Spitronics Simulator3

Introduction

The Spitronics Simulator is a diagnostic tool designed to help you test Spitronics products. It has Potentiometers to simulate analogue inputs and LED's to simulate digital outputs.

The Spitronics simulator is compatible with:
EMU, Titan, Venus, Venus2, Venus3, Pluto, Pluto2, Saturn, Orion, Orion2, Mercury and Mercury2
Firing modules; F10, F11 and Mercury Coil Drivers
Idle control models 1 and 2 Type 1 and 2.
Selective non Spitronics management units with the correct harness for the simulator.

Please read through the manual to make sure you follow the correct setup requirements.

Hardware Setup

Each product requires a unique harness to connect to the Simulator3. Do not use other product harness as it my connect outputs together and destroy the simulator or your product.

Important!

ECU's is automatically grounded through the 12 way connector, do not apply a separate ground to the unit, unless testing an old EMU, TCU

Power is supplied to the simulator through the round 12V DC jack that is fitted to the simulator either through the 220/12V power supply sold with the unit or 12V battery via a 12V harness with clamps. Do not make polarity mistakes for the 12V option.

Connecting Instructions

Connect the power supply to the 12V jack on the simulator.
Connect the simulator with the device that is tested with the specified harness.
Make sure the green power (PWR) LED on the simulator comes on when power is applied. If it does not come on switch of and investigate. the device tested may be damaged making a short on the simulator.
Ensure the power LED of the device being tested comes on.

Inputs and Outputs

The LED Indicators on the simulator can be used differently for the different products. Each product has a GP Priority Layout sheets that will indicate which LED is used for which output. Below is a list as it is used for Mercury2 which has the most outputs.

Digital Outputs

Relay = Fuel Relay
P7 = Positive Coil Driver 7
P5 = Positive Coil Driver 5
P3 = Positive Coil Driver 3
P1 = Positive Coil Driver 1
GP1   = General Purpose Output 1
N1 = Negative Injector Driver 1
N3 = Negative Injector Driver 3
N5 = Negative Injector Driver 5
N7 = Negative Injector Driver 7
GP2 = General Purpose Output 2
PWR = Power

E-Relay = Electronic Relay
P8 = Positive Coil Driver 8
P6 = Positive Coil Driver 6
P4 = Positive Coil Driver 4
P2 = Positive Coil Driver 2
RPM = RPM Output
N2 = Negative Injector Driver 2
N4 = Negative Injector Driver 4
N6 = Negative Injector Driver 6
N8 = Negative Injector Driver 8
5V = Monitor the Mercury2 5V Output
TRIG = Simulator Trigger

Analogue Input Potentiometers

TPS = Throttle Position Sensor
POT = Potentiometer
MAP = Manifold Absolute Pressure Sensor
Altitude = Altitude Pressure Sensor
Water = Water Temp Sensor
Air = Air Temp Sensor

RPM = Engine Revolutions per minute
Cam1 = Cam Sensor Degrees
Cam2 = Cam Sensor Degrees
Speed = Road Speed
Lambda = Exhaust Gas Sensor
Fuel Pressure = Fuel Pressure Sensor

Digital Inputs

Up and Down Buttons
These two buttons are mainly for TCU testing to simulate the up and down shift buttons. The buttons are connected to the DB44 and can be used for other purposes as well.

Program Button

The program button is not only there to put the simulator in the correct program, it can be used to change the RPM speed to simulate high and low speeds as well as removing RPM from the unit to test start-up or fuel relay. If the simulator is set on 0 RPM and the power is removed for a very short time and put back on again the PRM's will still be 0 and the unit will switch the fuel relay driver on and then off again if there is still no RPM's to simulate fuel pump prime when the key is turned on.

Connecters

DB44

The DB44 connecter has all the connections for inputs and outputs from the simulator to the devices being tested.

12V DC Power Jack

The Power Jack for applying power to the Simulator.

6Way

The 6Way connecter connects to USB Debug Adapter or firmware programmer so you can update your simulator's firmware if there are new features available. Be sure to never upload incorrect firmware into the simulator as it will lock the internal processor. Once the processor is locked the simulator will have to be sent back to Spitronics to be repaired.

8Way

The 8Way is for future use

Signal Simulating

The simulator is capable of simulating Crank Cam's and Speed sensor pulses to test different firmware's. These pulses represent a pattern that is generated on different cars. Crank pulses that are generic like 60-2, 36-1 etc. is called a generic name. Other that is more type specific like Nissan etc. will have a Nissan in the name. These different patterns can be selected by the program button located on the simulator.

