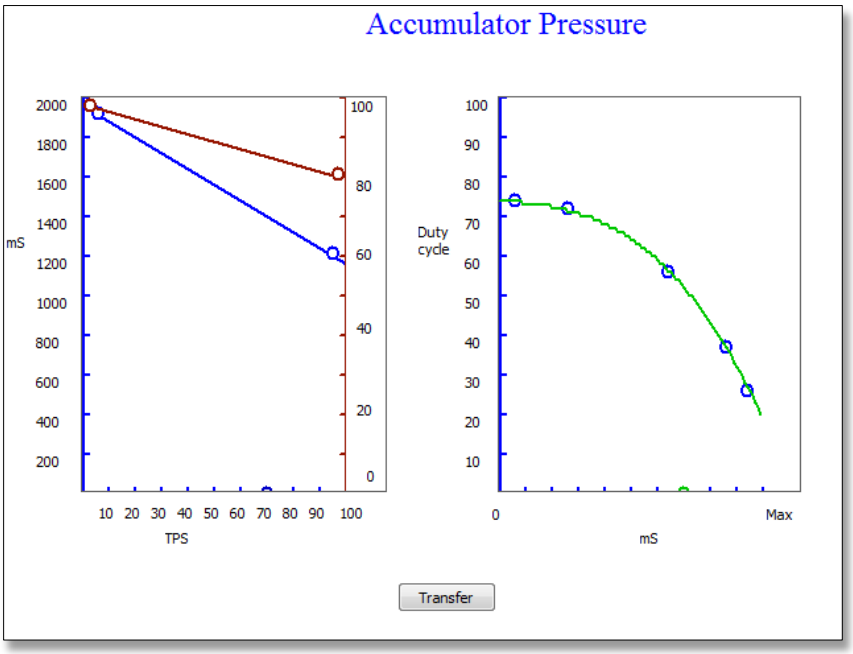
- Line Pressure:



The Line Pressure is controlled according to throttle position. High Line Pressure will result in a firm gear change and a low pressure will result into a smoother change. A higher duty cycle on the solenoid will cause a lower line pressure.
On the Y axis of the graph is the PWM percentage that will be output according to the throttle position as indicated on the X axis. The lower the throttle position, the higher the PWM value and the lower the Line Pressure.

All the points on the graph can be dragged around with the mouse to change its values. It is recommended to make only small changes at a time.

- Accumulator Pressure:



The Accumulator pressure is activated during every gear shift to soften the shift. A lower pressure will result into a smoother shift. A higher duty cycle on the solenoid will cause a lower Accumulator pressure.

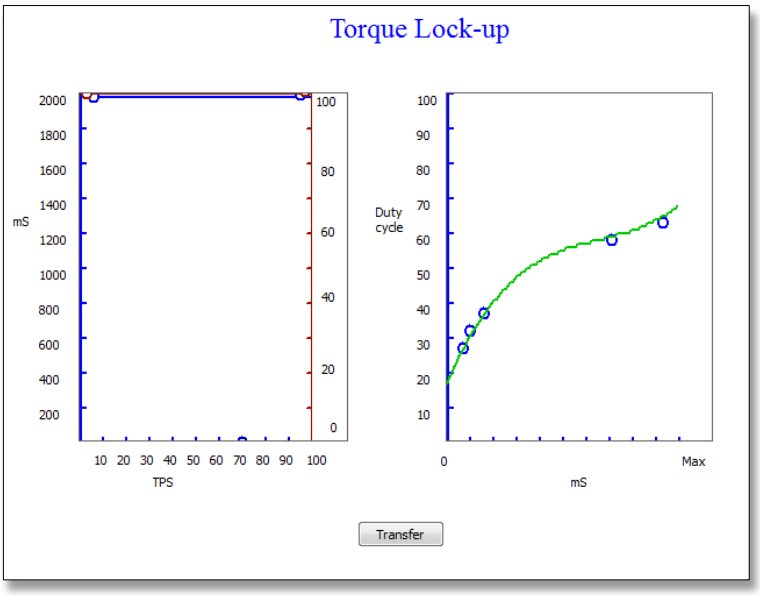
The graph on the left has multiple adjustments. The blue line which is measured on the left hand Y axis determines the time it will take to complete the sequence at different throttle positions. The brown line which is measured on the right hand Y Axis is a modifier. It determines the percentage of the PWM that will be applied to the solenoids at different throttle positions.

$$PWM(final) = PWM(graph) \times modifier$$

The modifier if set at full 100, which is 100% will equate to a factor of 1.00 and have no effect on the above equation.
Note: Modifier is not available on version 1.3 of firmware.

The graph on the right is a visual representation of the PWM signal that is applied to the accumulator solenoid. All the points on the graphs can be dragged around with the mouse to change its values.

Torque Converter Lock-up:



All modern transmissions have the ability to lock the torque converter at certain speeds and conditions. The torque converter is locked to prevent slip in the torque converter and thus increase the efficiency. The torque converter is controlled by a PWM signal and will lock at high PWM values.

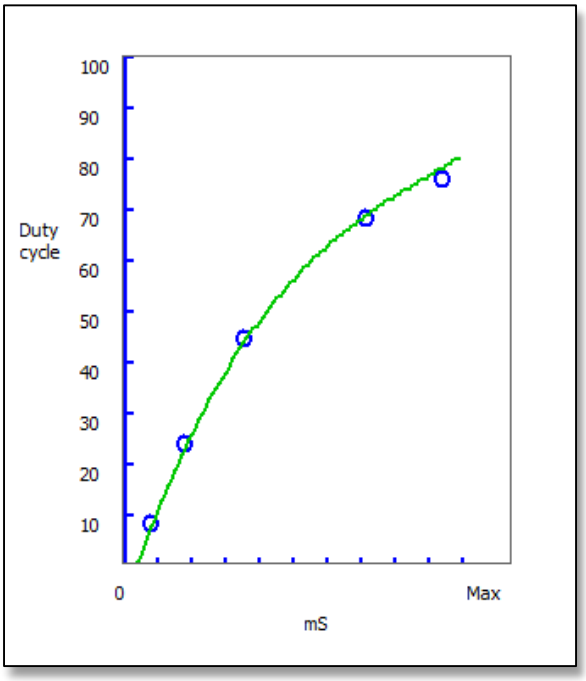
The graph on the left have multiple adjustments. The blue line which is measured on the left hand Y axis determines the time it will take to complete the sequence at different throttle positions. The brown line which is measured on the right hand Y Axis is a modifier. It determines the percentage of the PWM that will be applied to the solenoids at different throttle positions.

$$PWM(final) = PWM(graph) \times modifier$$

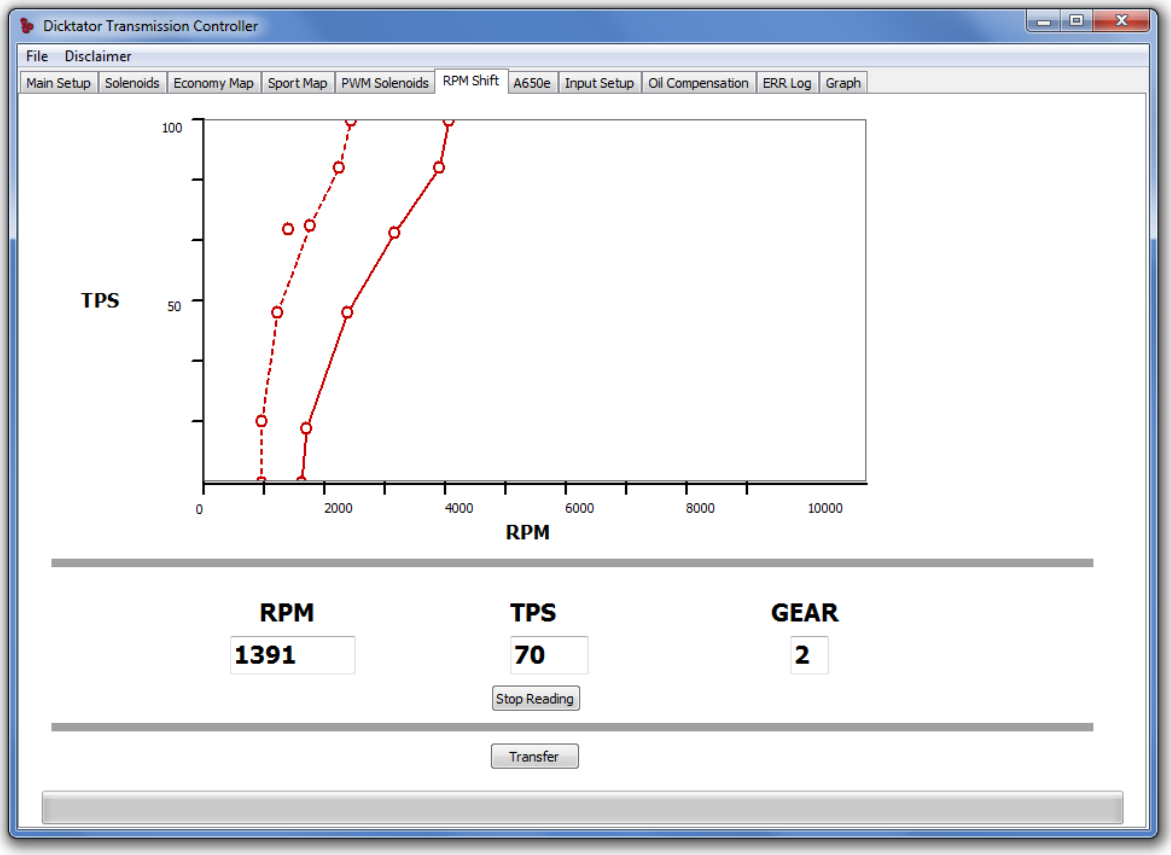
Note: Modifier is not available on version 1.3 of firmware.

