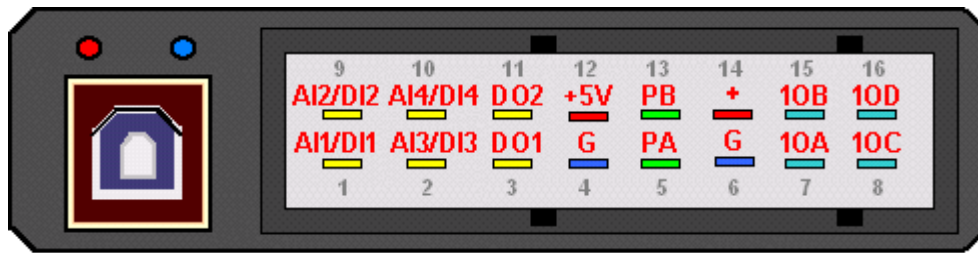


Ideas make future

**ECU MASTER
CDI - TCI
scheme & configuration**

Rev 8.43

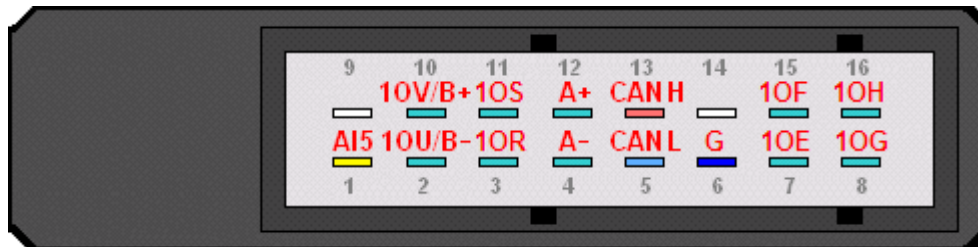
Connector wiring – MASTER front connector (aluminium case)



MARKING	DESCRIPTION	RANGE, ACTIVE LEVEL
+	Voltage supply	7 - 36V
G	Power ground Sensors ground	0V
10A-10D	Switching coils A-D or user output	CDI - Capacitance, resistance 0.1 - 1.5Ω TCI* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ) TCI* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ)
+5V	Power sensors output	+5V, 100mA
PA, PB	Rotation sensor A,B	±25.5V, minimum ±0.1V, sampling 1MSPS
AI1.. AI4 / DI1.. DI4	Analog input AI1..4 Digital input DI1..4	AI1..AI2: 0-5V; AI3..4: 0-5V/ 0-10kΩ DI1..DI2: 0-16V; DI3..4: 0-16V (Pull up 10kΩ)
DO1, DO2	Digital output DO1..2	MOSFET BRIDGE 5A/40V (Pull up 1kΩ)

* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

Connector wiring – MASTER back connector (extended)



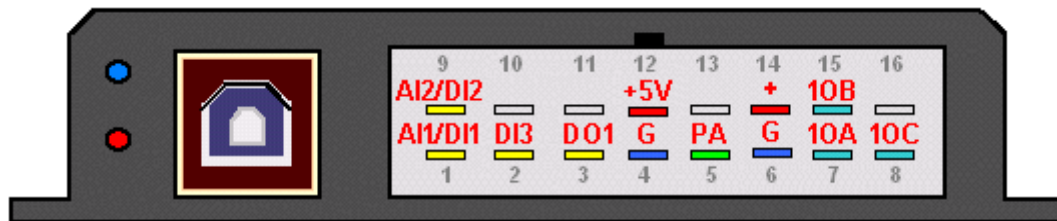
MARKING	DESCRIPTION	RANGE, ACTIVE LEVEL
G	Power ground Sensors ground	0V
CAN H CAN L	CANbus	J1939 / OBD2 and CANopen, 250kbps, 120R
10E-10V	Switching coils E-V or user output	CDI - Capacitance, resistance 0.1 - 1.5Ω TCI* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ) TCI* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ)
AI5	Analog input AI5	AI5: 0-5V
A+,A-,B+,B-	Stepper Motor	1,5A, internal control by signal -10U, 10V

• TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

Connector wiring – LAMBDA back connector (extended)

Please find in document LAMBDA controller (1002-0028-14)

Connector wiring – MASTER MINI (orange plastic case)

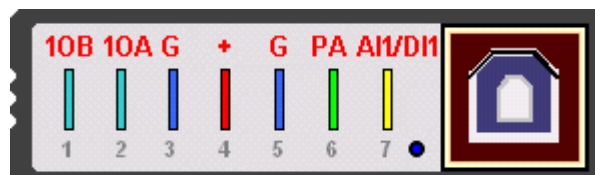


MARKING	DESCRIPTION	RANGE, ACTIVE LEVEL
+	Voltage supply	3.5 - 25V
G	Power ground Sensors ground	0V
10A-10C	Switching coils A-C or user output	TCl* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ) TCl* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ)
+5V	Power sensors output	+5V, 100mA
PA	Rotation sensor A	±25.5V, minimum ±0.1V, sampling 1Mps
AI1, AI2 / DI1, DI2, DI3	Analog input AI1,2 Digital input DI1,2,3	AI1: 0-5V/ 0-10kΩ; AI2: 0-5V DI2: 0-16V; DI1,DI3: 0-16V (Pull up 10kΩ)
DO1	Digital output DO1	MOSFET 1A/100V (Pull up 1kΩ) - not in Bridge

* TCl - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

MASTER MINI does not contain these signals: AI3, AI4, D4, PB, 1OD, but all software functions are present. Please choose in MASTER Control Application in menu "i" → HARDWARE VARIANT → V7.x

Connector wiring – MASTER LITE (aluminium case)



MARKING	DESCRIPTION	RANGE, ACTIVE LEVEL
+	Voltage supply	3.5 - 21V
G	Power ground Sensors ground	0V
10A-10B	Switching coils A-B or user output	TCl* - Inductive, resistance 0.2 - 25Ω (Pull up 1kΩ) TCl* - Injection, resistance 0.2 - 25Ω (Pull up 1kΩ)
PA	Rotation sensor A	±25.5V, minimum ±0.1V, sampling 1Mps
AI1 / DI1	Analog input AI1 Digital input DI1	AI1: 0-5V/ 0-10kΩ; DI1: 0-16V (Pull up 10kΩ)

* TCl - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)

MASTER LITE does not contain these signals: AI2, AI3, AI4, DI2, DI3, DI4, PB, 10C, 10D, DO1, DO2, but all software functions are present. Please choose in MASTER Control Application in menu "i" → HARDWARE VARIANT → V7.x

Outputs plugging – CDI and TCI

The table below describes the arrangement outputs for each type of MASTER unit. Outputs CDI and TCI are arranged in the order and number of signs MASTER, eg. MASTER 2xCDI 2xTCI contains first outputs CDI for 10A,10B and next TCI for 10C, 10D.

MASTER type	10A	10B	10C	10D	10E	10F	10G	10H	10R	10S
2xTCI (LITE)	TCI	TCI								
3xTCI (MINI)	TCI	TCI	TCI							
1xCDI 3xTCI	CDI	TCI	TCI	TCI						
2xCDI 2xTCI	CDI	CDI	TCI	TCI						
3xCDI 1xTCI	CDI	CDI	CDI	TCI						
4xTCI	TCI	TCI	TCI	TCI						
4xCDI	CDI	CDI	CDI	CDI						
2xCDI 8xTCI	CDI	CDI	TCI	TCI	TCI	TCI	TCI	TCI	TCI	TCI
3xCDI 7xTCI	CDI	CDI	CDI	TCI	TCI	TCI	TCI	TCI	TCI	TCI
4xCDI 6xTCI	CDI	CDI	CDI	CDI	TCI	TCI	TCI	TCI	TCI	TCI
5xCDI 5xTCI	CDI	CDI	CDI	CDI	CDI	TCI	TCI	TCI	TCI	TCI
6xCDI 4xTCI	CDI	CDI	CDI	CDI	CDI	CDI	TCI	TCI	TCI	TCI
8xCDI 2xTCI	CDI	CDI	CDI	CDI	CDI	CDI	CDI	CDI	TCI	TCI
10xTCI	TCI	TCI	TCI	TCI	TCI	TCI	TCI	TCI	TCI	TCI
10xCDI	CDI	CDI	CDI	CDI	CDI	CDI	CDI	CDI	CDI	CDI

* TCI - possibility for other use (switching, injector jets, fuel pump, stroboscope, speedometer etc.)





Installation

Electronic spark ignition unit *ECU MASTER* is powered by safe voltage up to 36V, but there is present a voltage of thousands of volts on ignition coils!!! Therefore, it is necessary to pay maximum attention when manipulating. Any changes to the electrical installation of ignition cannot be carried on unless the power is off!!!

Power supply and all ignition inputs are protected against overvoltage and reverse polarity. Neither overvoltage status nor reverse polarity can last permanently, as it can overload the security elements and cause partial or complete damage to the functionality of the ignition.



