SMART SENSOR CIRCUIT
SSC

Many who have converted their gasoline cars to E85 will usually manipulate the engine temperature sensor and in that way (try to) fool the car's electronic control unit (E85 makes a cooled car engine harder to start). **I will now present a proven methodology:**

The problem is that alcohol-based fuels do not contribute at any help when the engine is cold and shall be started. Unlike other liquid fuels such as gasoline are alcohols often difficult to gasify, particularly at low temperatures. One simply has to increase the fuel supply so that the active sub-component (gasoline) can be supplied in abundant quantities.

Actually it is not so smart to trim a (cold) spark-ignition engine to thereby get it to start/run normally because the alcohol component is not ready to participate in propulsion - instead it gets lost. It is not only during the start of the engine that requires extra fuel - while the engine is about to heat up must additional fuel/alcohol be added.

Anyway, we will assume that you still wish to manipulate the temperature sensor, thus the temperature sensor located on the engine block. There are also other temperature sensors on a vehicle such as in the air channel, but this sensor is mainly used to calculate the proper quantity of air and contributes (current the fuel quantity) to a lesser extent than the engine sensor. So, if one fool the sensor on the engine block that it is colder than it actually is, will it inevitably result to an increased fuel quantity.

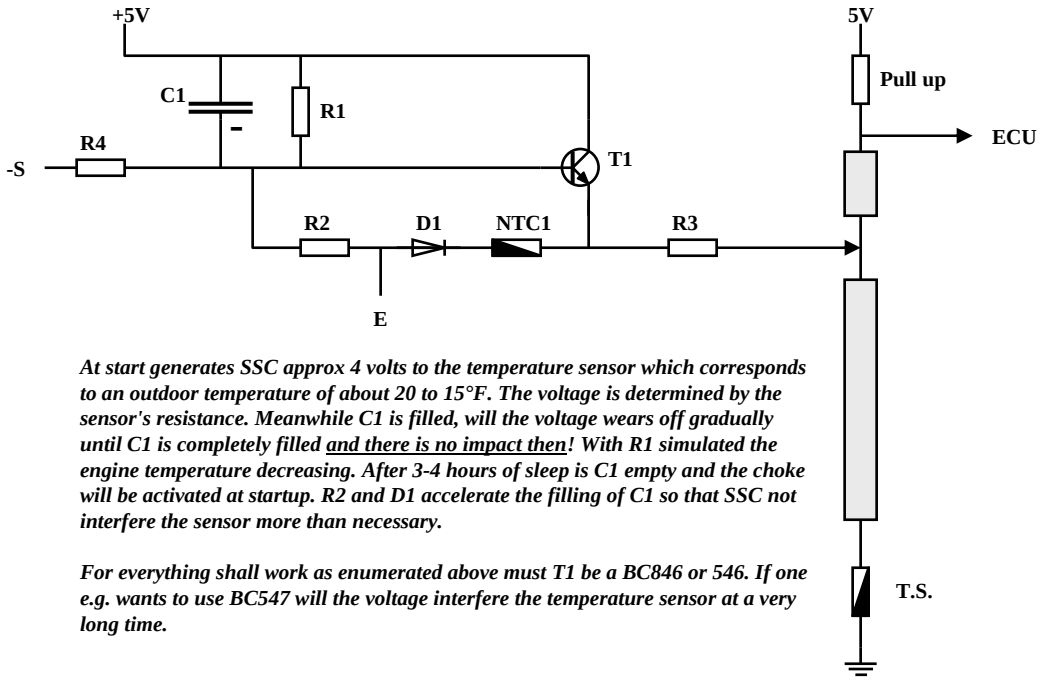
SSC is intelligent into the account the number of parts. With 6 components will one get a circuit that working down to +30°F and not only just start a cold engine (choke), but also - after that - boost the input fuel during the engine warm-up phase. It diminishes then gradually and ceases completely when the engine is adapted to alcohol. This can SSC do and it is the resistor R2 that determines the delay of this decreasing function.

Resistor R3 can be said; smooths extreme situations. If an engine already is warm when it starts, so will it means that the temperature sensor's resistance also is low. When SSC choke the engine (which it always does after a long electric break / downtime) will the sensor resistance plays an important role - is it low will although the voltage across the sensor stay low. The output of the SSC will always depend to some extent by the temperature sensor's resistance.