The graph on the right is a visual representation of the PWM signal that is applied to the torque converter solenoid. Al the points on the graphs can be dragged around with the mouse to change its values. The minimum PWM on the torque converter will be about 20% according to this example. Some A340E transmissions are more sensitive and requires 0% when the torque converter lock is

disabled. Simply ensure that the PWM percentage is set at 0% at 0mS as shown in the following example.



- RPM Shift



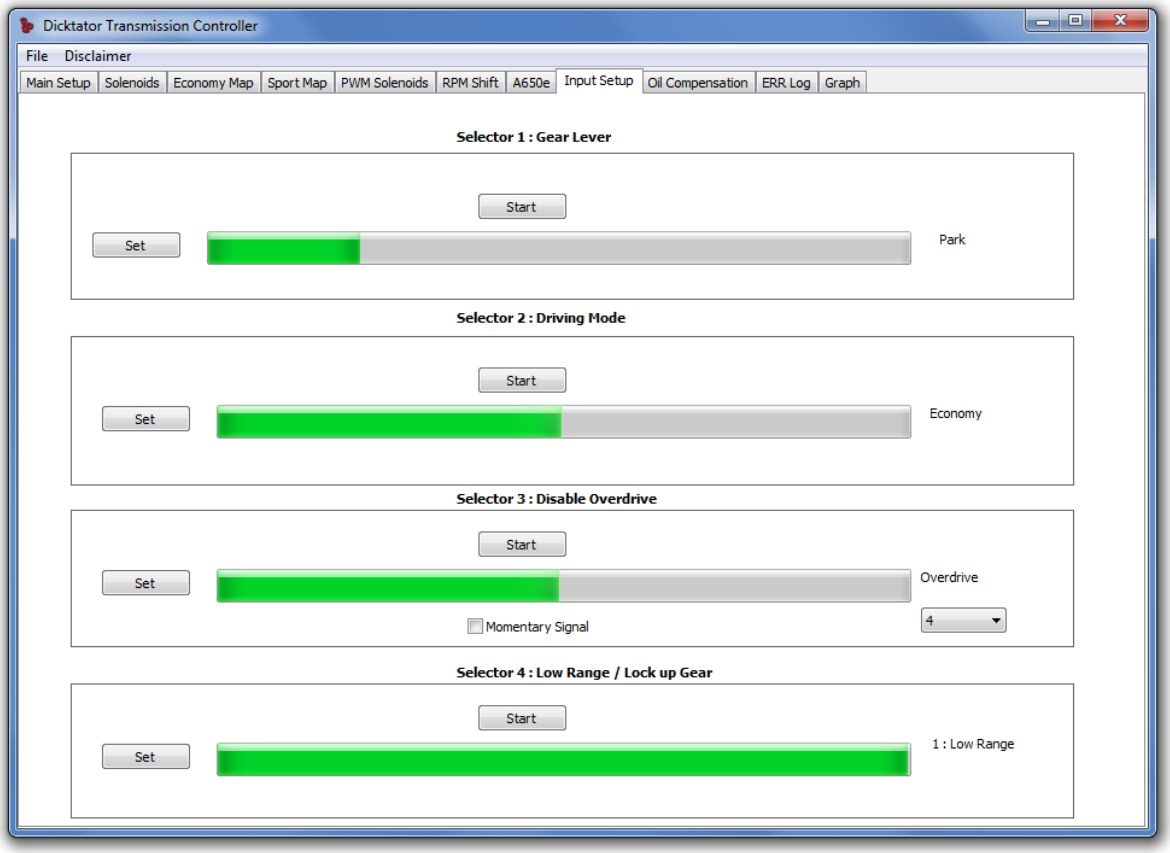
The controller uses road speed as primary input to determine appropriate gear. The road speed is calculated by using a sensor located on the transmission, the differential or a wheel. The wiring that connects the speed sensor to the controller might get damaged in various ways. E.g. rubbing against the propeller shaft or hot exhaust pipe. A lost speed sensor will result in a zero speed indication and force the controller into gear one. Even though some transmissions have a freewheeling first gear, this doesn't sound like fun at 80 mph.
Before every gear change the controller verifies if everything is still in order. If it detect that the speed signal was lost, it will do one of two things:

- If RPM is less than 2500 it will prevent any gear shift.
- If RPM is greater than 2500 it will go into RPM Mode.

In RPM Mode, the transmission will change gears according to RPM. There are two lines on the graph. If the dot is to the right of the solid line, an up shift will follow. When the dot is to the left of the dashed line, a down shift will follow. Ensure that there is sufficient space between the two lines to prevent the dot falling to the left of the dashed line after an up shift or to the right of the solid line after a down shift. It will cause hunting between gears if the lines are too close together.

The controller will stay in RPM Mode until the ignition is switched off and on again. If the road speed is still lost, RPM Mode will be enforced as soon as the RPM exceeds 2500RPM.

- Input Setup

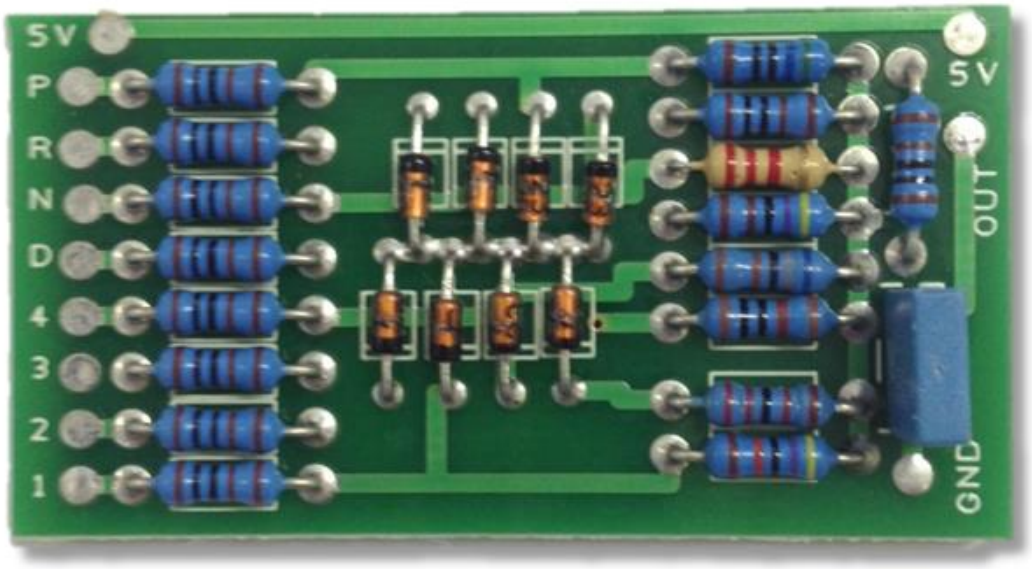


This page is used to setup the following Inputs:

- Gear lever
- Driving mode selector
- Overdrive selector
- Low Range & Gear Lock selector

- Gear Lever:
  - P – Park
  - R – Reverse
  - N – Neutral
  - D – Drive
  - 4 – Drive mode with gear limited to 4th gear
  - 3 – Drive mode with gear limited to 3rd gear
  - 2 – Drive mode with gear limited to 2nd gear
  - 1 – Only first gear available

The Gear lever input makes use of a voltage input. Some gear selectors come standard with a voltage output. However some popular transmissions come with a gear selector that powers a different input pin on the controller for every different gear. Your transmission controller is supplied with a little converter board. All the inputs from the gear selector are connected to the board and the output is connected to the gear lever input.



Setup procedure: Click on the “Start” button. Note that the caption on the “Start” button changes to “Skip”. With the gear lever in the Park position, click “Set”. Move the gear lever to the Reverse position, wait for the display to update and click the “Set” button. Move the gear lever to the Neutral position, wait for the display to update and click the “Set” button. Move the gear lever to the Drive position, wait for the display to update and click the “Set” button. The D4 – D1 positions are all the same. If you do not require a certain position you can click the “Skip” button and it will skip that function.

- Driving Mode:
    - E – Economy
    - S – Sport
    - M – Manual

The procedure to setup the Driving mode, is similar to that of the Gear lever. Any mode can be skipped if not required but if this feature is not used, the Economy map must be selected as a minimum requirement.