Ignition outputs are not protected against short circuit and therefore outputs from 10A up to 10V, DO1 or DO2 must not be connected to the power terminal (+). Connection to impedance is also forbidden as it would exceed the amount of allowed current and result in overload and following destruction of certain switching elements in the ignition.

Spark plug together with cylinder head and engine block must be connected to negative or positive pole of the power. This is necessary to flow of current from secondary winding of ignition coils.

Aluminium housing if ignition is due to own shielding connected to negative pole. Therefore no other conductor apart from negative pole can be connected to the housing.

Ignition must never be installed at the places with direct exposure to water, chemicals, extreme temperatures and vibrations. The effect of any of these may cause irreversible damage or destruction of ignition functionality.

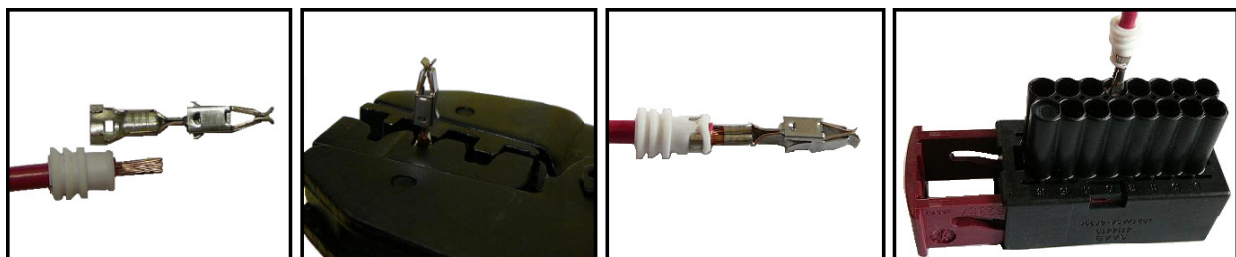


The correct and reliable function of installed equipment is based on its correct power supply. Power wires (+, G) must have a diameter of 1.5 mm², which is ideal for CDI variant. Variant TCI must follow this condition only in case of ground wire (G). Power supply must always be done through fuse 10A, which protects ignition in case of reverse polarity, overvoltage or other disorders.

Sparks must be provided with shielding caps and ideal use cable with a carbon core. The signal conductor from the rotation sensor cannot be led in parallel way with excitation coil wire (10A to 10V), high-voltage conductors or conductors of the alternator excitation. If it is not possible to carry out the wiring in this way it is recommended to lead signal conductor sensors (PA, PB) in twisted (twisted in pair) or shielded conductors in order to eliminate any possible interference of electric-installation.

Connectors crimping

Connector crimping requires a similar procedure as with FASTON connectors, although there is a rubber sealing grommet used here in addition. Regarding tool, it can be done with standard crimping pliers FASTON 1.5mm – 2.5mm. For blocking of unused terminal connectors TYCO it is appropriate to use supplied rubber plugs to comply with IP65 degree of protection.





PickUp Examples – Voltage level and Angle – Configuration

Configuring the scanning of engine rotation is the key part of ignition unit *MASTER ignition*.

1. PickUp Type and Voltage sensing level

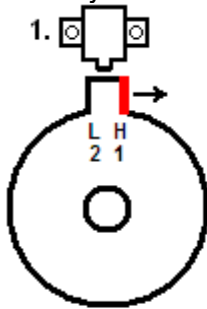
Pick type	Sense point	RPM filter		
HALL	3	20 [ms]		
RPM	H [V]	L [V]	H [V]	L [V]
0	5,0	1,9	5,0	1,9

Pick type	Sense point	RPM filter		
INDUCTIVE	3	20 [ms]		
RPM	H [V]	L [V]	H [V]	L [V]
0	0,5	-0,5	0,5	-0,5
600	1,9	-1,9	1,9	-1,9
2500	2,7	-2,7	2,7	-2,7

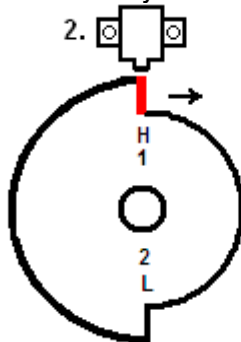
2. PickUp Tooth -> Synchronisation and Setting Angle of Rise (H) and Fall (L) Edges

In case Trigger wheel with one tooth only it is ideal to move this sensing tooth to peak of advance used. For Example set position of tooth to angle -45° (angle before up dead center).

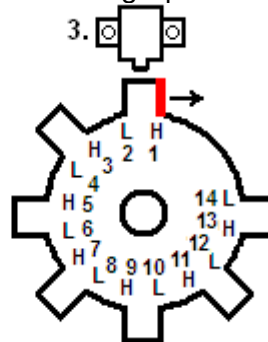
Without synchronisation



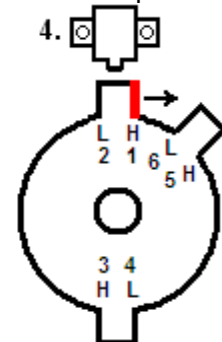
Without synchronisation



Long Space



Short Space



PA

Invert PA Offset PA -45

Edge [H/L]	Angle[°]
H	0
L	30

PA

Invert PA Offset PA -45

Edge [H/L]	Angle[°]
H	0
L	180

PA

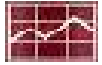
Invert PA Offset PA -45

Edge [H/L]	Angle[°]
H	0
L	22
H	45
L	67
H	90
L	112
H	135
L	157
H	180
L	202
H	225
L	247
H	270
L	292

PA

Invert PA Offset PA -45

Edge [H/L]	Angle[°]
H	0
L	132
H	180
L	312
H	354
L	357



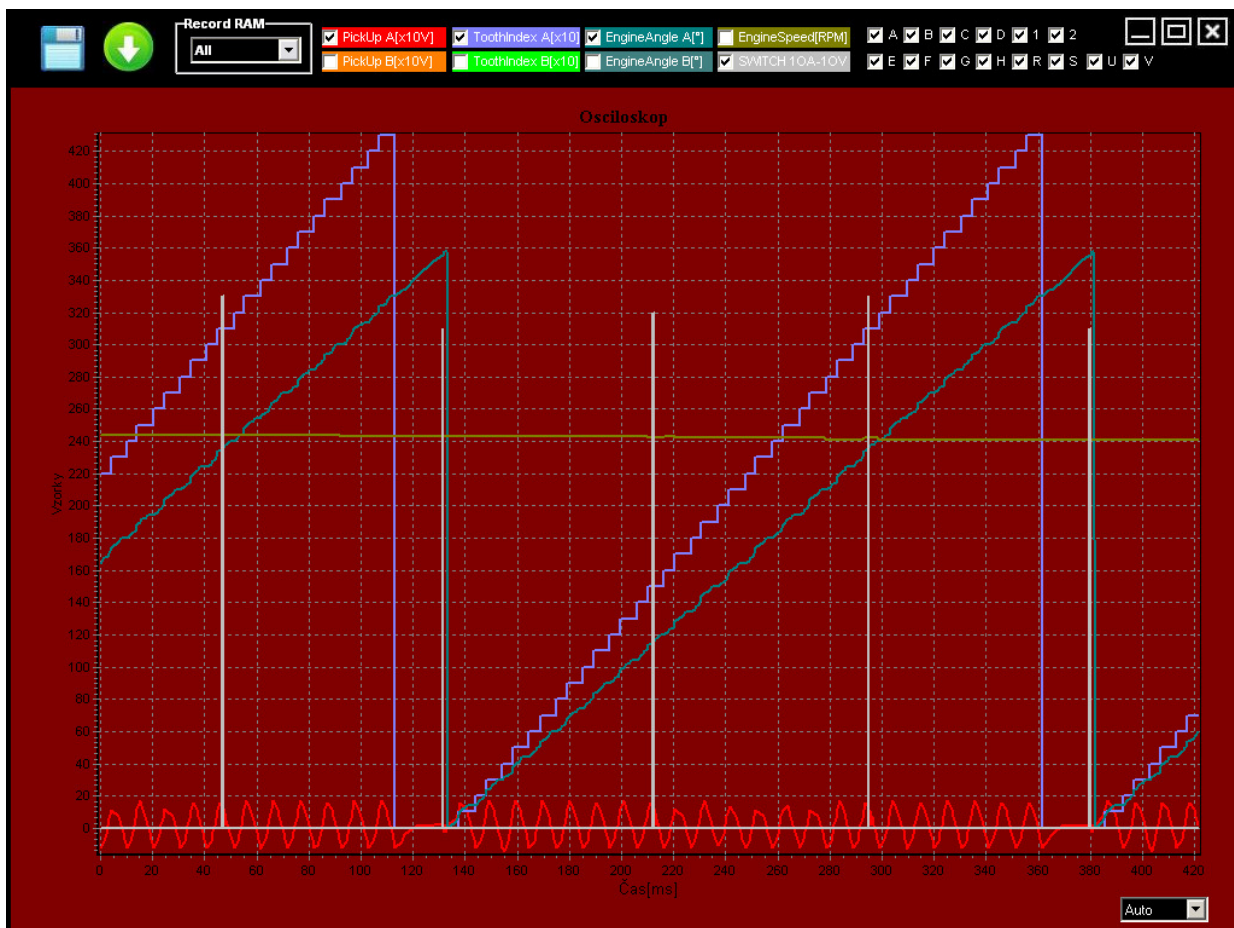
Oscilloscopic record

Oscilloscopic record is used in order to graphically visualise measured and calculated data. Please use oscilloscope record before you connect output coils. This helps to quickly evaluate the proper and accurate function of ignition unit *MASTER*.

