

SSV4

Fully programmable automatic and manual paddle shifting for your car

Warning:

Before proceeding you are obligated to read and agree to the terms and conditions attached to this manual. Misuse of this product may cause injury or death. Incorrect installation may cause damage to your vehicle and may void the warranty.

Installation

For questions or technical support, email tech@latentsolutions.com

1. Wiring Reference:

<u>Wire Color</u>	<u>Number</u>	<u>Description</u>
Black	1	Ground
White	2	Manual / Auto Selector (0 volts = auto, 12 volts = man)
Red	3	Ignition +
Light Blue	4	Solenoid 1 In
Tan	5	Solenoid 2 In
Orange	8	MPH
Dark Green	9	Throttle Position
Brown	10	Paddle / Upshift
Light Green	11	RPM (crank / cam angle sensor)
White/Blue	12	Brake Signal
Pink	13	Solenoid 1
Gray	14	Solenoid 2
Dark Blue	15	Solenoid Lockup
Purple	16	Shift Light (100 ma max load)
White / Brown	17	Downshift
Clear	18	WOT relay "in"
Clear / White	19	WOT relay "out"
Yellow	20	Shift Table (0 volts = 1, 12 volts = 2)

2. Initial Tests

After connecting all of the SSV4 wires, start by turning the car's ignition to on (do not start the car). The SSV4 unit will click twice. Select manual shifting mode by applying 12 volts through a user supplied switch to the white wire. Shift up and down through the gears. Default shifting is accomplished by applying 12 volts through user supplied momentary switches to the brown and white / brown wires for upshift and downshift, respectively. You should hear a distinctive click in the SSV4 box and in the transmission for each shift. The SSV4 is now ready to operate in manual mode.

You must use a personal computer to configure the unit for your vehicle according to the "Initial Setup" section of this manual to enable proper operation of all options and the automatic shifting mode.

Initial Setup

The software settings of the SSv4 must be updated for your vehicle before the Automatic mode of the SSv4 may be used. Connect your personal computer via serial cable to the SSv4's serial port and start your computer's terminal program. For windows 95, 98, Millennium, XP, 2000, 2003, and Vista you will use HyperTerminal. Access this program from the start menu / programs / accessories / communications / HyperTerminal.

Follow the cues and set the program up to use the serial port you have connected the SSv4 to, using **19200 bits per second, 8 data bits, None for parity, 1 stop bit, and hardware flow control**. Turn the ignition to "on", and you will be presented with the SSv4's initial screen.

```
SupraStick Version: 4.6: Press 1 for user config
M G TH SPD RPM
a 1 15 0 0 _
```

Press "1" to enter the General Settings menu.

To navigate the menus, simply press the number key that corresponds with the line number you wish to access.

```
General Settings
1. Diagnostics
-----
2. Logging: 0
3. Shift Light RPM: 5500
4. Speed Display : MPH
5. Automap: 0
-----
6. Shift Tables:
-----
7. Vehicle Settings:
8. Shift Settings:
-----
9. Reset to defaults:
0. Exit and Save:
Enter your selection -->
```

The first items that are required to be set for proper operation are under the "Vehicle Settings" submenu, option 7.

Note:

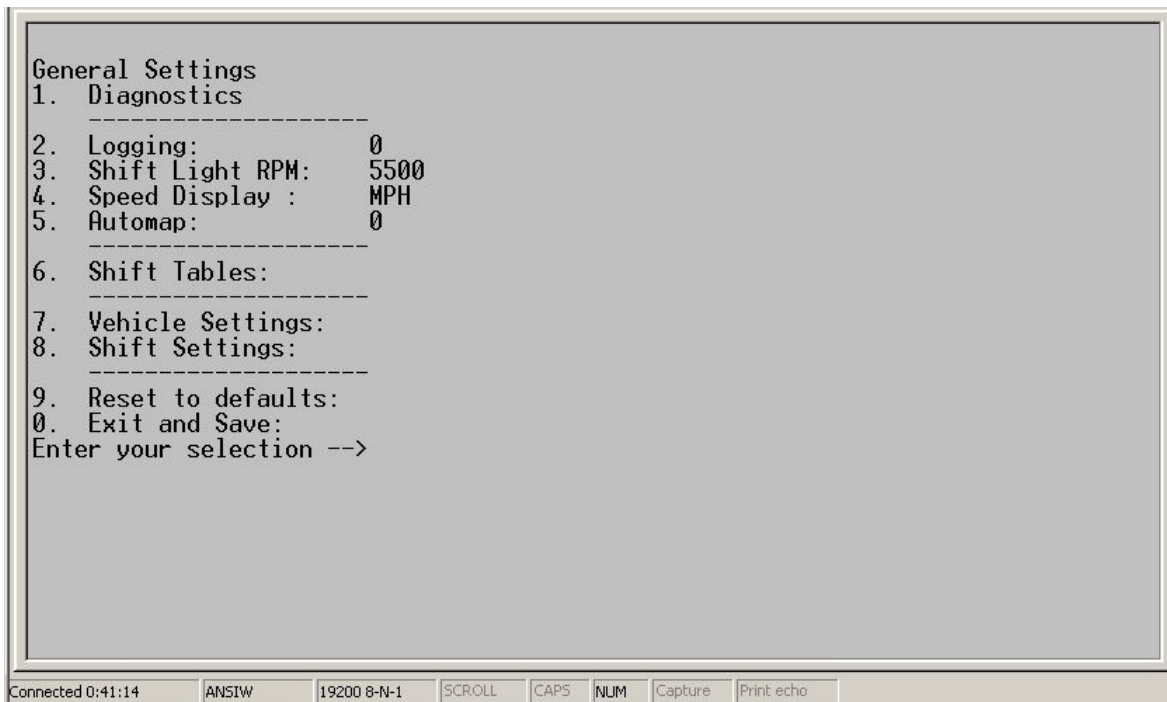
Vehicle Speed, RPM, and throttle displayed by the SSv4 must match your vehicle's actual speed, rpm, and throttle position or automatic mode will not operate correctly. Vehicle speed is configured by a combination of 3 settings. Speed sensor teeth, tire size and rear end ratio all factor into the speed calculation. Any speed sensor that does not vary by gear may be used to read speed. If the sensor you choose to use is on the driveline, you must set the rear end ratio setting to account for the reduction gearing in the rear end. If you are using a wheel mounted speed sensor (an ABS sensor for example), then the rear end ratio setting would be "1" for no reduction.

```
Vehicle Settings:
1. RPM sensor teeth: 12
2. Speed sensor teeth: 20
3. Rear end ratio: 41
4. Tire size: 253
5. Stall Speed: 2900
6. Tps max voltage: 445
7. Tps min voltage: 62
8. Downshift Rev limits:
9. Paddle / Button Settings:
0. Exit to main menu and Save:
Enter your selection -->_
```

1. Set the vehicle's Rear End Ratio
2. Set the vehicle's tire size.
Diameter =Width * aspect * 2, + wheel size
Example...185/60R14
185mm x .60=111mm x 2=222mm + 355.6mm(14")= 577.6mm or 22.74"
3. With the car on but not running set the TPS max and min values.
4. With the vehicle's engine running set the Rpm Sensor teeth by adjusting the value up or down to match the vehicle's actual engine rpm.
5. With the vehicle traveling at 20mph set the Speed Sensor teeth by adjusting the value up or down to match the vehicle's actual speed.

After completing these steps you can now drive the car in automatic mode and are ready to adjust the other options of the SSv4, as described in the "General Settings" section of the manual.

General Settings



Diagnostics enables you to check controller functionality and wire connections. Please see the “Diagnostics” section of this manual for more information.