- Disable Overdrive:
    - O – Overdrive

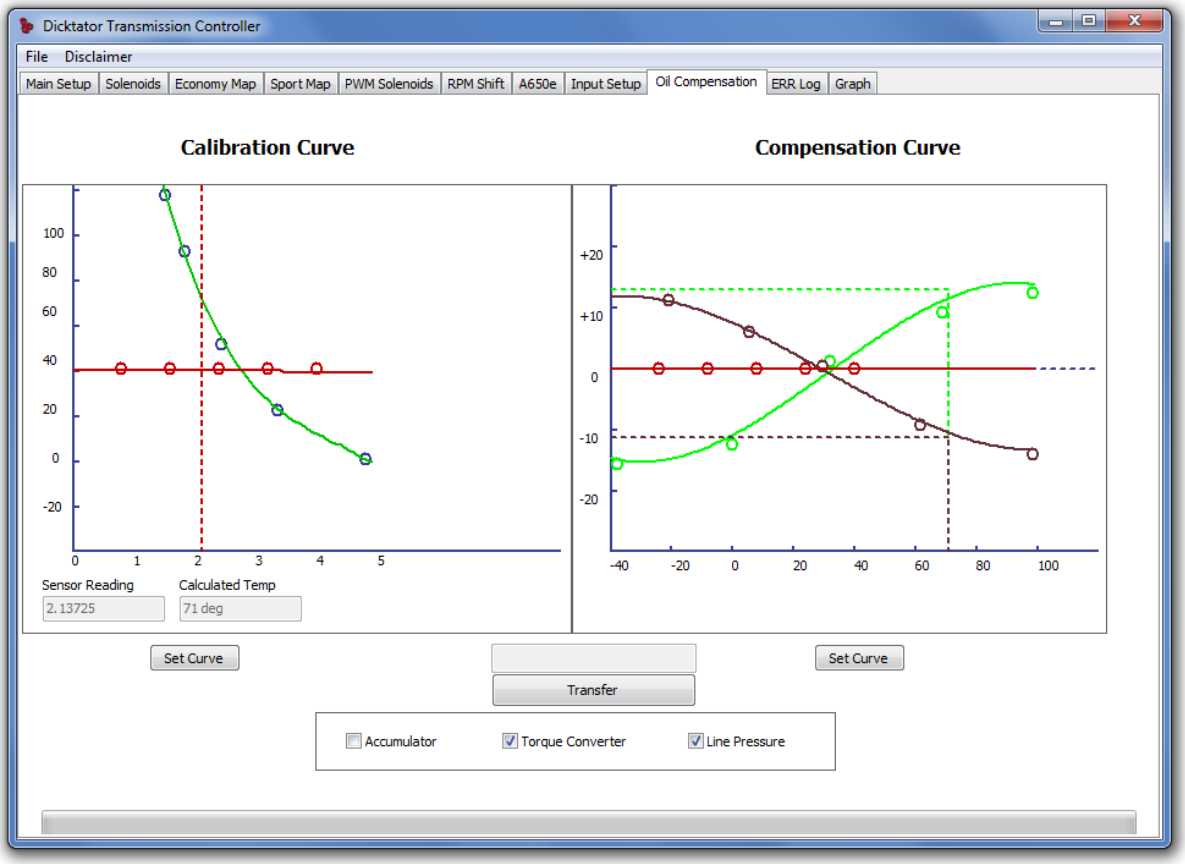
There is just one setting for this selector. Similar to the other selectors, you press “Set” when the Overdrive is selected.
In the dropdown box on the right hand side, you can select at what gear you want to limit the transmission. There is also an additional setting. The momentarily checkbox is check if the overdrive button doesn’t latch. In this case the button must pull the signal to ground. The overdrive button is pushed once to activate overdrive and once to deactivate it. If you are using the momentarily setting, the “Set” button must still be used.

- Low Range & Lockup gear:
    - 1 – Low Range
    - 2 – Low Range & Lock gear
    - 3 – Lock Gear
    - 4 – Normal

The “Low Range” button is used on 4 x 4 vehicles with a speed sensor on a wheel or in the differential. It multiplies the differential ratio with the transfer case ratio when Low Range is selected to correct the speed calculation.
The “Low Range & Lock gear” button is used when you want to lock the transmission in a specific gear and you use the “Low

Range” function as above. This setting is used for rock crawling or extreme off road conditions.
The next setting, “Lock gear” is used when only the lock gear function is used.
The last setting, “Normal” is for normal driving.

- Oil Compensation



The “Oil Compensation” page is used to setup the oil temperature compensation. The viscosity of the automatic transmission fluid changes with changes in temperature. This change has a direct effect on the hydraulic pressure inside the transmission. The following control signals can be adjusted to compensate for oil temperature variations:

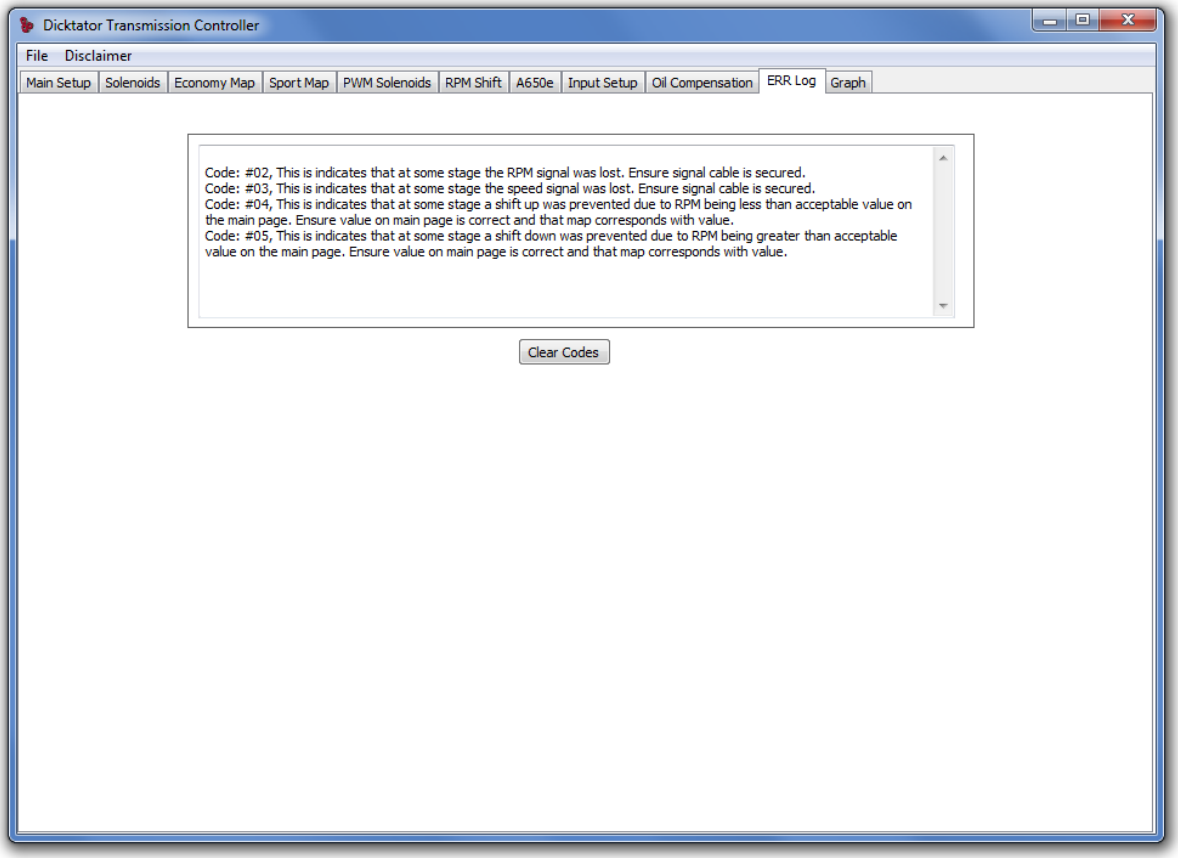
- Accumulator Pressure
- Torque Converter Pressure
- Line Pressure

The graph on the Left hand side of the page is used to setup the temperature sensor. Manufacturers normally make use of a “Negative Temperature Coefficient” sensor. The graph shows typical setting for such a sensor. Your sensor can be calibrated by moving the dots around with your mouse. Once again, try to make only small changes at a time. Additional help is in the form of the

“Set Curve” button. When you press this button, the red line will be copied over the green line. It is then easy to make small changes and see the effect of your changes.

The graphs on the right hand side are used for actual calibration. There is also a “Set curve“ button that can be used to fine-tune your graph. It is important to note that only one graph should be selected and set at a time. Once you are finished with your graphs, select all the signals that you want to compensate and press the “Transfer“ button. If a checkbox is not checked, Zero values will be entered and there will be no compensation for that signal.
When setting up this page press the “Start Reading” button to get live feedback from the controller. This will ensure you know what temperature the controller is currently calculating and the compensation. Both calculated temperature and compensation are shown in the dashed lines of same colour on the right hand side graph.

- Error Log



Whenever you “upload map from Chip”, the error log will be populated if any errors occurred since the codes were cleared a previous time.