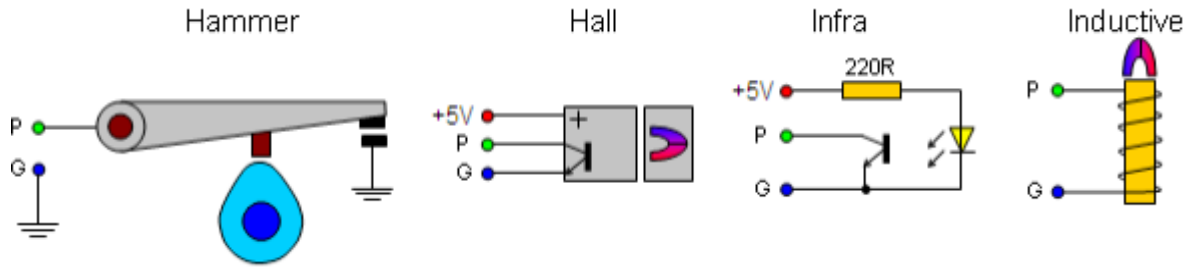
An example to be given; curve angle of engine angular rotation must be regularly and horizontally increased from 0 to 360°. If there is any change of steepness in the curve or the angle is shorten, the problem is to be found either in wrong angle value set up, number of teeth, the type of synchronisation or unsuitable voltage for sensing.

Visualised data

- Rotation pick up sensor voltage, PA, PB [V]
- Tooth index of pick up Trigger wheel, Tooth index A-B [-]
- Engine angular rotation, Angle A-B [°]
- Engine speed, Speed A-B [%]
- Outputs switching 10A-10V [-]

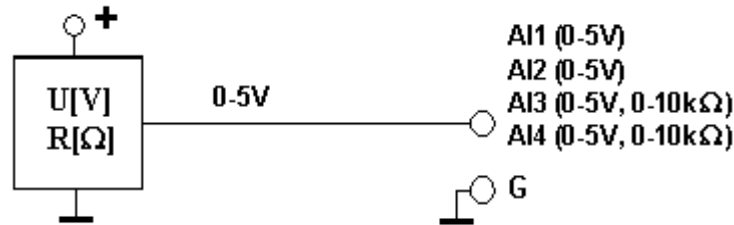


Connecting of Pick up sensors PA, PB



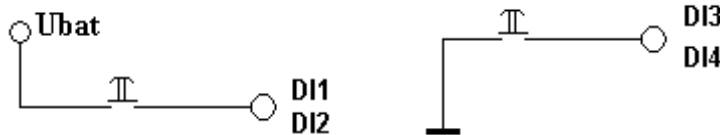
Analog inputs AI1, AI2, AI3, AI4

It is possible to connect sensors whose output is either voltage or resistance to analog inputs AI1, AI2, AI3 and AI4, where AI1, AI2 works with voltage 0-5V and AI3, AI4 works with voltage 0-5V or resistance 0-10kΩ. Signal from analog sensors should be lead by Twisted or shielded cable, which helps significantly to eliminate interference.



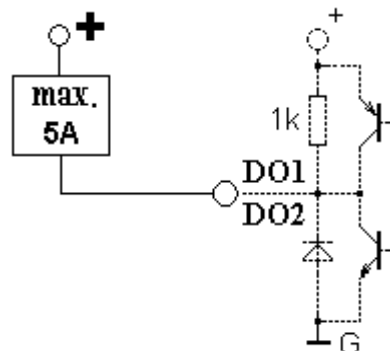
Digital inputs DI1, DI2, DI3, DI4

Change of input status DI3 and DI4 is easily done by input earthing or Bat. supply DI1, DI2.



Digital outputs DO1, DO2

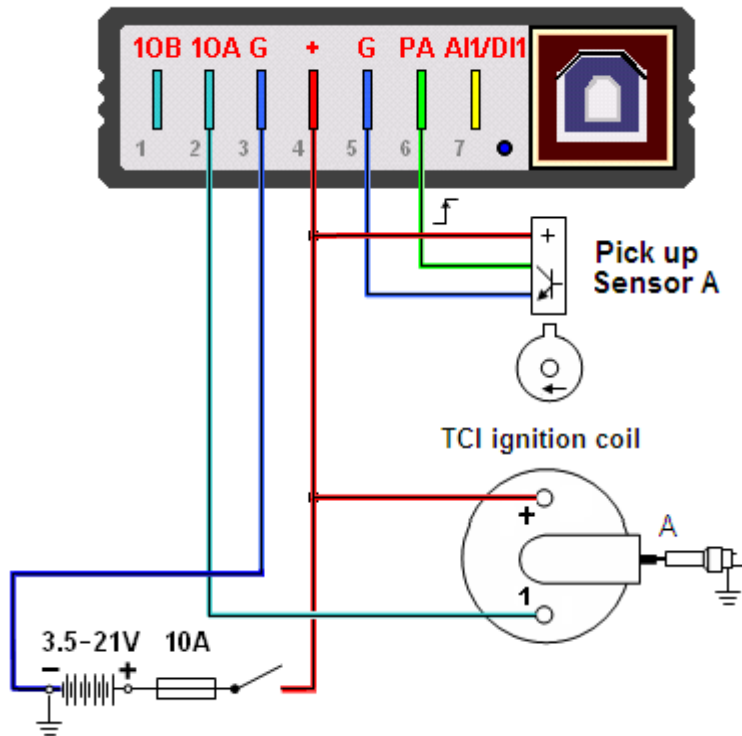
Digital outputs can be used for load switching to zero or to supply with maximum current load 5A. Therefore it is possible to connect e.g. relay coil, fuel pumpe, servo control, indicator of shift revolutions, stroboscope etc.



ECU MASTER LITE

1. Example connecting of one HALL pickup sensor and one TCI coil

1x HALL pickup sensor connected to PA input
 1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2				<input type="checkbox"/>
FO.3	Injection Coil	XA= injection angle 10A..XS=10S														<input type="checkbox"/>
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]														<input type="checkbox"/>

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



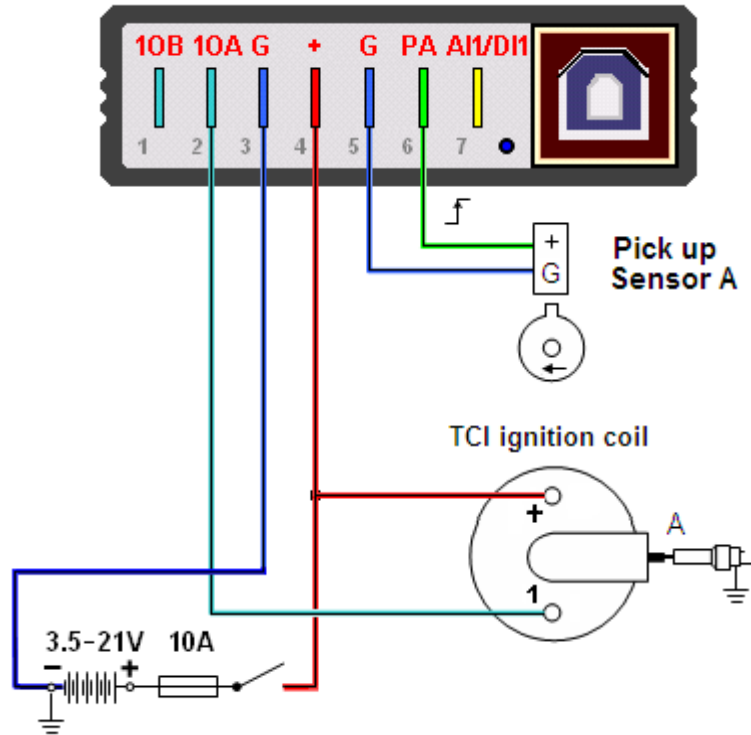
Example of Configuration FILE [*.ig]:

Example[01]_LITE_1xHALL_1xTCI

ECU MASTER LITE

2. Example connecting of one INDUCTIVE pickup sensor and one TCI coil

1x INDUCTIVE pickup sensor connected to PA input
 1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2		10B		<input type="checkbox"/>
FO.3	Injection Coil	XA= injection angle 10A..XS=10S												10C		<input type="checkbox"/>
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]												10D		<input type="checkbox"/>

