DEVICE CONNECTIONS, RELAY & FUSES, SPEEDUINO MAPPING AND ENGINE DROPPING CONNECTIONS **05/10/22**

SPEEDUINO BOARD

Pin #	Function	Pin #	Function
21	O2 Sensor	20	Inlet Air Temp (IAT)
22	TPS input	19	Coolant (CLT)
23	Signal Ground Shared	unused 18	Proto Area 5
unused 24	Cam Input / VR2+	unused 17	Proto Area 4
25	Crank Input / VR1+/Hall sensor signal	unused 16	Proto Area 3
unused 26	VR2- (Not used for hall sensor)	unused 15	Fan jmp Prot/Ardu pin 47 med output
unused 27	VR1- (Not used for hall sensor)	14	Tach - proto 1 jmp to Tach output pin 49
28	5v supply to Hall sensor	13	5v supply to TPS sensor
unused 29	Idle Stepper 2B	12	Star Engine Ground 20 gauge
unused 30	Idle Stepper 2A	11	MAP Sensor (0v-5v)
unused 31	Idle Stepper 1A	10	Star Engine Ground 20 gauge
unused 32	Idle Stepper 1B	9	Star Engine Ground 20 gauge
unused 33	Ignition 3	unused 8	Ignition 4
34	Ignition 2	7	Ignition 1
35	Fuel Pump ground (remap FP to Arduino 7 in TS-c	6	Injector 2 - Pin 2/2 (controls INJ2& INJ4)
36	PWM Idle 2	5	Injector 2 - Pin 1/2 (controls INJ2& INJ4)
37	PWM Idle 1	unused 4	Injector 3 - Pin 2/2
38		unused 3	Injector 3 - Pin 1/2
unused 39	Injector 4 - Pin 1/2	unused 2	Injector 4 - Pin 2/2
40	Injector 1 - Pin 2/2 (controls INJ1& INJ3)	1	Injector 1 - Pin 1/2 (controls INJ1& INJ3)
+12V	Battery voltage 16 gauge		
GND	Star Engine Ground 16 gauge		

SPEEDUINO BOARD MOD FOR BOSCH COIL PACK

Board mods needed for the 106B (F) ignition coil. Notes from David (PSIG), on the Speeduino forum. Our coils fire with 5V, but to fire reliably, the ignition output resistance on the 4 IGN outputs (R25, R27, R31 & R32 on the v0.4.3 boards), needs to be reduced from the original 160-ohm resistors to a lower value (e.g. 56-ohms or 82-ohms). This will give a higher amperage at 5V and make the coil fire more reliably.

On my board, these are 1 watt resistors (dimensions 11mm x 5mm). I only use IGN1 & IGN2 so I just took the 160-ohm resistors from IGN3 & IGN4 and soldered them in parallel on top of the IGN1 & IGN2 resistors giving 80-ohms output resistance.

SPARE ANALOG INPUT

Arduino A6 appears to be open for use as a spare analog input (Arduino analog inputs are numbered A#)

TACHOMETER OUTPUT

Arduino Pin 49 in the proto area is a low voltage tach output jumpered to IDC pin 14 which goes to the standard bundle

FUEL PUMP CONTROL

IDC Pin 35 to white spare wire to front trunk relay area. Provides ground to fuel pump relay.

Remember to configure Fuel Pump in TS to use Arduino 7 and to config Boost to use Arduino 4 (disable Boost and VVT)

TPS MINI-TIMER CONNECTOR PIGTAILS

	blue +5V
	white - GND
	yellow - signal

IDLE AIR CONTROL MINI-TIMER CONNECTOR

	PWM Idle 1 green
	Switched 12v blue

	PWM Idle 2 red					
BAROMETRIC CORRECTION - 2ND MAP SENSOR						
2nd MAP sensor - cut off the unused 3 pins (pins 4-6) and on top of the MAP sensor on the board connecting pin 3 (+5V)						
and pin 2 (ground)also connected a 330 nf capacitor between pin 1 and ground.						
Pin 1 is the output and is connected through a 470 ohm 1/4 watt resistor to the A7 analog input pad for the Arduino chip.						
Configure using the Tools tab in Tunerstudio and choose Calibrate Pressure Sensors. Enable Baro and tell it which type of						
sensor you're using and connected to analog input pin **A7**.						
2000 GOLF 2.0 IGNITION MODULE CONNECTIONS - FIRING ORDER 1-4-3-2						
Pin 1 = grey Ign A input 1 - fires A & D (plugs 1 & 3)						
Pin 2 = yellow Switched Pwr +12v						
Pin 3 = red Ign B input 2 - fires B & C (plugs 4 & 2)						
Pin 4 = black Gnd						
HALL CRANKSHAFT SENSOR PIGTAILS						
red	5v					
black	signal ground					
white	signal output					
SPARTAN2 WB02						
Red	Switched +12V					
Black	Signal ground					
White	Heater ground - goes to Star Engine Ground					
Green	WBO2 signal output					
Full pin number chart stock v0.4 boards						
Chart consist all pin numbers used in Speeduino Firmware for v0.4 boards.						
Pin numbers are Arduino Mega pin numbers. Not IDC pin numbers.						
This chart can be used as a guide when setting unused default outputs for some other use.						