#1 – Torque converter speed lost

#2 – RPM signal lost

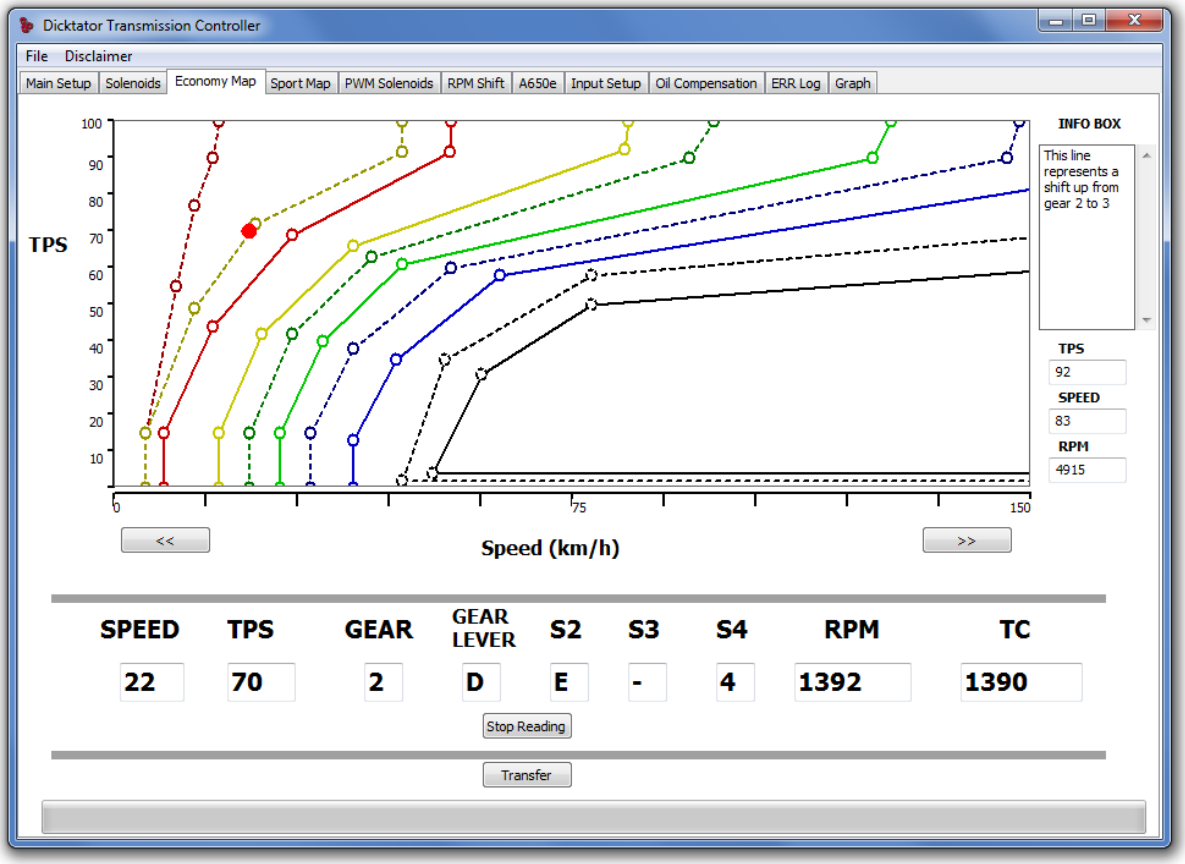
#3 – Speed signal lost

#4 – Up shift prevented, RPM too low

#5 – Down shift prevented, RPM too high

The “Clear Codes” button is used to clear all current fault codes.

- Economy Map



This is where the controller is “Tuned”.
This page consists of a graph with throttle position on the Y axis and road speed on the X axis. There is however a lot more info on this page. Firstly it indicates the current speed and throttle position on the graph in the form of a red dot. It also indicates the speed (km/h) and throttle position (%) in a text box. It shows you the currently selected gear. All four the selectors are shown. Gear lever, Driving mode selector, Overdrive selector and Low Range & Gear Lock selector. The engine and torque converter RPM is also shown.

The controller is “Tuned” by dragging the dots with the mouse. There are solid and dashed lines on the graph. Each line colour represents a different gear. When the red dot crosses a solid line from the left to the right, an up-shift will be executed. When the dot crosses a dashed line from right to left, a down

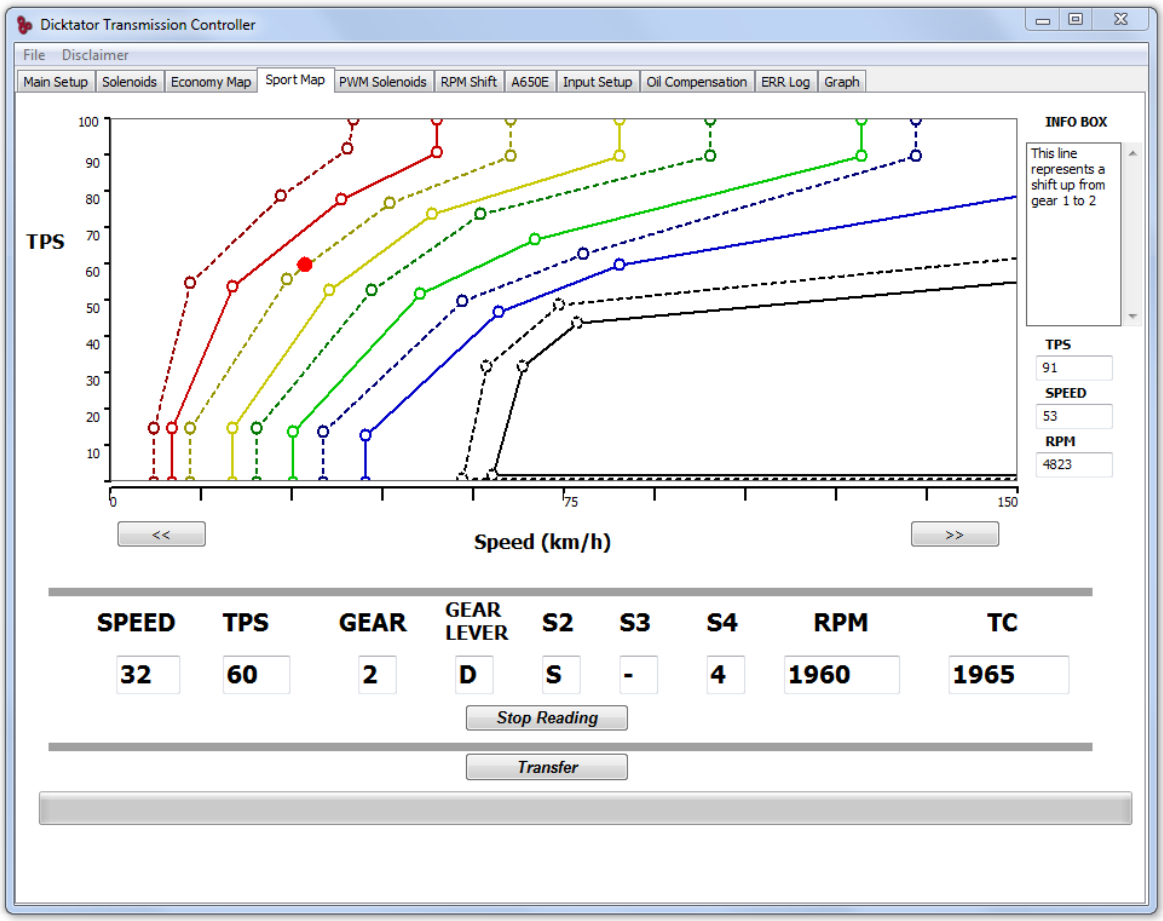
shift will be executed. It is permissible to have a solid line from a gear crossing a dashed line from another gear. It is also permissible to have two lines on top of each other. The above example will cause a downshift from 3rd to 1st when the throttle is less than 15% and the vehicle is decelerating. The software prevents you from setting the shift point at a lower throttle position higher than a higher throttle position. It also prevents you from setting the shift point at a higher throttle position lower than a lower throttle position.

On the right hand side of the graph, are four more text boxes. These boxes are populated when you drag the dots around on the map. The “Info Box” will show you which gear the line represents and if it is an up or down shift. The throttle and speed boxes will indicate the exact throttle position and speed on the map. The last textbox will indicate what the engine RPM will be at that gear change. Keep in mind that it takes some time to complete a gear shift and that one should probably initiate the shift a bit earlier than the ideal shift point. By minimising the Accumulator Pressure at full throttle, these times can be considerably reduced.

The black line represents the torque converter lock-up and unlocking. When the red dot is to the right of the solid black line, the torque converter will lock-up. When the red dot is to the left of the dashed black line, the torque converter will unlock.
As per the example above, the torque converter will unlock when at 0% throttle. If the solid line is pulled right to the bottom, the torque converter will stay locked up at 0% throttle.