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[02]_LITE_1xINDUCTIVE_1xTCI

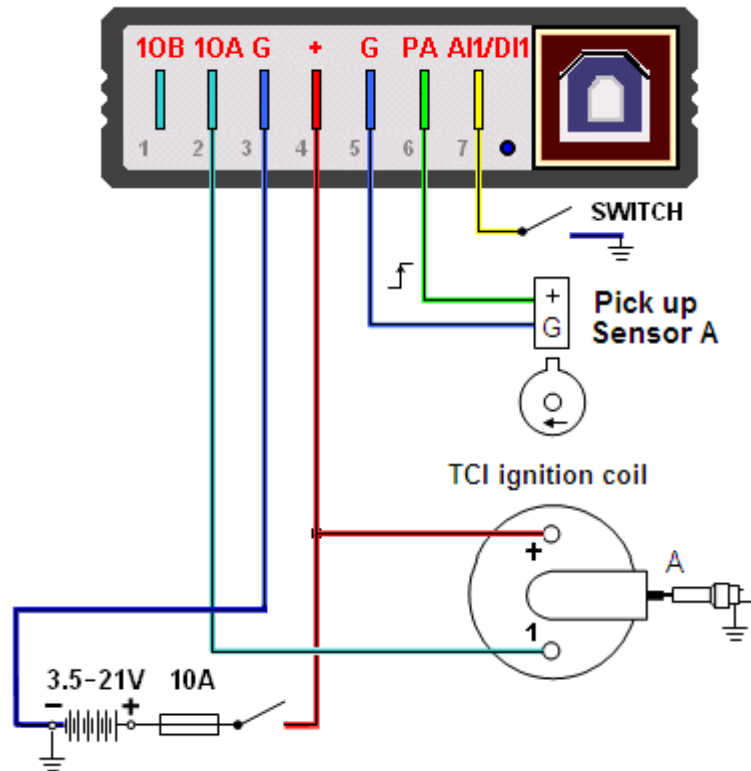
ECU MASTER LITE

3. Example connecting of one INDUCTIVE pickup sensor, one TCI coil and Advance Switch

1x INDUCTIVE pickup sensor connected to PA input

1x TCI coil connected to 10A output

1x SWITCH conected to AI1/DI1 (select advance curve 1 or curve 2)



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2				
FO.3	Injection Coil	XA= injection angle 10A..XS=10S														
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]														

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[03]_LITE_1xINDUCTIVE_1xTCI_1xSWITCH

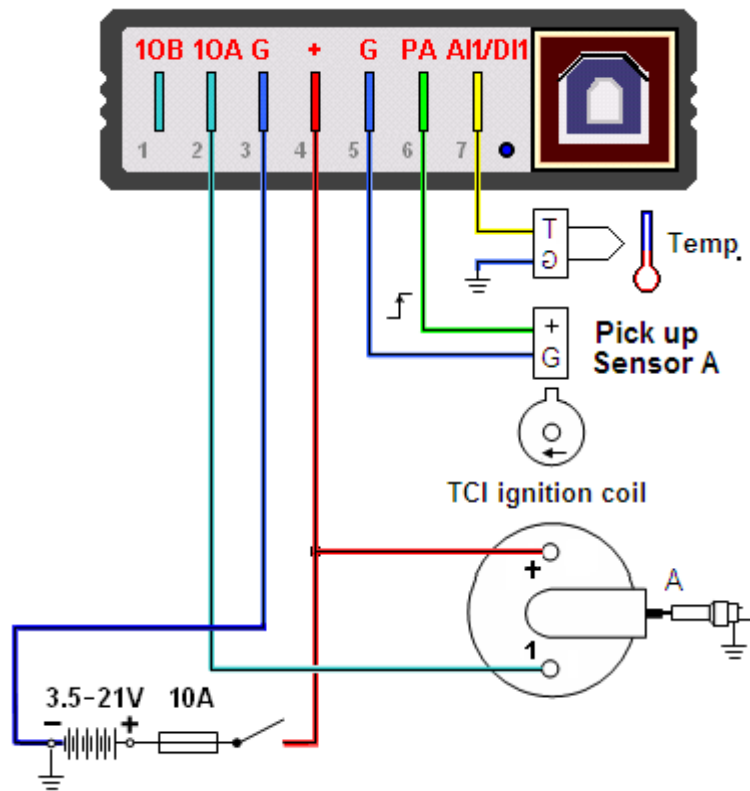
ECU MASTER LITE

4. Example connecting of one INDUCTIVE pickup sensor, one TCI coil and Temperature measurement

1x INDUCTIVE pickup sensor connected to PA input

1x TCI coil connected to 10A output

1x TEMPERATURE sensor connected to AI1/DI1 (select advance curve 1 or curve 2)



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0										2				Invert
FO.3	Injection Coil	XA= injection angle 10A..XS=10S															Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]															Invert

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



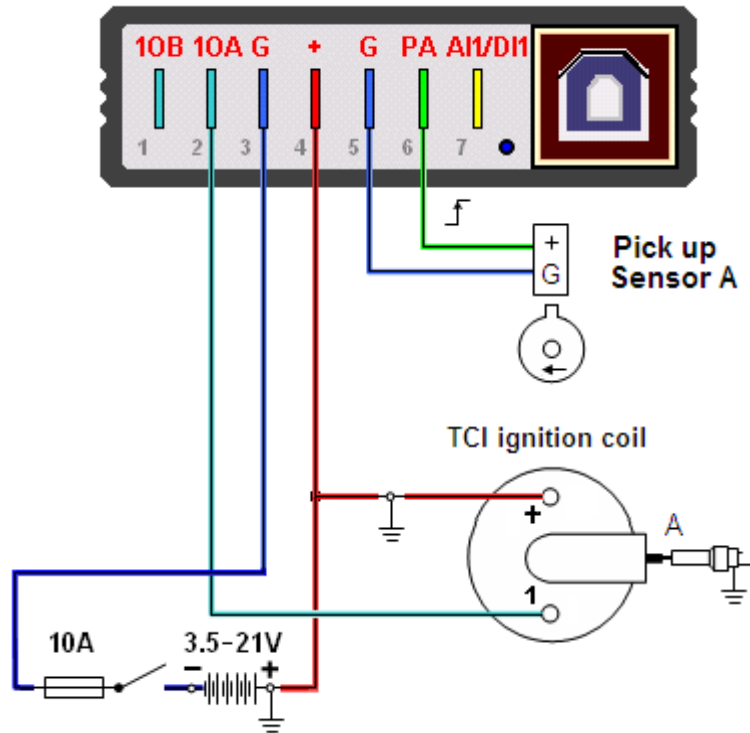
Example of Configuration FILE [*.ig]:

Example[04]_LITE_1xINDUCTIVE_1xTCI_1xTEMP

ECU MASTER LITE

5. Example connecting of one INDUCTIVE pickup sensor and one TCI coil (Battery PLUS pole connected to case!!)

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2				<input type="checkbox"/>
FO.3	Injection Coil	XA= injection angle 10A..XS=10S														<input type="checkbox"/>
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]														<input type="checkbox"/>

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setup to peak of advance or use more teeth for a precision sensing



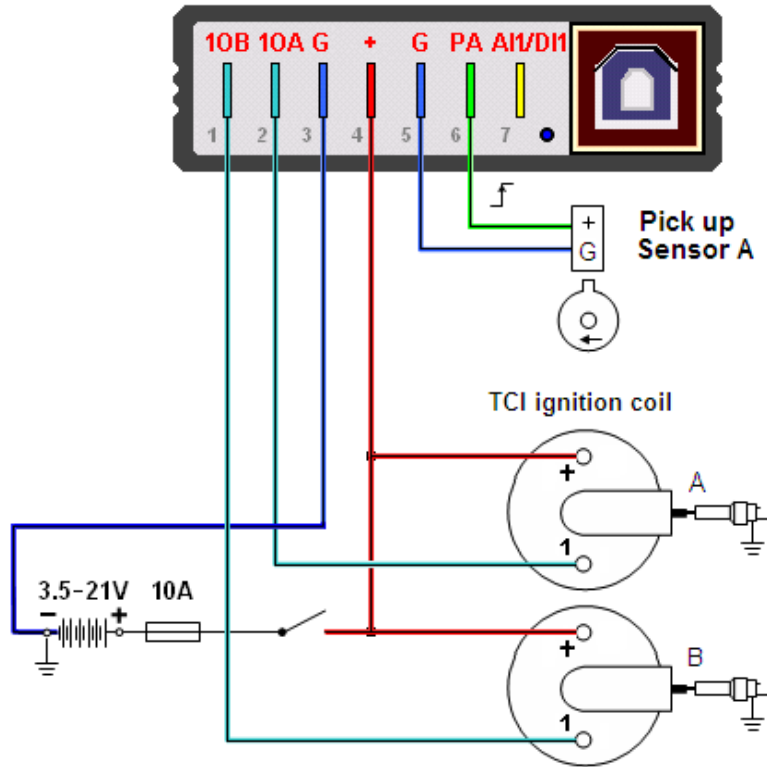
Example of Configuration FILE [*.ig]:

Example[05]_LITE_1xINDUCTIVE_1xTCI

ECU MASTER LITE

6. Example connecting of one INDUCTIVE pickup sensor and two TCI coils

1x INDUCTIVE pickup sensor connected to PA input
 2x TCI coils connected to 10A,10B outputs