SSC works almost exclusively with time unless you choose to build the complement circuit - then extend the number of components to six and SSC can operates over an infinite range of temperatures. SSC can then be fed with 12V (instead of 5V) and below 20°F will the supply voltage stepping up to one volt (to 6 volts). In addition, there are a host of other selections for various features and options - maybe you even can convert your car with this concept? SSC does not require that one need to break up existing electronics / cables - just connect it to the temperature sensor warm side. The sensor must be grounded!

CIRCUIT DIAGRAM

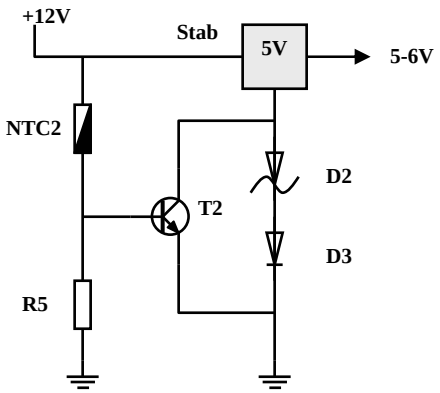
SSC-circuit **Existing electronics**



At start generates SSC approx 4 volts to the temperature sensor which corresponds to an outdoor temperature of about 20 to 15°F. The voltage is determined by the sensor's resistance. Meanwhile C1 is filled, will the voltage wears off gradually until C1 is completely filled <u>and there is no impact then</u>! With R1 simulated the engine temperature decreasing. After 3-4 hours of sleep is C1 empty and the choke will be activated at startup. R2 and D1 accelerate the filling of C1 so that SSC not interfere the sensor more than necessary.

For everything shall work as enumerated above must T1 be a BC846 or 546. If one e.g. wants to use BC547 will the voltage interfere the temperature sensor at a very long time.

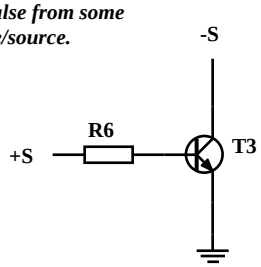
Temperature adjustment circuit (complement)



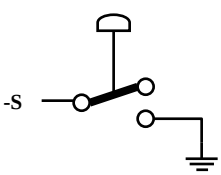
When the temperature drops below +20°F will the circuit switch to 6V so that SSC also can work well in extreme cold.

Switch circuit for turning off (optional)

Allows use of switches or via a voltage pulse from some other device/source.



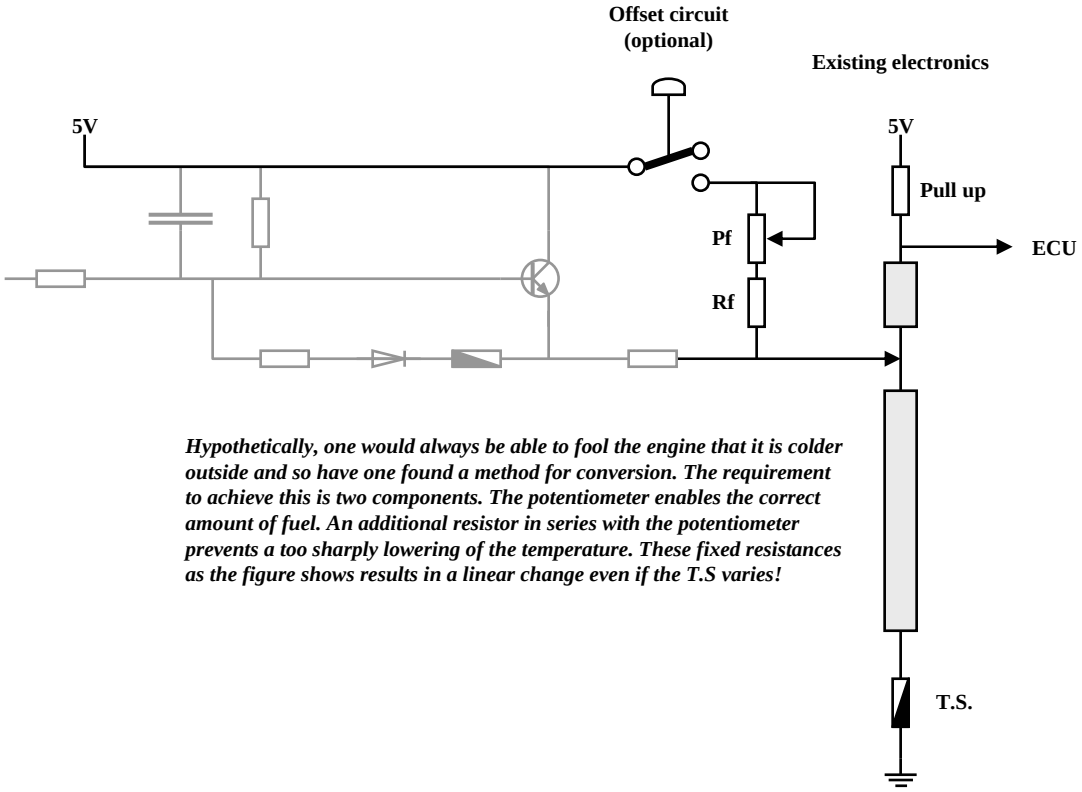
A switch in the cabin (optional)