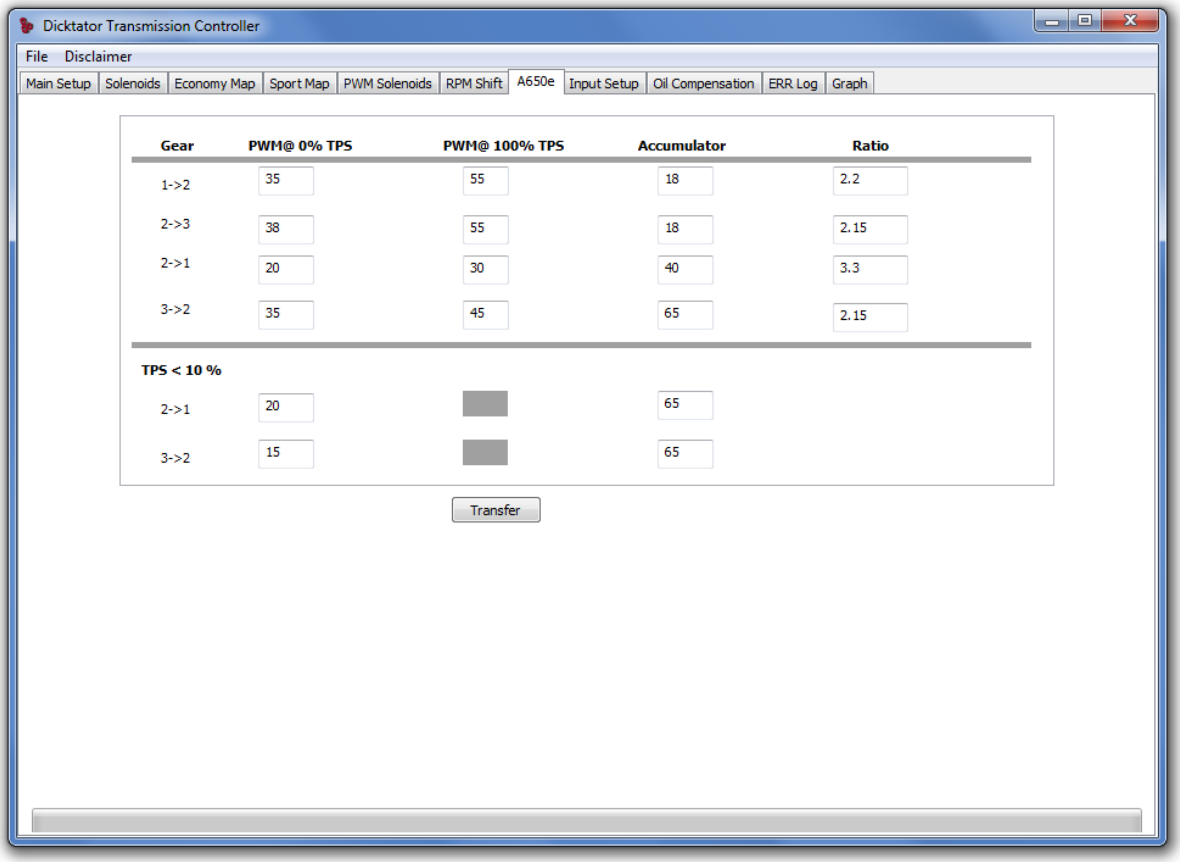
Below the graph are two buttons with arrows on them. You can press these buttons to scroll the graph to the left or the right if need to.

- Sport Map



The Sport map is identical in features to the Economy map. Note on the example the 1st to 2nd line is crossing the 3rd to 2nd line. It is permitted and the vehicle will drive normally.

- A650E



The A650E is a 5 speed transmission that is utilised in some Lexus vehicles. It was utilised with the versatile 1UZ-FE, 3UZ-FE and the 2JZ-GTE engines. Lots have been said about these transmissions.

It uses a unique philosophy. The torque converter signal is utilised to control the shift into and out of second gear. Get it wrong, and you have either a jerky or a lumpy shift. To make matter worse, it is very sensitive to ATF temperature changes. However we believe that we have tamed the beast and workable maps are available for download from the Dicktator web site.

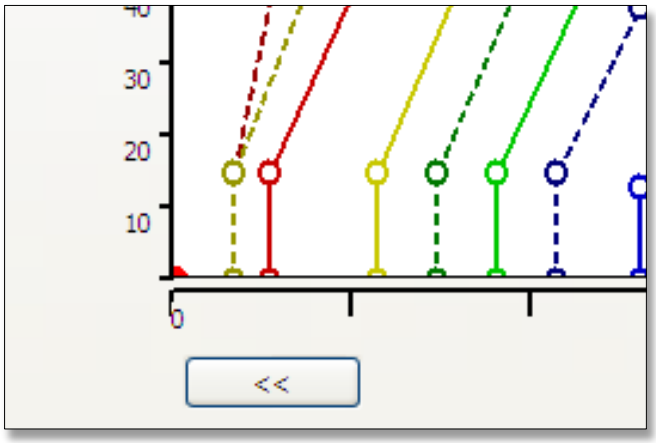
It requires different PWM levels at different throttle positions. The first two columns on the A650E page are for 0% and 100% throttle positions. A PWM value will be calculated by interpolating the throttle position. If, after a preprogramed time, the gear shift into second gear is not completed, the PWM will

be increased until it reaches the 100 % throttle value. If you have a lumpy shift, simply increase the PWM values. If the shift is jerky, decrease the values.

Similarly, a PWM value will be calculated for a gear shift out of second gear. The PWM will however decrease after the controller senses that the gear change is completed. If it feels as if the transmission is braking the vehicle during a second to third shift, the initial PWM value is too high and must be reduced. If you can hear the RPM increasing during the second to third shift, increase the PWM value.

The values in the third column “Accumulator” is applied to the accumulator solenoid while the shifts into and out of second takes place. The values in the fourth column “Ratio” is the actual gear ratio that the controller is looking for to confirm that a gear shift is completed.

The “TPS < 10%” values are used when the throttle is less than 10% open and a down shift is initiated. This strategy is used because the transmission is utilising freewheeling clutches in its lower gears and it is impossible to determine when a gear shift is completed. Note that the OEM A650E controller prohibits a 3rd to 2nd shift when decelerating. To ensure a smooth ride, apply the settings as per the example on the “Economy Map” page and shift down from 3rd to 1st.



- Special Features

The controller has some special features, it allows the user to use the transmission for purposes that was probably never envisaged by its creators. It has a Tiptronic mode, Gear Lock mode and the ability to be used with a transfer case selected to "Low Range" when measuring speed at the differential or on a wheel.

Because most automatic transmissions utilise freewheeling clutches in its lower gears, smooth down shifting during deceleration is quite tricky. Because of this, the Dicktator transmission controller uses the downshift pattern of the Economy Map for down shifts when the throttle position is below 10% and the vehicle is decelerating. There is no need for the driver to gear down when coming to a stop. Just take off when the light goes green and you are again in full control of the gear shifts. The driver can override this feature by using the "Gear Lock" selection. By using this selection, the user can select a gear in manual mode and the controller will keep it in that gear.

The "Gear Lock" mode is disabled when the gear lever is in the Drive position. When the gear selector is in the D1 – D4 position, the "Gear Lock" can be selected to prevent a down shift. The "Gear Lock" mode is only available in Manual mode and D1 – D4 modes.

The "Low Range" mode is used on 4 x 4 vehicles with a speed sensor on a wheel or in the differential. It multiplies the differential ratio with the transfer case ratio when "Low Range" is selected to correct the speed calculation. Note that the vehicle should be stationary when changing Range.

Another possibility is to use this feature to quickly move the complete shift map left or right to create an additional map.

3. Connecting the Controller Inputs

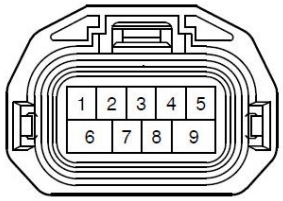
- Gear Lever

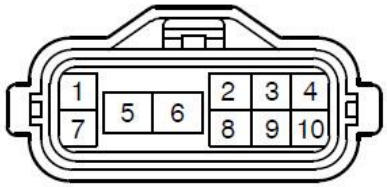
The Gear lever input makes use of a voltage input. Some gear selectors come standard with a voltage output. However some popular transmissions come with a gear selector that powers a different input pin on the OEM controller for every different gear. Your transmission controller is supplied with a little converter board to be used when your selector have the separate output pins. All the inputs from the gear selector are connected to the board and the output is connected to the gear lever input. You need to supply the selector switch with a 5V or a 12V supply and a ground wire.

Some voltage type selectors need a pull-up resistor to pull the signal up to 5V. The pull-up resistor is provided and you only have to connect the pull-up wire (pin 5 of the 20 pin plug) and the signal wire together on these applications.

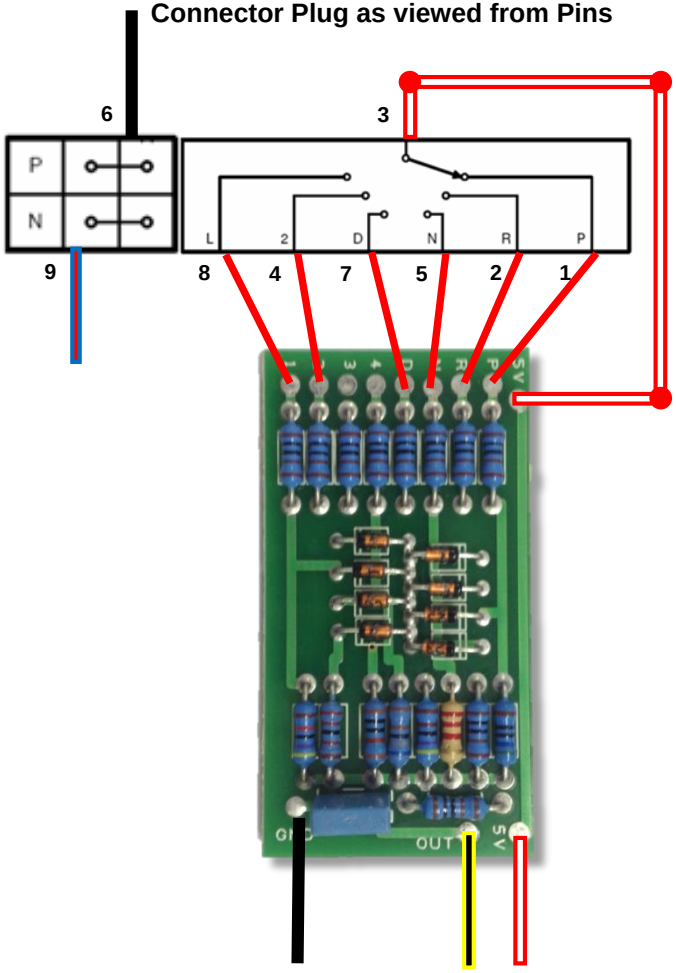
Normally the “Park Neutral” switch, which prevents the vehicle from being started in gear, is incorporated in the gear selector plug.