Logging enables you to review commanded shifts by inserting a new line into the terminal display of the main SSv4 status screen. This is useful to troubleshoot shift table problems by recording the MPH and throttle position the SSv4 is seeing. Turn off logging while using an external display.

Shift light rpm sets the rpm at which the unit test signal is lit when in manual mode to be used as a shift light.

Speed Display switches between MPH and KPH display for the SSv4. All menus, displays, and shift tables are affected by this setting.

Automap enables the automapping feature of the SSv4. **Vehicle Speed, RPM, and throttle displayed by the SSv4 must match your vehicle’s actual speed, rpm, and throttle position, and the stock transmission computer must be connected to the SSv4 for the automap feature to operate correctly.** The vehicle will read the gear commanded by the stock ecu as you drive, and fill in the current shift table with that information according to the speed and throttle position observed by the SSv4. The system can only map in conditions that you drive, so you must vary the throttle through each gear.

Shift Tables opens the shift table submenu. Please see the “Shift Table” section of this manual for more information.

Vehicle Settings opens the vehicle settings submenu. Please see the “Vehicle Settings” section of this manual for more information.

Shift Settings opens the shift settings submenu. Please see the “Shift Settings” section of this manual for more information.

Reset to defaults will erase all of your personal configuration settings and restore the factory defaults.

Exit and Save You must choose this menu option to save all of your changes, from any menu, to the memory of the SSv4

Diagnostics

```
Diagnostics (Press 0 to exit)

Press 1 to upshift, 2 to downshift, 3 to lock TC, and 4 to unlock TC.

::
```

Connected 0:41:28 ANSIW 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

You may check the shift functionality of the controller while in this menu by pressing 1 to upshift, 2 to downshift, and 3/4 to lock and unlock the torque converter. Any solenoid, brake, or shift inputs to the SSv4 will be displayed in text on the screen. To test inputs, be sure to input only one signal at a time.

Shift Table

TBL: 1	1>2	2>3	3>4	4>3	3>2	2>1
5	9	16	26	17	12	7
10	9	19	26	22	14	7
15	9	19	26	22	14	7
20	14	23	42	22	14	7
25	14	23	42	22	14	7
30	19	32	53	37	17	11
35	19	32	53	37	17	11
40	22	43	62	50	20	12
45	22	43	62	50	20	12
50	22	43	62	50	20	12
55	23	50	74	60	35	17
60	23	50	74	60	35	17
65	23	50	74	60	35	17
70	27	57	87	68	48	20
75	27	57	87	68	48	20
80	27	57	87	68	48	20
85	27	57	87	68	48	20
90	32	65	94	86	62	28
95	32	65	94	86	62	28
100	32	65	94	86	62	28

Press 7, 8, 5, 9 to move right, up, down and left.
Press 1 to increase, 2 to decrease, or 3 to Exit & Save: _

This menu shows the automatic shift table of the SSv4. There are two user adjustable shift tables. The current table is indicated in the top left corner of the screen. It is arranged by rows based on throttle position, and columns based on shifts.

The table data is speed in either miles or kilometers per hour, depending on the Speed display setting on the general setting menu.

For upshifts, the shift will occur if the mph is greater than the table data for that shift and throttle position. For downshifts, the shift will occur if the mph is lower than the table data for that shift and throttle position.

Navigate the table by using the “7”, “8”, “9”, and “5” keys. The highlight will indicate what cell you are in. To change the cell value, use the “1” and “2” keys.