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	180									2		FO.2		
FO.3	Injection Coil	XA= injection angle 10A..XS=10S													- - -		Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													- - -		Invert

- Out setting to angle 0°, where XA is reserved for 10A and XB is reserved for 10B
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B
- Pick up tooth with length 180° is set up to peak of advance or use more teeth for a precision sensing



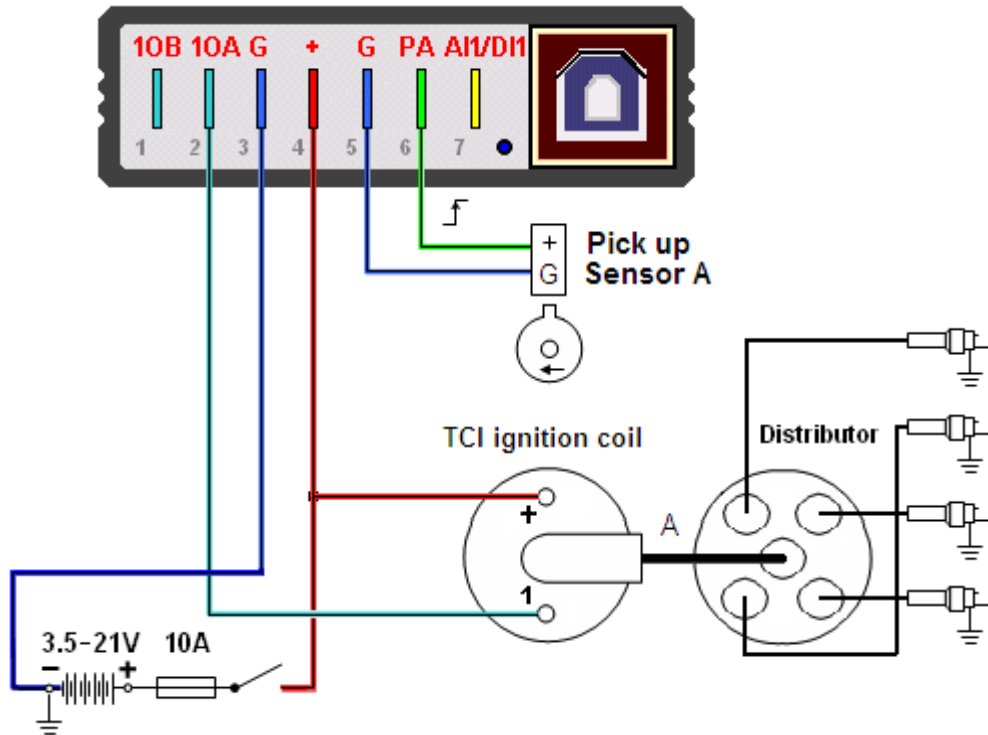
Example of Configuration FILE [*.ig]:

Example[06]_LITE_1xINDUCTIVE_2xTCI

ECU MASTER LITE

8. Example connecting of one INDUCTIVE pickup sensor , one TCI coils and distributor

- 1x INDUCTIVE pickup sensor connected to PA input
- 1x TCI coils connected to 10A outputs
- 1x Distributor connected to TCI coils



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0/A	180/A								2		10B	FO.2
FO.3	Injection Coil	XA= injection angle 10A..XS=10S												10C	- - -
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]												10D	- - -

- Out setting to angle 0° and 180°, where XA is reserved for 10A
10B must be setuped same as 10A
- TCI excitation time 2ms (XTIME)
- Used outputs 10A
- Pick up tooth with length 30° is setuped to peak of advance
or use more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[08]_4xTCI_1xINDUCTIVE_1xTCI_1xDISTRIBUTOR

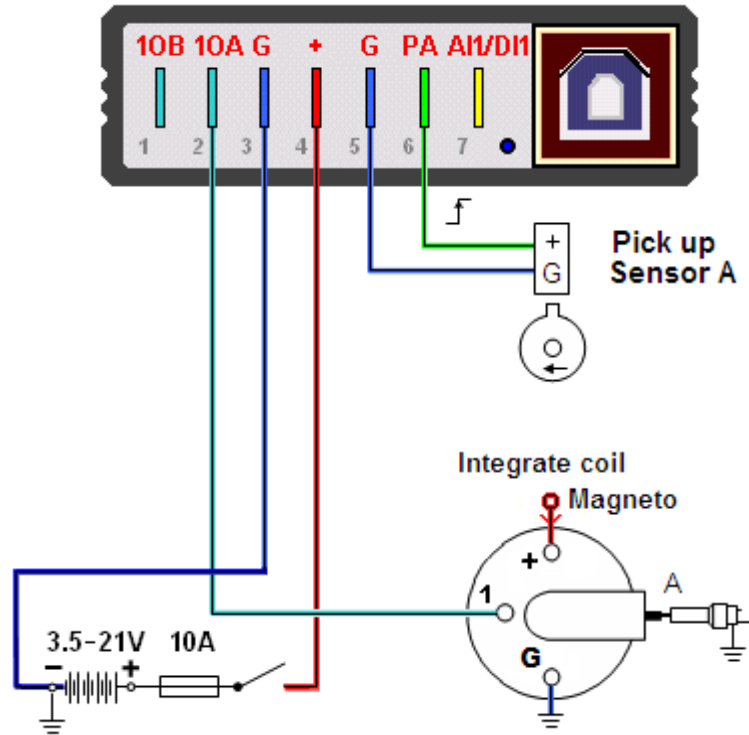
ECU MASTER LITE

9. Example connecting of one INDUCTIVE pickup sensor and one Integrated coils

1x INDUCTIVE pickup sensor connected to PA

1x Integrate coil connected to 10A.

Integrated coil works with supply from Magneto or other source



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.4	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.4	<input checked="" type="checkbox"/>
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]												10B	- - -	<input type="checkbox"/>
FO.3	Injection Coil	XA= injection angle 10A..XS=10S												10C	- - -	<input type="checkbox"/>
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]	0									300		10D	- - -	<input type="checkbox"/>

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 300us
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



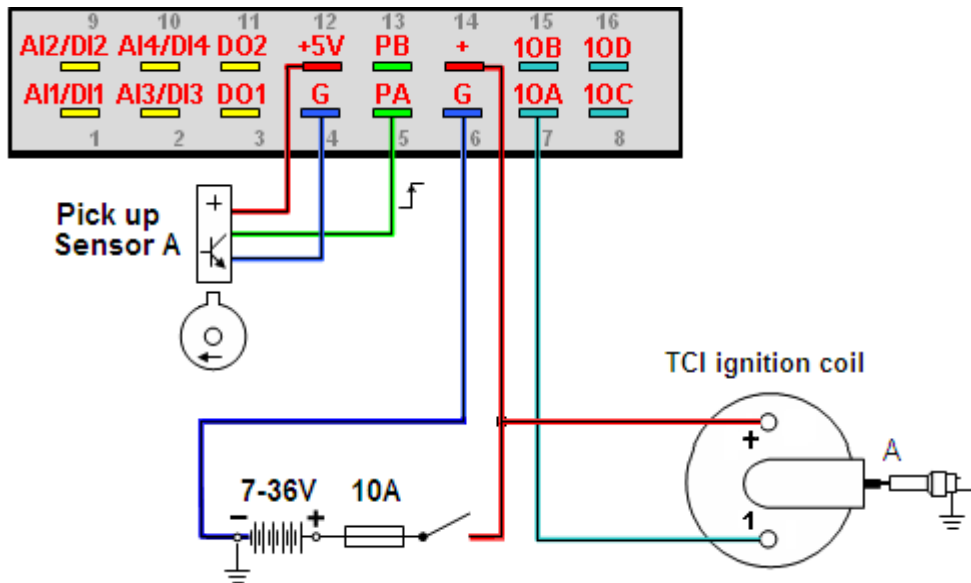
Example of Configuration FILE [*.ig]:

Example[09]_LITE_1xINDUCTIVE_1xTCI_1xINTEGRATED

ECU MASTER 4xTCI

10. Example connecting of one HALL pickup sensor and TCI coil

1x HALL pickup sensor connected to PA input
 1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2	
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2				<input type="checkbox"/> Invert
FO.3	Injection Coil	XA=inject angle 10A..XS=10S														<input type="checkbox"/> Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]														<input type="checkbox"/> Invert