If one pulls a switch into the cabin can one choose when and how much SSC shall be active.

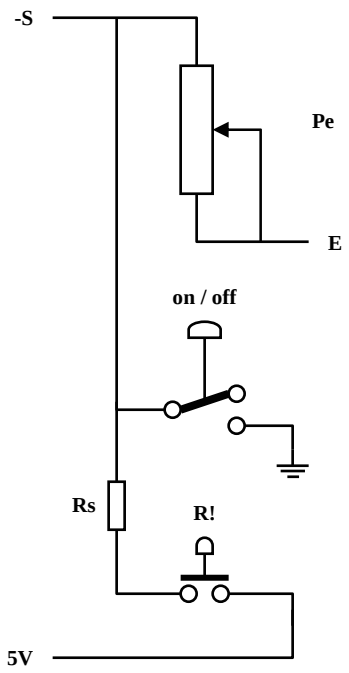
PROJECT	*Smart Sensor Circuit*	
MODULE		
MODEL	**SSC**	
AUDIT	A-2	**DRAWING: 1 of 2**
SUPPLY		
CURRENT		
OTHER	*Tested*	
B. Lindqvist		*2012-06*

CIRCUIT DIAGRAM



Hypothetically, one would always be able to fool the engine that it is colder outside and so have one found a method for conversion. The requirement to achieve this is two components. The potentiometer enables the correct amount of fuel. An additional resistor in series with the potentiometer prevents a too sharply lowering of the temperature. These fixed resistances as the figure shows results in a linear change even if the T.S varies!

Control module - RCW1
(optional)



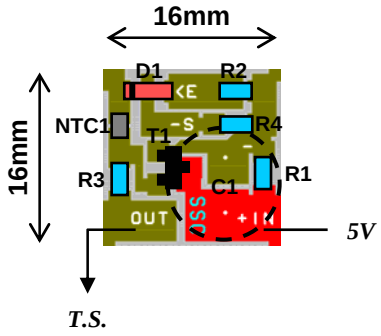
With this module can one remotely turn on or off SSC. With Pe can one set how long it will takes before C1 becomes filled or in other words: How long the extra enrichment will last. If one turn Pe to zero becomes only a short-pulse at choke. "R" restores both choke and the enrichment time.

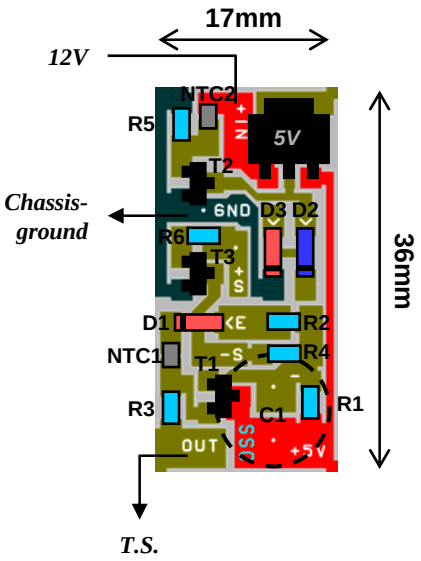
SAM

RCW1 is now prepared also working with SAM. Pe should then be replaced by P21 (50k). At two places on the layout shall the copper track be sanded off. "E" is connected to R21 and the other two against each contact point P21 occupies. A cable with 6 poles are required if all control functions is selected to be available according to the schedule.