Vehicle Speed, RPM, and throttle displayed by the SSv4 must match your vehicle’s actual speed, rpm, and throttle position or automatic mode will not operate correctly. Ensure that automapping is set to off, or the changes you make to the shift table will be overwritten

Vehicle Settings

```
Vehicle Settings:
1. RPM sensor teeth:      12
2. Speed sensor teeth:   20
3. Rear end ratio:       41
4. Tire size:            253
5. Stall Speed:         2900
6. Tps max voltage:     445
7. Tps min voltage:     62
8. Downshift Rev limits:
9. Paddle / Button Settings:
0. Exit to main menu and Save:
Enter your selection -->_

Connected 0:42:00  ANSIW  19200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

RPM sensor teeth should be set to the number of signals per rotation (the number of teeth on the sensor) If you are unsure as to the number, adjust the number until the rpm display matches the engine's rpm.

Speed sensor teeth should be set to the number of signals per rotation (the number of teeth on the sensor) If you are unsure as to the number, adjust the number until the mph display matches the vehicle's speed after you have set the correct tire size and rear end ratio.

Rear end ratio should be set to your car's actual rear end ratio, using only 1 decimal place and no decimal point. IE: for a 4.11 rear end, enter 41.

Tire size should be set to you tire's actual diameter (not wheel size), using only 1 decimal place and no decimal point. IE: for a 24.9 inch tire, enter 249

Stall speed should be set to the stall speed of your torque converter. You may wish to vary the value from the actual stall speed to adjust the performance to your personal preferences, as it affects the rpm at which the torque converter locks up. The actual rpm at which lockup begins and ends is based on the stall speed setting, current gear, and throttle position.

Tps min / max voltage should be set to the voltage the tps outputs at wide open throttle, using only 2 decimal places and no decimal point. IE: for 3.75 volts, enter 375. This setting sets the scale of the tps and is a major factor in the automatic shift computation. **Engine off voltage readings may be lower than voltages under Wide Open Throttle conditions, and incorrect settings will affect automatic shifting.**

Downshift Rev limits is used to compute the downshift lockout. The SSv4 will not allow you to downshift in manual mode if the rpm will exceed this value for the associated gear when the car is downshifted.

Paddle / Button Settings sets the voltages, wires, and settings for shifting in Manual mode.

```
Button / Paddle lockout on shift (miliseconds): 100
Paddle Shift Voltages:
1 wire upshift / downshift disabled.
Upshift: Paddle wire
Downshift: Downshift Wire

(use only 1 decimal places and no decimal point ie:35 for 3.55)
Press 7 to enable, 8 to disable the one wire (voltage shift) paddle mode.
Press 1 to increase the Downshift, 4 for the Upshift, 2/5 to decrease.

Press 6 to increase the shift lockout, 3 to decrease, and 0 to exit.

Current / Min / Max Voltage
0      / 0      / 0      _
```

Connected 0:42:14 ANSIW 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Button / Paddle lockout sets the amount of time the SSv4 will wait before looking for the next shift command. This helps prevent accidental double shifts.

One Wire Shifting uses a single wire to shift and looks for 2 distinct voltages (+- one volt) to command the shift. This is used with factory cruise control wires to enable the cruise control buttons to shift the SSv4. Ensure these two voltages are at least 2 volts apart. **Engine off voltage readings may be lower than voltages under Wide Open Throttle conditions, and incorrect settings will affect manual shifting.**

Two Wire Shifting uses separate wires for up and down shifting.

Shift Settings