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



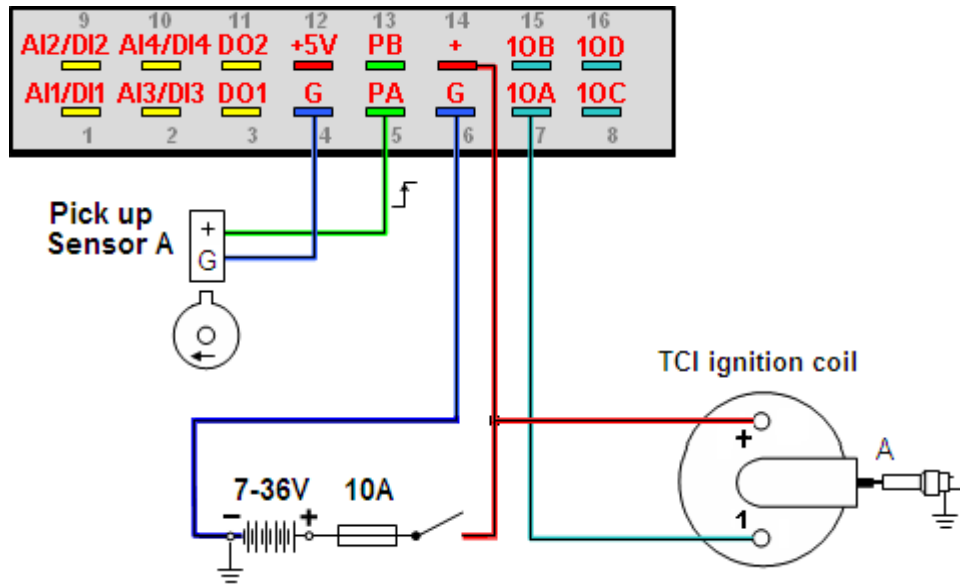
Example of Configuration FILE [*.ig]:

Example[10]_4xTCI_1xHALL_1xTCI

ECU MASTER 4xTCI

11. Example connecting of one INDUCTIVE pickup sensor and TCI coil

1x INDUCTIVE pickup sensor connected to PA input
 1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2				<input type="checkbox"/>
FO.3	Injection Coil	XA=inject angle 10A..XS=10S														<input type="checkbox"/>
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]														<input type="checkbox"/>

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



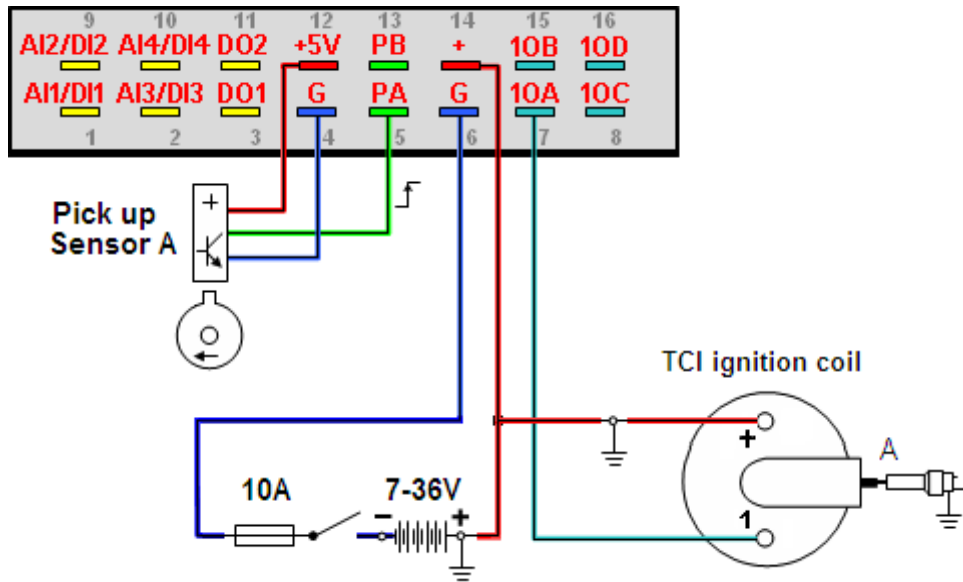
Example of Configuration FILE [*.ig]:

Example[11]_4xTCI_1xINDUCTIVE_1xTCI

ECU MASTER 4xTCI

12. Example connecting of one HALL sensor and TCI coil (Battery PLUS pole connected to case!!)

1x HALL pickup sensor connected to PA input
1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2					Invert
FO.3	Injection Coil	XA= injection angle 10A..XS=10S															Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]															Invert

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



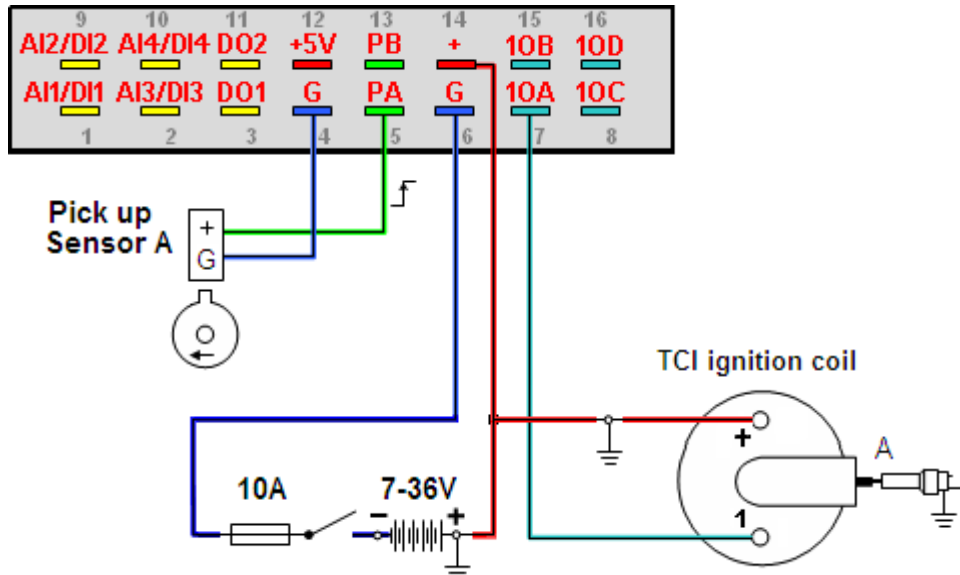
Example of Configuration FILE [*.ig]:

Example[12]_4xTCI_1xHALL_1xTCI

ECU MASTER 4xTCI

13. Example connecting of one INDUCTIVE pickup sensor and one TCI coil (Battery PLUS pole connected to case!!)

1x INDUCTIVE pickup sensor connected to PA input
1x TCI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0									2			<input type="checkbox"/> Invert
FO.3	Injection Coil	XA= injection angle 10A..XS=10S													<input type="checkbox"/> Invert
FO.4	Integrate Coil	XA= out angle 10A..XS=10S,XTIME=switch[us]													<input type="checkbox"/> Invert

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 2ms (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



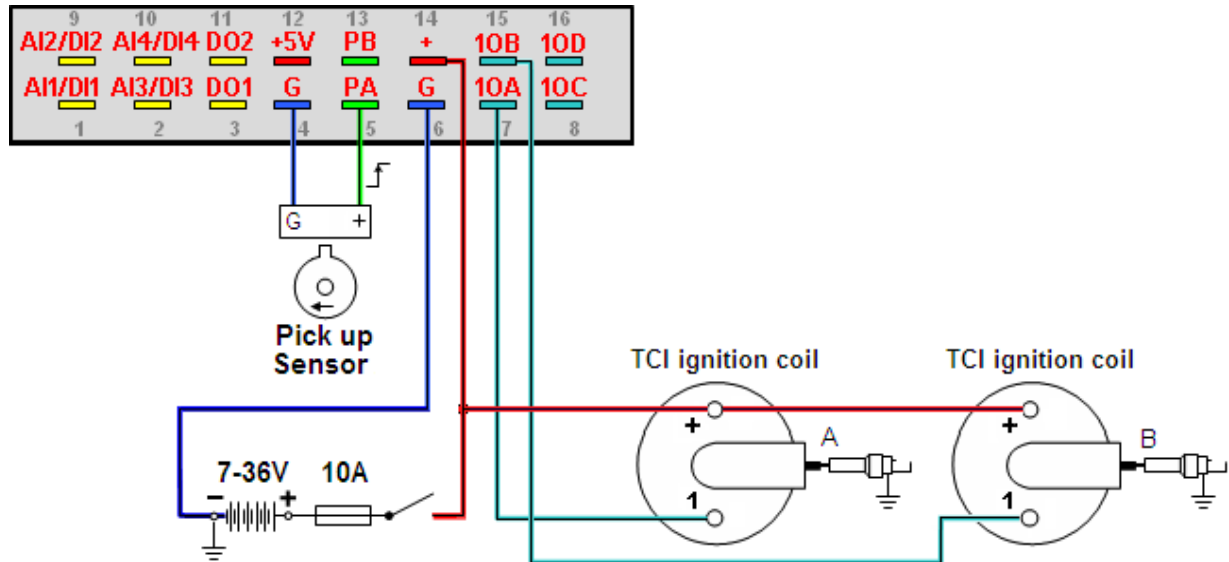
Example of Configuration FILE [*.ig]:

Example[13]_4xTCI_1xINDUCTIVE_1xTCI

ECU MASTER 4xTCI

15. Example connecting of one INDUCTIVE pickup sensor and two TCI coils

1x INDUCTIVE pickup sensor connected to PA input
 2x TCI coils connected to 10A,10B outputs



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	180								2			FO.2		
FO.3	Injection Coil	XA=inject angle 10A..XS=10S													- - -		Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													- - -		Invert