Changing Engine Programs or Patterns.

Note
When programming the Simulator, the TRIG LED will flash slowly indication a number from 0 to 9. Two rapid flashes indicates a zero. A pause indicate end of one digit and then a next digit will start. There is always 2 digits which means up to 99 different programs can be selected.

To change a program switch the simulator off.
Hold the PROG button in while turning the power on to enter program mode.
Release the button and press it once.
The green TRG LED will indicate the current program number of the simulator.
If it is 2 fast flashes followed by 5 slow flashes then it means zero and five which indicates program 05.

If it is 5 slow flashes followed by 2 fast flashes then it means five and zero which indicates program 50.
If it is 2 slow flashes followed by 9 fast flashes then it means two and nine which indicates program 29.
Note there is a longer delay between the 2 digits to indicate their separation.

If the simulator is in the correct program and if you do not want to change the program, then simply switch the power off and on again to go back to run mode.

To Enter a new program you must enter the 2 digits separately. After each group the TRIG LED will flash the same value back to acknowledge your input. to enter a Zero enter a value of 10 or more. The simulator will see it as a zero.
 If you want to select program 09 push the Prog button 10 times or more. The TRG LED will flash two times fast indicating a zero. Then enter 9 pulses and the TRG LED will do 9 flashes. Now you can put the simulator off and on and it will enter run mode again.
Another example program 20. Push the Prog button 2 times. The TRG LED will do 2 flashes. Then enter 10 or more pulses and the TRG LED will do 2 flashes fast indicating a zero. Now you can put the simulator off and on and it will enter run mode again.

Changing Simulator Firmware

The simulator firmware can be updated as new versions are released. In most cases the new firmware will activate more triggers to be simulated and new features. It uses the USB Debug Adapter which have a manual of its own if you are not familiar with it.

Important!
Remember to hold the power button down when connecting to the simulator with the firmware programmer, the unit has a build in power relay which means as soon as you connect the firmware programmer the relay will deactivate and the power for the simulator will switch off.

Testing a Spitronics TCU

Note that when testing a TCU unit on the simulator that the inputs and output will work different from an ECU. This is because the TCU requires the Up and Down buttons. They require different harnesses and they will also switch on the N7 and N8 LED's.

When testing a TCU, put the simulator in program 45. With this program you can change the engine RPM and road speed individually to simulate what happens on a vehicle while driving.

Simulator tags were designed for the ECU. Most TCU harnesses and programs will use the MAP input to change between 4 Shifter Profiles or tuning maps. The POT will be used for Shifter Sensor analogue. Water and Air sensors will alternate between Oil temperature and Low range input.

Simulator Program Numbers

Crank Gears

Program 1   8-1 Gear
•   7 Teeth Crank Pulse with 1 Tooth Slot

Program 2   12-1 Gear
•   11 Teeth Crank Pulse with 1 Tooth Slot

Program 3   12+1 Gear
•   12 Teeth Crank Pulse with 1 TDC Tooth

Program 4   12+Home Gear
•   12 Tooth Crank Pulse
•   1 Tooth Cam Home Pulse

Program 5   18-1 Gear
•   17 Teeth Crank Pulse with 1 Tooth Slot

Program 6   24-1
•   23 Teeth Crank Pulse with 1 Tooth Slot

Program 7   24-2 Gear
•   22 Teeth Crank Pulse with 2 Tooth Slot

Program 8   30-2 Gear
•   28 Teeth Crank Pulse with 2 Tooth Slot

Program 9   36-1 Gear
•   35 Teeth Crank Pulse with 1 Tooth Slot

Program 10   36-2 Gear
•   34 Teeth Crank Pulse with 2 Tooth Slot

Program 11   60-1 Gear
•   59 Teeth Crank Pulse with 1 Tooth Slot

Program 12   60-2 Gear
•   58 Teeth Crank Pulse with 2 Tooth Slot

Program 13   Suzuki 3Cyl 36-4 Gear
•   36 Teeth Crank Pulse with 2x2 Tooth Slots

Program 14   Colt V6 - 18 Pulse/Rpm
•   3 Pulse Crank Gear
•   4 Pulse ID Cam Gear (3 Small 1 Large)

Program 15   Subaru 6&7 Tooth
•   6 Pulse Crank Gear "Weird 6 Tooth"
•   7 Pulse Cam Gear "Weird 7 Tooth"