Gear Lever Position Switches

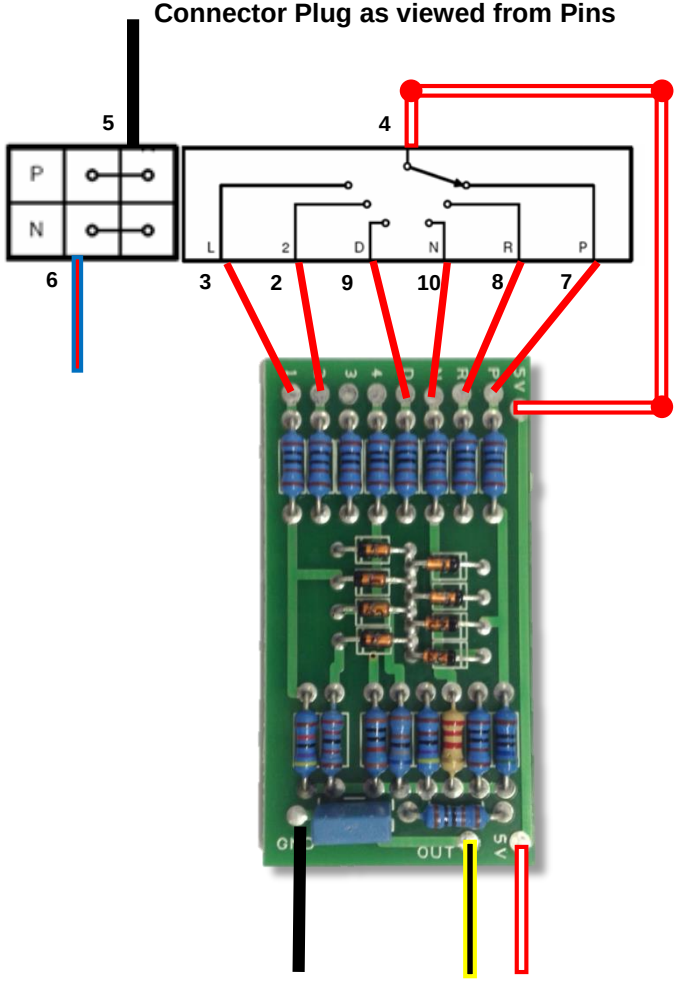




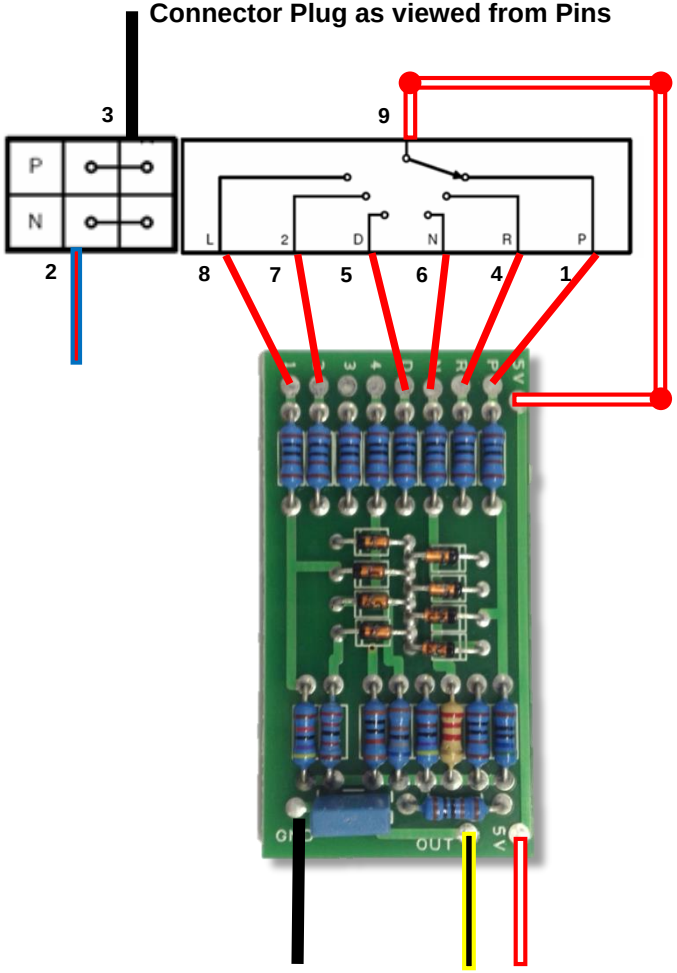
Connector Plug as viewed from Pins



Connector Plug as viewed from Pins

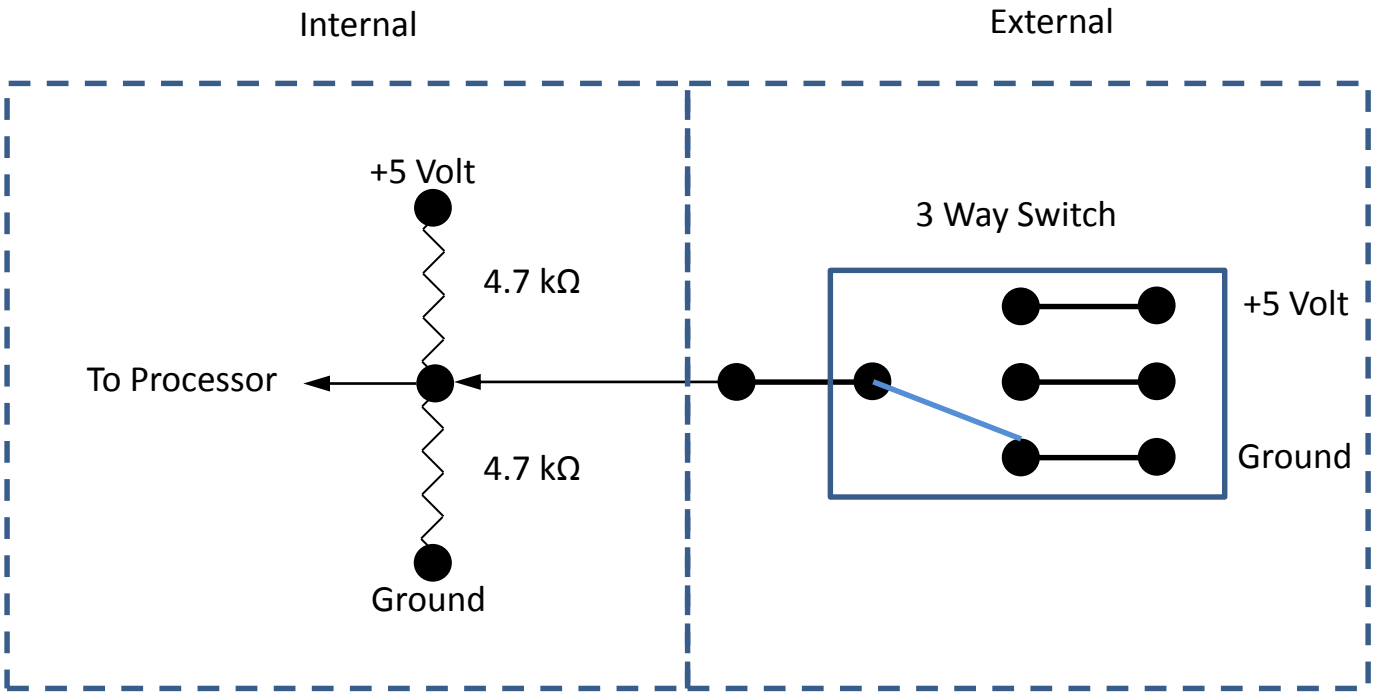


Connector Plug as viewed from Pins

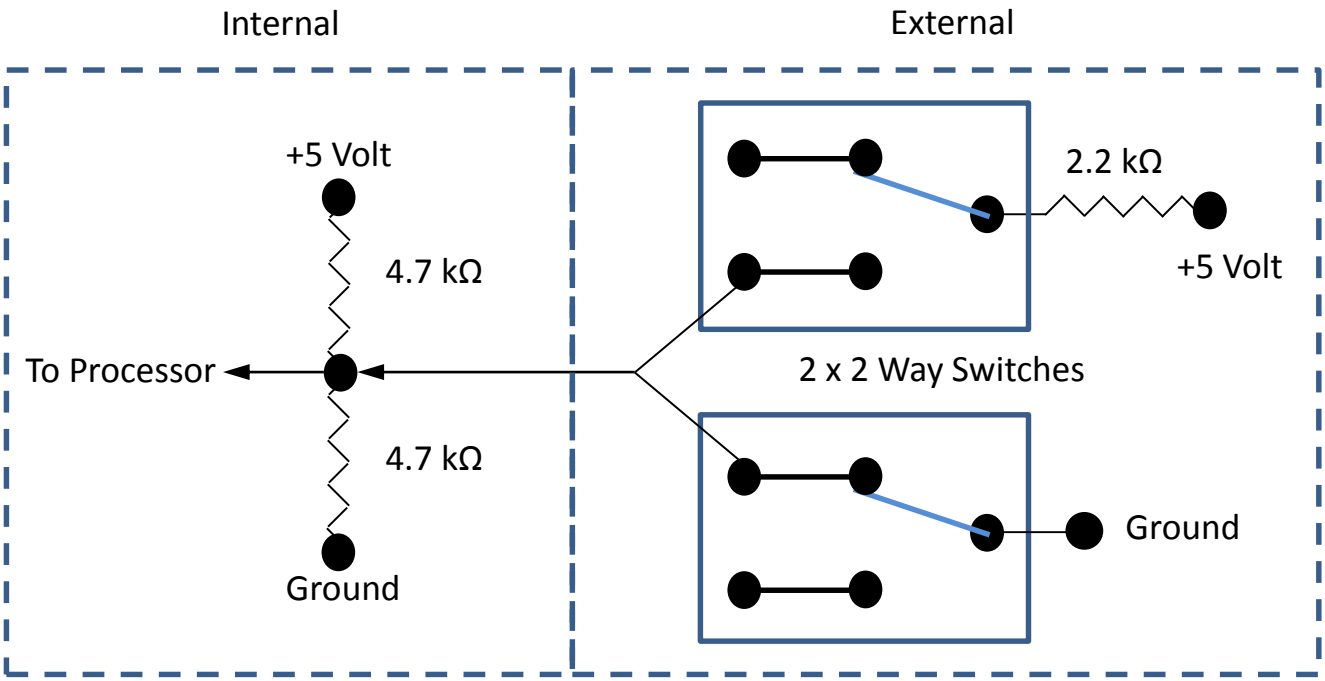


- Selectors S2, S3 and S4

The three selectors also determine selection by using a different voltage for every selection. The inputs are internally connected to 5V positive and the ground via two identical resistors. Connect the controller and open the “Input Setup” page. Find the wire for Selector 2 or “Drive Mode” Note the “Drive Mode” position indicator bar. When the wire is disconnected, the bar is in the middle. The bar moves all the way to the left when it is grounded and to the right when connected to a 5V source. Note: Never connect any signal wires directly to a 12V source.
A three way switch can easily be connected to give you three different voltages or different selections.



Two separate switches can also be used. A good example is when you want to use the OEM gear lever on a vehicle to select “Manual” and a separate switch to switch between “Economy” and “Sport”. The OEM lever switches to ground when you select “Manual”. The other switch will switch to 5V when you select “Sport”. Take care not to create a short circuit when “Manual“ and “Sport” are simultaneously selected. Below is a connection diagram that will prevent a short.



- Speed signal

The controller has the required hardware to accept either a magnetic or a hall signal. The user has the choice to either use the magnetic or the hall speed input. When using the magnetic input, connect one side of the sensor to the input and the other side to the provided ground. When using a hall sensor, connect the sensor to the 5 V output, the ground and the signal to the hall input.