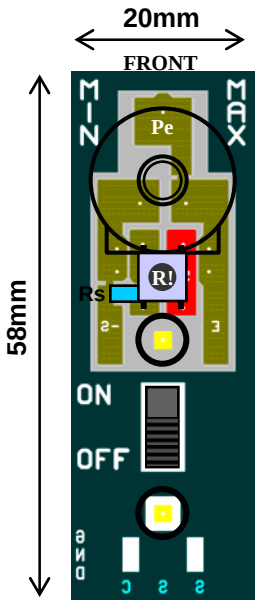
PROJECT	*Smart Sensor Circuit*	
MODULE		
MODEL	**SSC**	
AUDIT	A-2	**DRAWING: 2 of 2**
SUPPLY		
CURRENT		
OTHER		
B. Lindqvist		*2012-11*

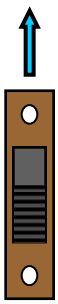
PLACING OF COMPONENTS





RCW1





SMR1206:
R1 = 10M
R2 = 0-220k (82k if NTC1 is used)
R3 = 220Ω if T.S ≈ 1k
If T.S ≈ 2k shall R3 = 470Ω - also cut R2 in half!
R4 = 100-500Ω (optional)
R5 = 820Ω (complement)
R6 = 22k (optional)

Other components:
C1 = 470µ , E-lytic Hole/SMD
D1 = BAS32 (1N4148) , SMD
D2 = BAS85 (BAT85) , SMD (complement)
D3 = BAS32 (1N4148) , SMD (complement)
T1 = BC846B (BC546B) , SMD
T2 = BC847B (BC547B) , SMD (complement)
T3 = BC847B (BC547B) , SMD (optional)
NTC1 = 10k at 25°C , SMD (can be excluded)
NTC2 = 4k7 at 25°C , SMD (complement)
The Stab = LM340MP , 5V , SMD (complement)

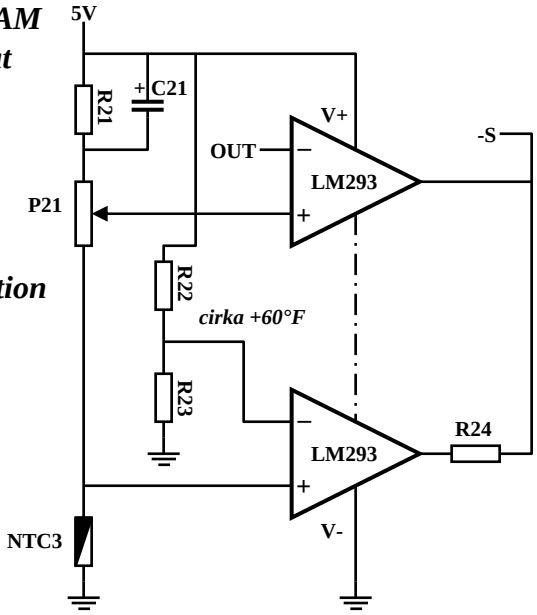
Pe = 100k , PT-15NV(17) , hole mount
Also PT-10 / PTC-10
Rs = 220Ω , SMD
Switch = Elfa: 35-111-82
R! = TACT-Switch, compact snap-in type

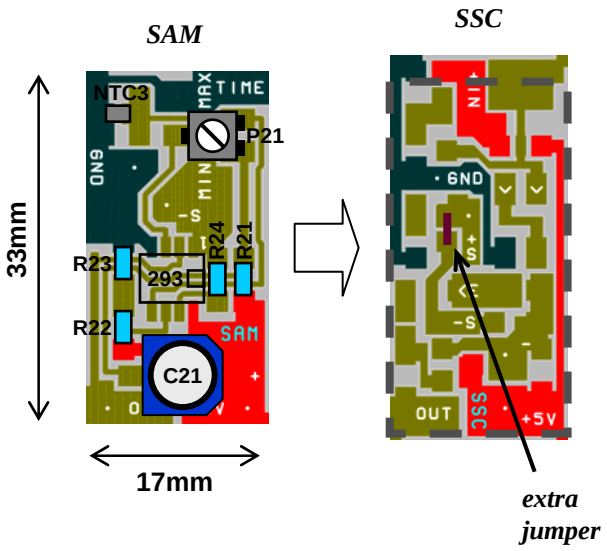
Single side board. All components are surface mounted except C1, Pe and switches. C1 can be an SMD-capacitor. Drill hole for C1, Pe, switches and the strap.