Pin name	Pin number	Description
pinInjector1	**8**	**Output pin injector 1**
pinInjector2	**9**	**Output pin injector 2**
pinInjector3	**10**	**Output pin injector 3**
pinInjector4	**11**	**Output pin injector 4**
pinInjector5	**12**	**Output pin injector 5**
pinInjector6	**50**	**CAUTION: Uses the same as Coil 4 below.**
pinCoil1	**40**	**Pin for coil 1**
pinCoil2	**38**	**Pin for coil 2**
pinCoil3	**52**	**Pin for coil 3**
pinCoil4	**50**	**Pin for coil 4**
pinCoil5	**34**	**Pin for coil 5 (PLACEHOLDER)**
pinTrigger	**19**	**The CAS pin**
pinTrigger2	**18**	**The Cam Sensor pin**
pinTrigger3	**3**	**The Cam sensor 2 pin (VVT2 input pin)**
pinTPS	**A2**	**TPS input pin**
pinMAP	**A3**	**MAP sensor pin**
pinIAT	**A0**	**IAT sensor pin**
pinCLT	**A1**	**CLS sensor pin**
pinO2	**A8**	**O2 Sensor pin**
pinBat	**A4**	**Battery reference voltage pin**
pinDisplayReset	**48**	**OLED reset pin**

pinTachOut	**49**	**Tacho output pin (Goes to ULN2803)**
pinIdle1	**5**	**Single wire idle control**
pinIdle2	**6**	**2 wire idle control**
pinBoost	**7**	**Boost control**
pinVVT_1	**4**	**Default VVT output**
pinVVT_2	**48**	**Default VVT2 output**
pinFuelPump	**45**	**Fuel pump output (Goes to ULN2803)**
pinStepperDir	**16**	**Direction pin for DRV8825 driver**
pinStepperStep	**17**	**Step pin for DRV8825 driver**
pinStepperEnable	**24**	**Enable pin for DRV8825**
pinFan	**47**	**Pin for the fan output (Goes to ULN2803)**
pinLaunch	**51**	**Can be overwritten below**
pinFlex	**2**	**Flex sensor (Must be external interrupt enabled)**
pinResetControl	**43**	**Reset control output**
pinBaro	**A5**	**Input pin for Baro sensor**
pinVSS	**20**	**VSS input pin**
pinWMIEmpty	**46**	
pinWMIIndicator	**44**	
pinWMIEnabled	42	

SPEEDUINO BOARD v0.4 DEFAULT PIN OUTPUTS - 4 med-current spare outputs (e.g., fuel pump, fan, boost control, VVT)

Function	**Board output**	**Arduino pin**	**Remap or Jump Pin**
Boost control	IDC Pin 35	7	Disable in TunerStudio and point to Arduino Pin 4
VVT	IDC Pin 38	4	Disable in TunerStudio
Idle 1	IDC Pin 37	5	
Idle 2 (3 wire idle valves)	IDC Pin 36	6	
Fuel pump	Proto area (45)	45	Remap Arduino Pin 7 IDC 35
Fan	Proto area (47) jumped	47	Jumper to IDC 15
Tacho	Proto area (49) jumped	49	Jumper to IDC 14
Launch / Clutch	Proto area (51)	51	

DISCONNECTS TO DROP ENGINE

Bulkhead 26 pin connector

Spartan2 WBO2 module to Bosch O2 sensor - exhaust left side

Star Engine Grounds

CLT - Coolant Temp Sensor on left front exhaust stud

Alternator battery cable (insulate or disconnect battery first)

Deutch 8 pin connector for right intake (TPS, INJ1, INJ2, IAT)

Left intake connectors for INJ4 & INJ3

Fuel lines to throttle bodies

Vacuum lines to throttle bodies

Linkage to throttle bodies

Intake manifolds

Rear Relay and Fuse Box

Bosch style relays	**Feeds**	**Bosch Relay Description**
Relay 1	Speeduino	Pin 30: Power into the relay for the accessory device
Relay 2	Ignition Module	Pin 87: Relay switched power out to the accessory device
Relay 3	WBO2 & Injectors	Pin 87a: Hot when relay is at rest. Open when relay is activated
Relay 4	Oil Cooler Fan & IAC	Pin 85: Positive hot line to activate the relay coil
Relay 5	AC Clutch & AC Fan	Pin 86: Ground line to the relay
Relay 6	Unused	

ATC/ATO Fuses	Protects	Load	Fuse Amps	Wires
Fuse 1	Speeduino	5a	10	16 ga
Fuse 2	Ignition Module	6a	10	2 x 16 ga to 2 pins D12 & 3 - Plug-26
Fuse 3	WBO2 & Injectors	5a + 6a	15	16 ga & 2 x 16 ga to 2 pins Plug-26
Fuse 4	Oil Cooler Fan & Idle A	5.3a +5a	15	16 ga to Fan & 16 ga to IAC
Fuse 5	AC Clutch & AC Fan	4a + 6a	15	16 ga green to clutch & 16 ga to AC Fan
Fuse 6	Unused	0a		

FUSE & RELAY BOX LAYOUT

Speeduino & relays coils fuse 10a	Ignition fuse 10a	WBO2 & Inj fuse 15a	Oil Fan/IAC fuse 15a	AC fuse 15a	Unused fuse slot
Fuse 1	Fuse 2	Fuse 3	Fuse 4	Fuse 5	Fuse 6
	WBO2 & Injectors Relay		Unused Relay		
	Relay 3		Relay 6		
	Ignition Module Relay		AC Fan/Clutch Relay		
	Relay 2		Relay 5		
	Speeduino and Relay Coils Relay		Oil Fan & IAC Relay		
	Relay 1		Relay 4		