- Torque converter signal

The controller has the required hardware to accept either a magnetic or a hall signal. The user has the choice to either use the magnetic or the hall torque converter speed input. When using the magnetic input, connect one side of the sensor to the input and the other side to the provided ground. When using a hall sensor, connect the sensor to the 5V output, the ground and the signal to the hall input.

- RPM signal

The controller can only accept a 5V square wave signal for the RPM input.

- Oil temp signal

The oil temp measurement makes use of a NTC sensor. The sensor has one or two wires. Connect one wire to the signal input and the other to the signal ground. If it has only one wire, the ground connection is on the body and will connect to ground when it is screwed into place.

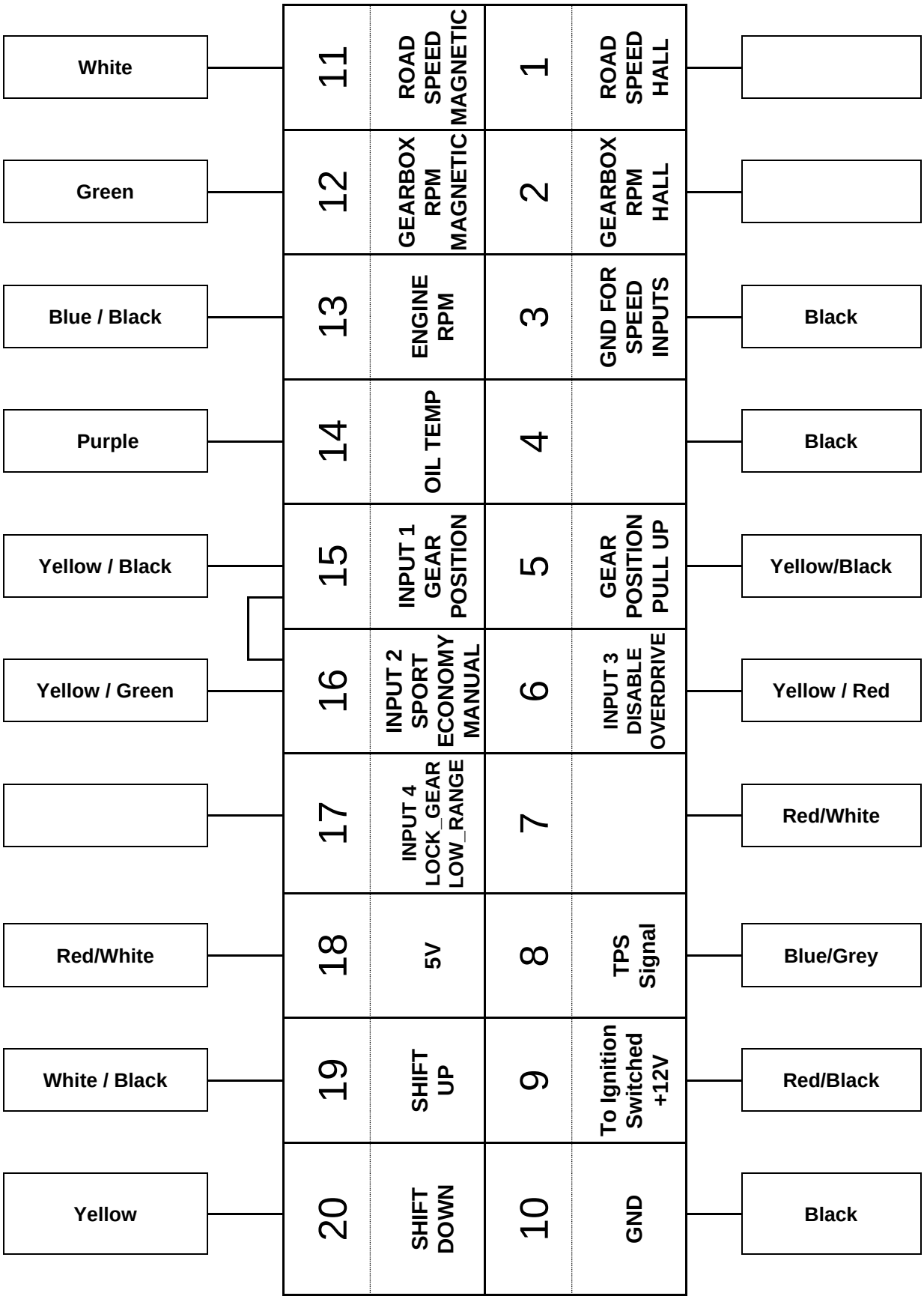
- TPS signal

If there is already a TPS sensor connected for the engine management, you can tie into that signal and calibrate it. If not, you will have to supply the TPS with 5V positive and ground from the signal ground.

- Tiptronic signals

The two inputs must be grounded to initialise an Up shift or a down shift when in “Manual” mode.

Input Pin Positions

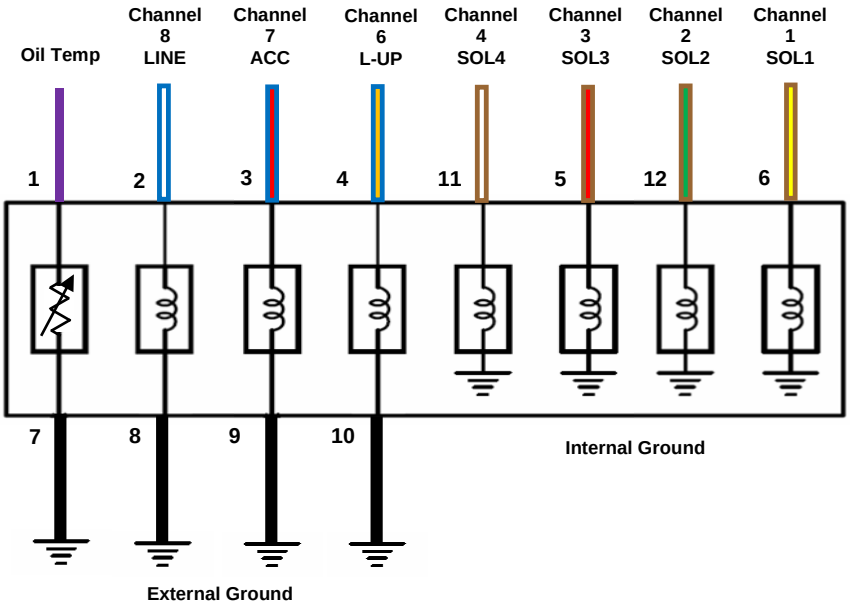


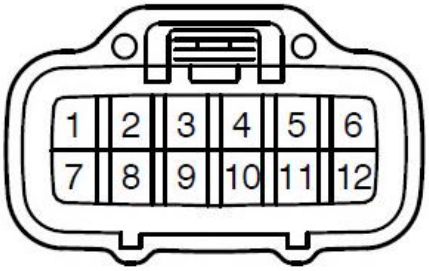
4. Connecting the Controller Outputs

- Solenoids

All the solenoid outputs on the Dicktator transmission controller are active HIGH. (The controller supplies the positive to the solenoid and the other end should be grounded) Some solenoids are grounded inside the transmission and others are connected to ground externally. Below are examples of both internally and externally grounded solenoids. Ensure that all solenoids are connected to a good earth. The positive wire on the solenoid plug must be connected to positive 12V.