PROJECT	*Smart Sensor Circuit*	
MODULE		
MODEL	**SSC**	
AUDIT	A-2	**DRAWING: 1 of 1**
OTHER	*Tested*	
B. Lindqvist		*2012-11*

MODULE PLACING OF COMPONENTS AND CIRCUIT DIAGRAM

During the spring, summer and fall when the temperature is around 40 degrees or higher, it happens that the idle becomes too high after a cold start. The reason is because SSC keeps the voltage across the T.S although that the choke has done its job and not serves any purpose anymore. SAM allows the choke to work undisturbed but will then begins to turn down the voltage pretty soon, while the idle gets a lower speed - then it stops and SAM allows the enrichment phase proceeds in a customary manner. SAM copy the engine temperature sensor and it will corresponds to a standard K220 type of sensor. The emulation allows obtaining adjacent values of the circuit that suppresses the voltage from SSC. The design also contains a temperature-controlled accelerator, current the enrichment when it's hot out there - it's the lower comparator that controls this function. With SAM shall SSC preferably be located in the cabin but in an inconspicuous place. It is only during cold starts that SAM affects the idle, is the engine already warm (engine heater) causes a high idle no wear. Besides idling reduction, affects P21 the enrichment period and choke. A MAX set P21 does not lead to any idle reduction but the time and choke will be at a maximum - reverse means; large idle reduction while the time and choke becomes minimal. Start from the middle point and adjust until the idle, time and choke is acceptable.





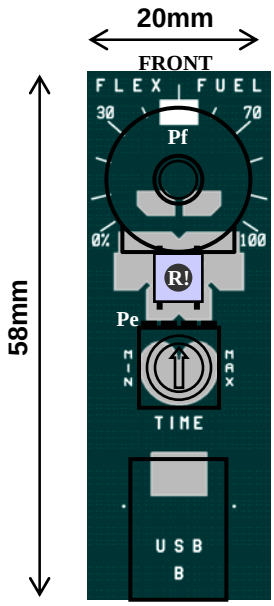
Components:
R21 = 47k , SMD 1206
R22 = 22k , SMD 1206
R23 = 33k , SMD 1206
R24 = 1M5 if R3 = 220Ω , SMD
R24 = 680k if R3 = 470Ω , SMD
P21 = 50k , 23A/B , SMD
C21 = 220µ , E-lytic SMD
NTC3 = 100k at 25°C , SMD
LM293 = Dual comparator , SMD

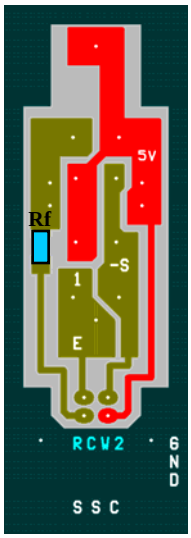
NOTE:
If R3 = 220Ω becomes R2 = 220k
If R3 = 470Ω becomes R2 = 100k

Single side board. All components are surface mounted. The four holes connecting SAM with SSC by wires. SAM is placed over SSC and is soldered via said contact points. Selected SAM_GP shall SAM be etched on the bottom of SSC2 and then requires a double side board!

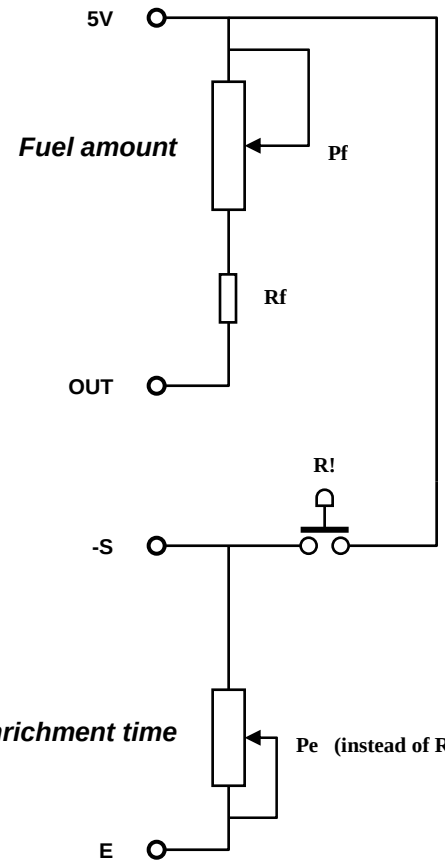
PROJECT	*Smart Sensor Circuit*	
MODULE	*Smart adjustment module*	
MODEL	**SAM**	
AUDIT	A-2	**DRAWING: 1 of 1**
OTHER	*Tested*	
B. Lindqvist		*2012-11*