- Out setting to angle 0°, where XA is reserved for 10A and XB is reserved for 10B
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B
- Pick up tooth with length 180° is set up to peak of advance or use more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[15]_4xTCI_1xINDUCTIVE_2xTCI

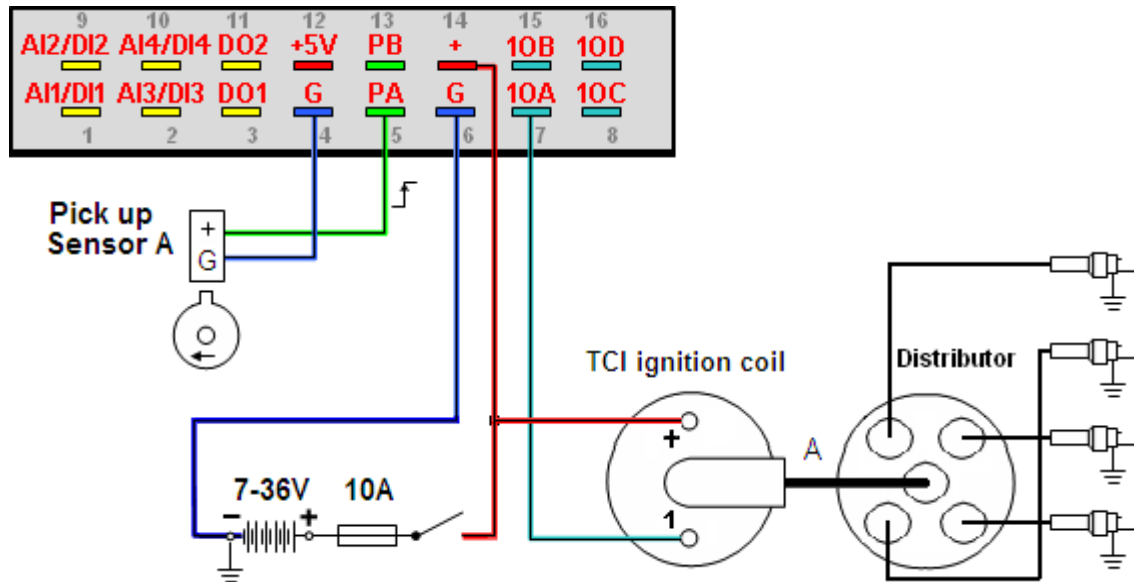
ECU MASTER 4xTCI

16. Example connecting of one INDUCTIVE pickup sensor , one TCI coils and distributor

1x INDUCTIVE pickup sensor connected to PA input

1x TCI coils connected to 10A outputs

1x Distributor connected to TCI coils



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0/A	180/A								2			FO.2		
FO.3	Injection Coil	XA=inject angle 10A..XS=10S													- - -	<input type="checkbox"/> Invert	
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													- - -	<input type="checkbox"/> Invert	

- Out setting to angle 0° and 180°, where XA is reserved for 10A
10B must be setuped same as 10A
- TCI excitation time 2ms (XTIME)
- Used outputs 10A
- Pick up tooth with length 30° is setuped to peak of advance
or use more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

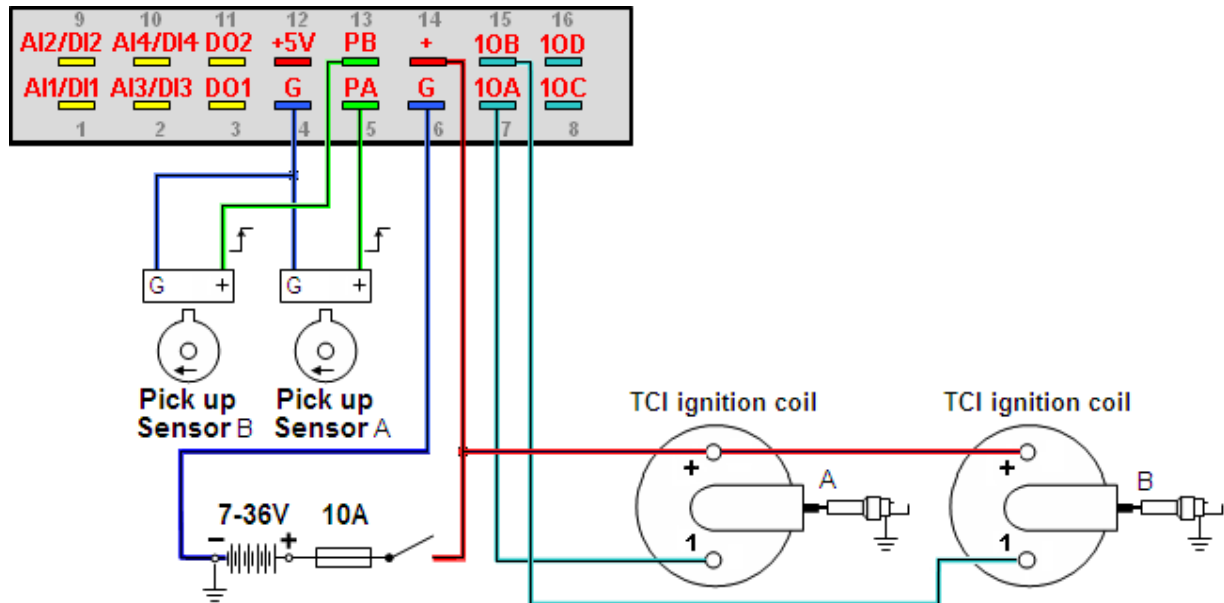
Example[16]_4xTCI_1xINDUCTIVE_1xTCI_1xDISTRIBUTOR

ECU MASTER 4xTCI

17. Example connecting of two INDUCTIVE pickup sensors and two TCI coils (10A is coupled with PA and PB is coupled with 10B)

2x INDUCTIVE pickup sensors connected to PA and PB input

2x TCI coils connected to 10A, 10B outputs, where 10A is coupled with PA and PB with 10B



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]															
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	0								2					
FO.3	Injection Coil	XA= injection angle 10A..XS=10S															
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]															

- Outs setting to angle 0°,0°, where XA is reserved for 10A and XB is reserved for 10B
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B
- Pickup sensors include the same angle as cylinders and setup to peak of advance or use more teeth for a precision sensing



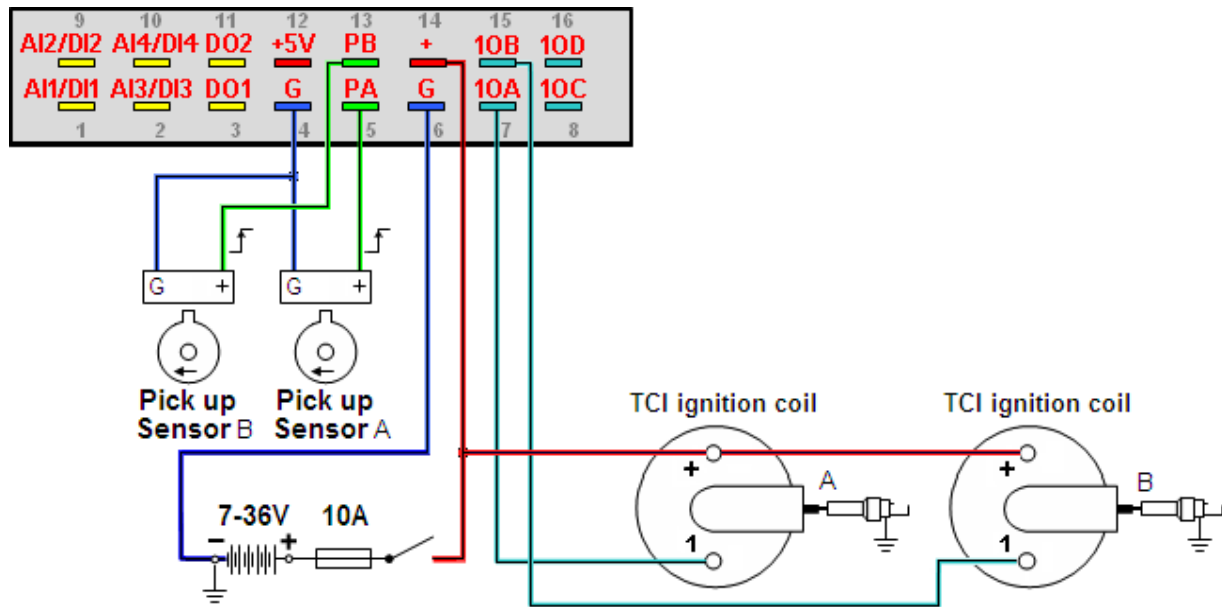
Example of Configuration FILE [*.ig]:

Example[17]_4xTCI_2xINDUCTIVE_2xTCI

ECU MASTER 4xTCI

19. Example connecting of two INDUCTIVE pickup sensors and two TCI coils (Pickup sensors PB works as REDUNDANT)

2x INDUCTIVE pickup sensors connected to PA and PB inputs, where PB works as REDUNDANT (PB is automatically used after damage or disconnect PA)
2x TCI coils connected to 10A, 10B outputs