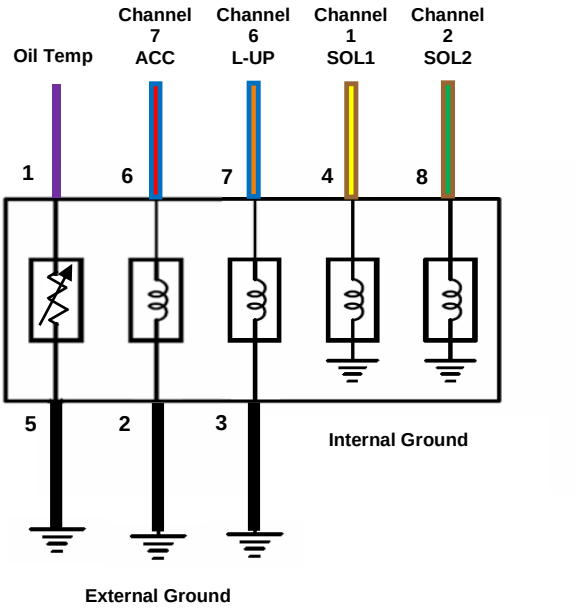
Solenoid Connectors

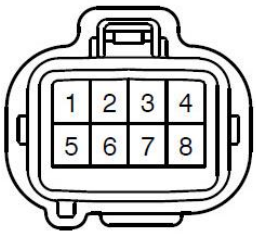




Connector Plug as viewed from Pins

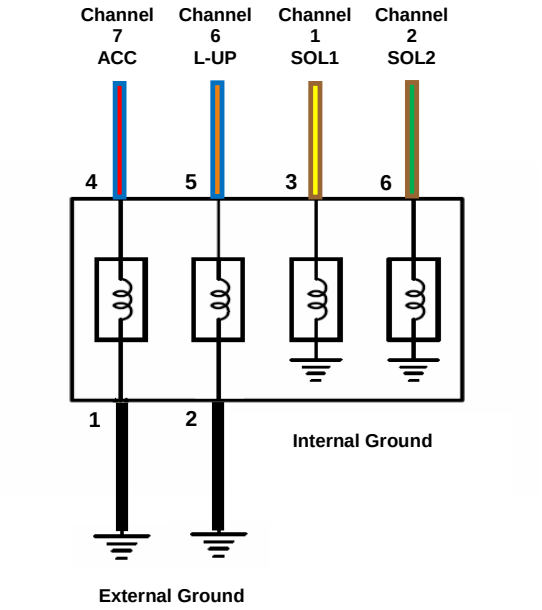
Solenoid Connections for Five Speed Transmission A650E





Connector Plug as viewed from Pins

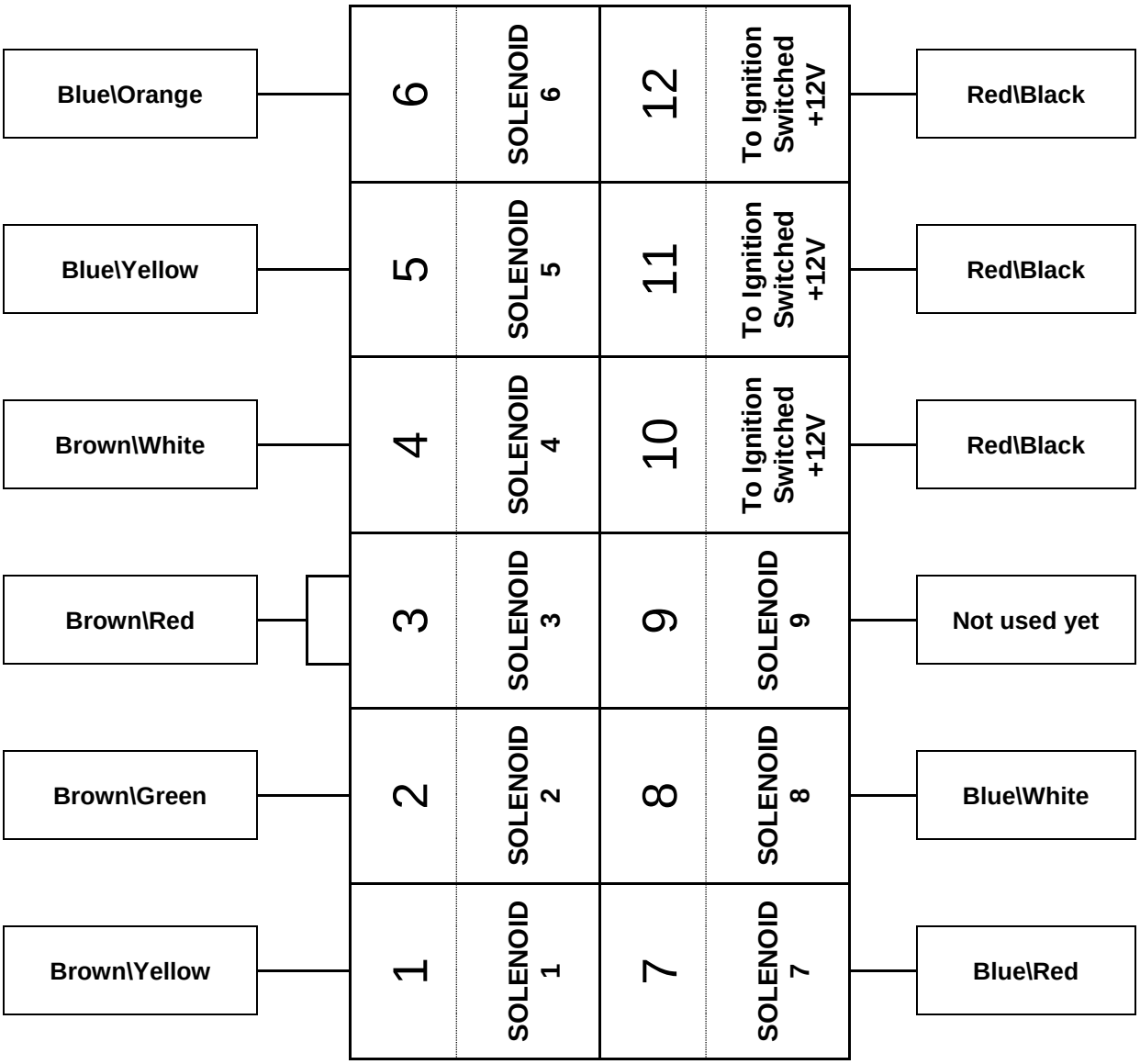
Solenoid Connections for Four Speed Transmission with Temp Sensor A340E



Connector Plug as viewed from Pins

Solenoid Connections for Four Speed Transmission without Temp Sensor A340E

Output Solenoid Positions



5. Minimum Requirements

- Four Speed (A340E)

  - Signals Required for proper operation:
    - Gear Position Switch
    - Economy Map selected (If not connected, set Economy Map selection on default voltage on Inputs Setup)
    - Engine RPM input
    - Road speed input
    - Throttle position input
    - All the values on the Main Setup Page must be completed correctly except the “Torque Converter Teeth”
    - When using the “2” or “1” selection on the Gear Position Selector, the “EB1” and “EB2” must be completed on the Solenoid Page.
    - Selector 4 (Lock-Gear, Transfer Case) must be set on option 4 on default voltage on Inputs Setup

  - Signals not required for proper operation:
    - Oil Temp
    - Torque converter speed and “Torque Converter Teeth”
    - Selector 2 (Economy, Sport, Manual)
    - Selector 3 (Disable Overdrive)
    - Selector 4 (Lock-Gear, Transfer Case)
    - Tiptronic Up and Down

- Five Speed (A650E)

  - Signals Required for proper operation:
    - Gear Position Switch
    - Economy Map selected (If not connected, set Economy Map selection on default voltage on Inputs Setup)
    - Engine RPM input
    - Torque Converter RPM
    - Road speed input
    - Throttle position input
    - All the values on the Main Setup Page must be completed correctly
    - When using the “2” or “1” selection on the Gear Position Selector, the “EB1” and “EB2” must be completed on the Solenoid Page.
    - Selector 4 (Lock-Gear, Transfer Case) must be set on option 4 on default voltage on Inputs Setup

  - Signals not required for proper operation:
    - Selector 2 (Economy, Sport, Manual)
    - Selector 3 (Disable Overdrive)
    - Selector 4 (Lock-Gear, Transfer Case)
    - Tiptronic Up and Down