```
Shift & Lockup Settings:
1. Lockup throttle:           45
2. Lockup min gear (auto):    1
3. Lockup min gear (manual):  1
4. 4th gear Lockup on / off SPD: 43/30
5. 3rd gear Lockup on / off SPD: 43/30
6. Auto shift first gear:     0
7. Lockup delay:              200
8. WOT relay throttle position: 90
-----
9. Shift Solenoid Setup
-----
0. Exit to main menu and Save:
Enter your selection -->
```

Connected 0:42:31 ANSIW 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Lockup throttle sets the minimum throttle required to lock up the torque converter in 1st and 2nd gears. This setting, along with the stall speed setting determine when the torque converter will lock up. Lockup throttle affects hard acceleration situations. Lockup min throttle affects 3rd and 4th gear and is the minimum throttle position the torque converter will stay locked up at. Lockup min throttle affects highway cruising situations.

3rd & 4th gear lockup on/off sets the vehicle speed in mph when the torque converter will lock up with a throttle position greater than “lockup min throttle”.

Auto Shift First Gear will return the vehicle to first gear when 0 speed is sensed. If this is enabled and the speed sensor is not functioning, no shifts will be possible.

Lockup delay sets the “wait time” between shifts before the torque converter is allowed to lock up again. Setting the lockup delay to “0” keeps the torque converter locked up during the shift sequence, **as long as all torque converter prerequisites are maintained**. This is recommended as a “race only” mode as it will put much more stress on the transmission.

WOT relay throttle position sets the throttle position for the “wide open throttle” relay. Below this throttle position the WOT relay “in” wire voltage is passed on the WOT relay “out” wire, and above this throttle position, ground is passed on the WOT relay “out” wire.

Shift Solenoid setup sets shift pattern of the SSv4. The stock shift pattern is correct for Toyota and Lexus applications.

```
Shift Solenoids:
Gear   Sol1   SOL2
1      ON     OFF
2      ON     ON
3      OFF    ON
4      OFF    OFF
Select the gear to adjust (1-4) or press 0 to exit:_
```

Connected 0:44:49 ANSIW 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

Shift Pattern Reference

Toyota		
Gear	Sol 1	Sol 2
1	On	Off
2	On	On
3	Off	On
4	Off	Off

Nissan		
Gear	Sol 1	Sol 2
1	On	On
2	Off	On
3	Off	Off
4	On	Off

Operation

The system operates in two modes: Normal Automatic Mode and Manual Shifting Mode. You may switch between the modes at any time. Normal Auto mode operates identically to the stock system, and uses the shift table selected by the voltage applied to the yellow wire. No user intervention is required. Selecting Manual Shifting Mode places the driver in full control of all shifts – any shift the car makes will be in direct response to an up or downshift you command.

Use extreme care, especially in low gears, not to over rev the transmission. You are responsible for shifting in manual shifting mode.

The system **will** prevent accidental downshifts at an rpm that will redline the engine upon downshifting.

Use extreme care downshifting at high rpm. The system is designed to the limits of the car and an experienced driver

Tech Tips & F.A.Q.

In Manual mode, SSv4 employs an aggressive lockup scheme in all 4 gears to improve shifting speed and deliver more power to the wheels. In first and second gears, with at least the user-configured “lockup throttle” throttle position the system will be eligible for lockup, depending on engine rpm, throttle position, and stall speed setting.

You can delay lockup while shifting gears to help control wheel spin or traction loss by not releasing the shift button or lever upon shifting. **The system will wait for release, plus the user defined “lockup delay” before enabling lockup computation, and plus the user defined “button / paddle lockout delay” before allowing another shift.**

SSv4 uses the brake signal input to disable torque converter lockup while the brakes are applied.

The system will fail to operate if the RPM wire is not connected. If downshift rev protection is not desired (**not recommended**) connect this wire to ground to bypass RPM checking.

Connect the serial port to a 16x2 serial display for an in car display of the current mode, gear, lockup, throttle, mph, and rpm!

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As to the Installation Manual:

WARNING: READ AND UNDERSTAND **ALL** INSTRUCTIONS BEFORE INSTALLING THE SSV4.

WARNING: THE SSV4 MAY NOT COMPLY WITH SOME JURISDICTION’S LAWS. PLEASE CHECK ALL APPLICABLE LAWS BEFORE INSTALLING OR USING THE SSV4 TO ENSURE THAT YOU ARE IN COMPLIANCE WITH THE LAWS. LATENT SOLUTIONS WILL NOT BE HELD RESPONSIBLE FOR THOSE INDIVIDUALS WHO DO NOT FOLLOW THE APPLICABLE LAWS AS TO THE INSTALLATION AND USE OF THE SSV4.