Program 16   Subaru 36-6 Gear
•   30 Teeth Crank Pulse with 3x2 Tooth Slots

Program 17   Mazda 4+Home
•   4 Tooth Crank Gear
•   1 Tooth Cam Home Pulse

Program 18   Fiat 4Cyl 1.8L 16V 6&3

- 6 Tooth Crank Gear
- 3 Tooth Cam Home Pulse - 1 Small 2 Large

Program 19   18-6 TDC Home Gear
- 12 Teeth Crank Pulse with 3x2 Tooth Slot
- 1 Tooth Cam Home Pulse - 180°

Program 20   Honda 12+3 Home Gear
- 12 Tooth Crank Pulse
- 3 Tooth Cam Home Pulse

Program 21   Nissan 350Z 36-6 Gear
- 30 Teeth Crank Pulse with 3x2 Tooth Slots
- 4 Tooth Cam Home Pulse

Program 22   24+3xTDC
- 24 Teeth Distributor Pulse
- 3 TDC Distributor Pulses

Program 23   60-4 Gear
- 56 Teeth Crank Pulse with 4 Tooth Slot

Program 24   Toyota 2JZ 36-2 Gear
- 34 Teeth Crank Pulse with 2 Tooth Slot
- 3 Tooth Cam Home Pulse Evenly spaced

Program 25   Chev LS1 24T + Home
- 24 Teeth Crank Pulse
- 1 Tooth Cam Home Pulse Toot and slot same size

Program 26   Subaru 6Cyl 36-6 Gear
- 30 Teeth Crank Pulse with 3x2 Tooth Slots
- 3 Teeth Cam Home Pulse Even space

Program 27   Rover 36-4 Gear
- 32 Teeth Crank Pulse with 4x1 Tooth Slots

Program 28   Nissan 36-1-1 Gear + 1,3,4,2 Home V8
- 34 Teeth Crank Pulse with 2x1 Tooth Slots
- 10 Teeth Cam Home Pulse

Program 29   Nissan 36-2-2 Gear + 1,3,4,2 Home V8
- 32 Teeth Crank Pulse with 2x1 Tooth Slots
- 10 Teeth Cam Home Pulse

Distributors

Program 30   ECU TEST Program
- Crank Pulse
- TDC Pulse
- Cam1 Pulse

- Cam2 Pulse

Program 31   24+TDC
- 24 Teeth Distributor Pulse
- TDC Distributor Pulse

Program 32   Nissan 4Cyl
- 4 x Progressive Slots Smaller

Program 33   Nissan 6Cyl
- 6 x Progressive Slots Smaller

Program 34   Nissan V8
- 4 x Progressive Slots Smaller + 4 x Intermediate Pulses

Program 35   Ford Slots 8Cyl
- 8 Slots 1 Large 7 Small (Pos Edge)
- Channel 2 Inverted (Neg Edge)

Program 36   Dawoo Matiz 60-6
- 60-2-2-2 Distributor Pulse
- Home Pulse

Program 37   Daihatsu Terios 4Cyl 4+1
- 4 Pulse + 1 Pulse

Program 38   Hundai 4Cyl 16 Valve 1600
- 4 Pulse Timing
- 2 Pulse TDC

Program 39   Mazda 4Cyl
- 4 Pulse Distributer
- 2 Pulse Home

Program 40   Alfa 4Cyl
- 4 Slots - First 2 Large then 2 Small

Program 41

Program 42   Mitsubishi 4Cyl 4G36
- 4 Pulse Timing
- 2 Pulse TDC

Program 43   4Cyl - 12 Pulse/Rpm
- 4 Slots
- 1 Pulse Home

Program 44   Mitsubishi 6Cyl Dizzy
- 6 Pulse Trigger

- 2 Pulse Home (1 Small 1 Large)

Program 45   Gearbox Test program
- Crank Pulse
- Speed Pulse
- Cam 1 Pulse for MERC05 Relay
- Cam 2 Pulse for MERC05 Fire Module

Program 46   24+Home
- 24 Teeth Distributor Pulse
- 1 Home Distributor Pulse

Program 47   16-4 Jeep 2.4 Prog 101 ??

Program 28   PT Cruiser 36-2-2 4Cyl
- 32 Teeth Crank Pulse with 2x2 Tooth Slots
- 7 Teeth Cam Home Pulse 1 Large 6 Small