MODULE PLACING OF COMPONENTS AND CIRCUIT DIAGRAM

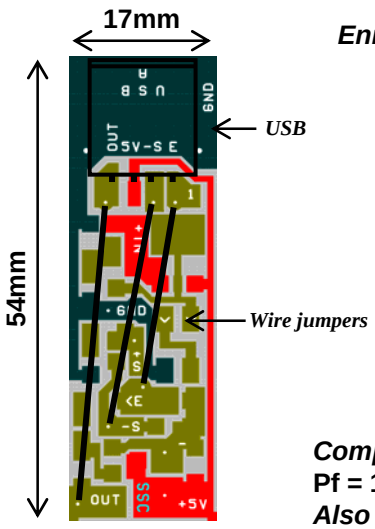




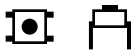
RCW2



SSC3



Components:
Pf = 100k , PT-15NV(17) , hole mount
Also PT-10 / PTC-10
Rf = 1-3k (= ”pull up”) , SMD
Pe = 100k , 72PT , hole mount
USB = USBA and USBB , PCB
R! = TACT-Switch, compact snap-in type

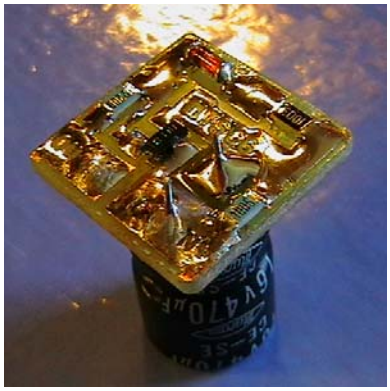


If one draw out the module from the USB-cable will the offset-function stop but SSC is still active! Turn off the unit through unplugging it or with a switch between R3 and T.S.

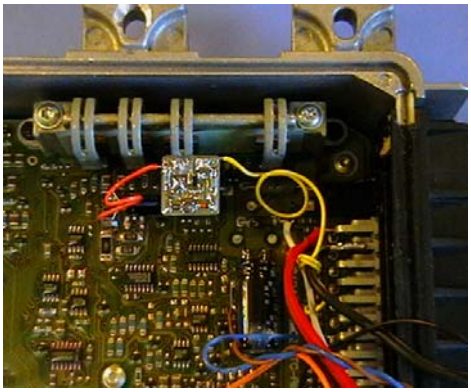
This module require a double side board and a number of holes must be drilled, since it contain both surface- and hole mount components.

PROJECT	*Smart Sensor Circuit*	
MODULE	*Remote control by wire*	
MODEL	**RCW2**	
AUDIT	A-2	**DRAWING: 1 of 1**
OTHER	*Hypothetic!*	
B. Lindqvist		*2012-06*

PHOTOS

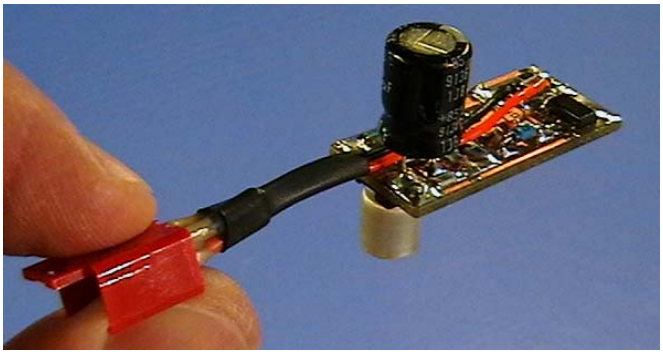


SSC base circuit (earlier prototype)

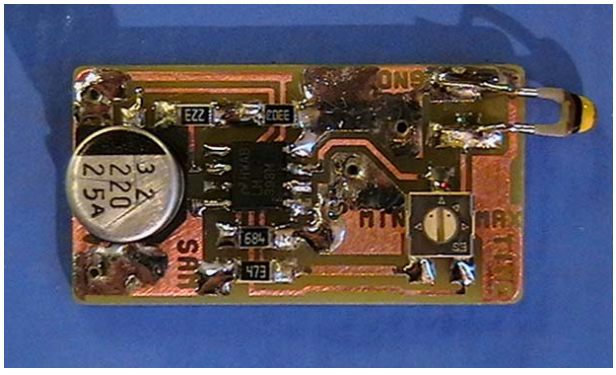


in a ECU

With the complement circuit



SSC (ready to plug) with SAM included



SAM

RCW1