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	180								2			FO.2		
FO.3	Injection Coil	XA= injection angle 10A..XS=10S													- - -		Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													- - -		Invert

- Outs setting to angle 0°,180°, where XA is reserved for 10A and XB is reserved for 10B
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B
- Trigger wheel should contain more teeth for a precision sensing



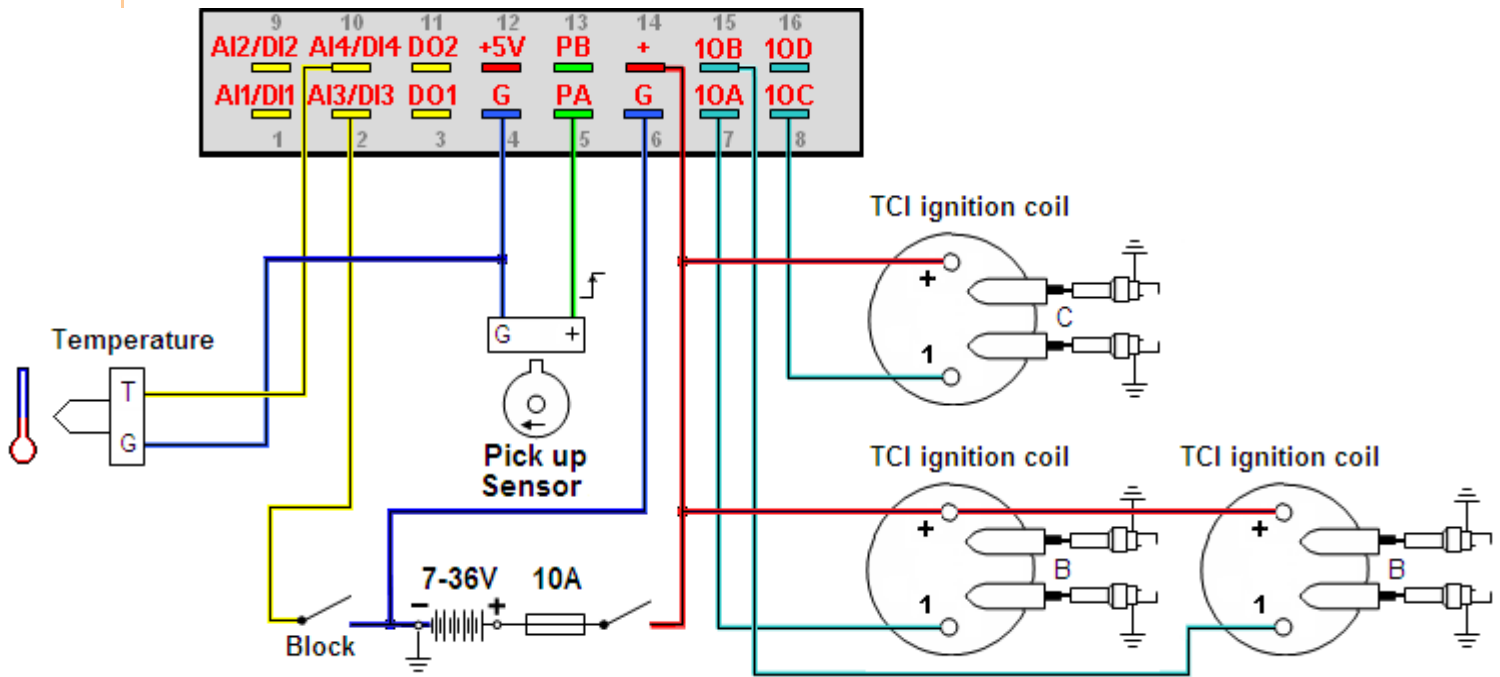
Example of Configuration FILE [*.ig]:

Example[19]_4xTCI_2xINDUCTIVE_2xTCI_REDUNDANT

ECU MASTER 4xTCI

20. Example connecting of one INDUCTIVE pickup sensor, three TCI double ended coils, Temperature measurement and Blocked run engine signal

- 1x INDUCTIVE pickup sensors connected to PA input
- 3x TCI double ended coils connected to 10A,10B,10C outputs
- 1x Temperature sensor
- 1x Block Run engine signal



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.2		
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	120	240							2			FO.2		
FO.3	Injection Coil	XA= injection angle 10A..XS=10S													FO.2		
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													- - -		<input type="checkbox"/> Invert

- Outs setting to angle 0°,120°,240°, where XA is reserved for 10A
XB is reserved for 10B
XC is reserved for 10C
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B, 10C
- Trigger wheel should contain more teeth for a precision sensing



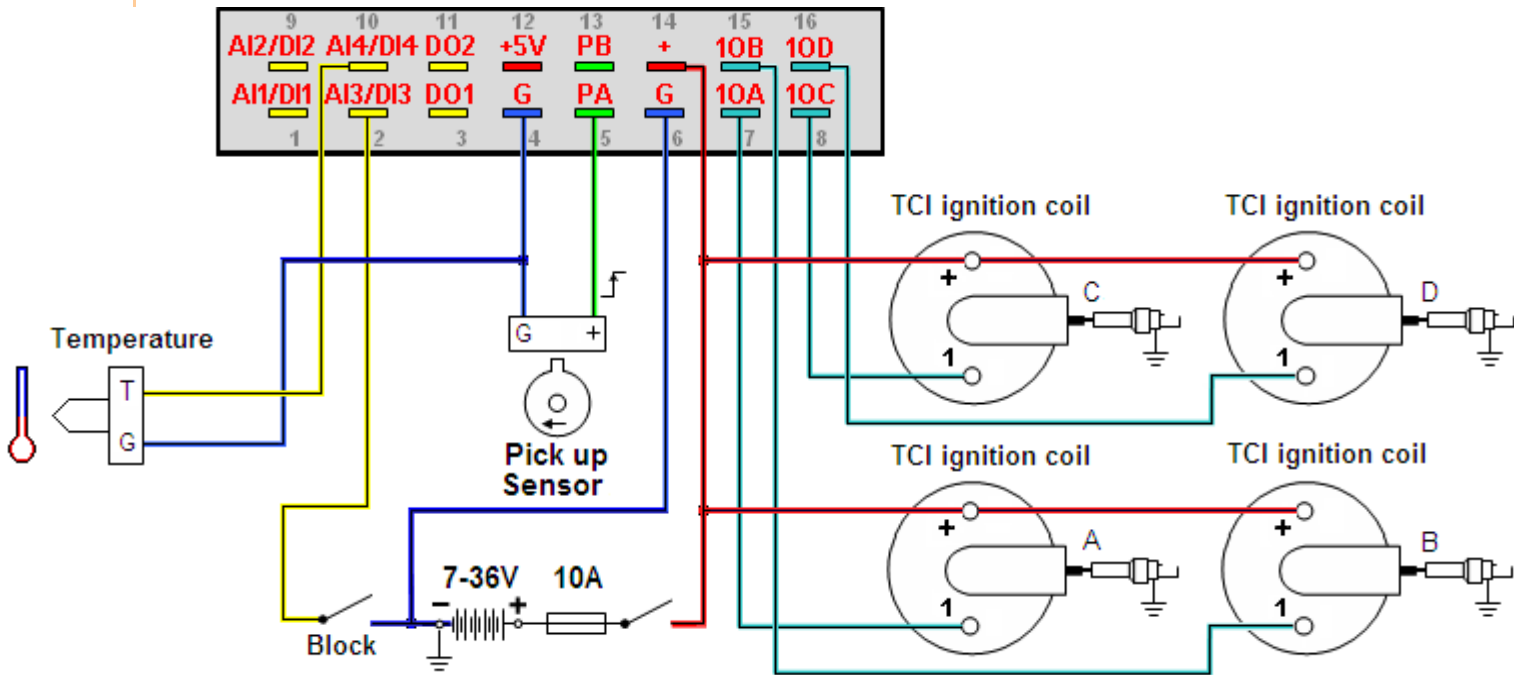
Example of Configuration FILE [*.ig]:

Example[20]_4xTCI_1xINDUCTIVE_3xTCI

ECU MASTER 4xTCI

21. Example connecting of one INDUCTIVE pickup sensor, four TCI coils, Temperature measurement and Blocked run engine signal

- 1x INDUCTIVE pickup sensors connected to PA input
- 4x TCI coils connected to 10A,10B,10C,10D outputs
- 1x Temperature sensor
- 1x Block Run engine signal



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
F0.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													F0.2		
F0.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	60	180	240							2		F0.2		
F0.3	Injection Coil	XA=injection angle 10A..XS=10S													F0.2		
F0.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													F0.2		

- Outs setting to angle 0°,60°,180°,240°, where XA is reserved for 10A
XB is reserved for 10B
XC is reserved for 10C
XD is reserved for 10D
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B, 10C, 10D
- Trigger wheel should contain more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[21]_4xTCI_1xINDUCTIVE_4xTCI

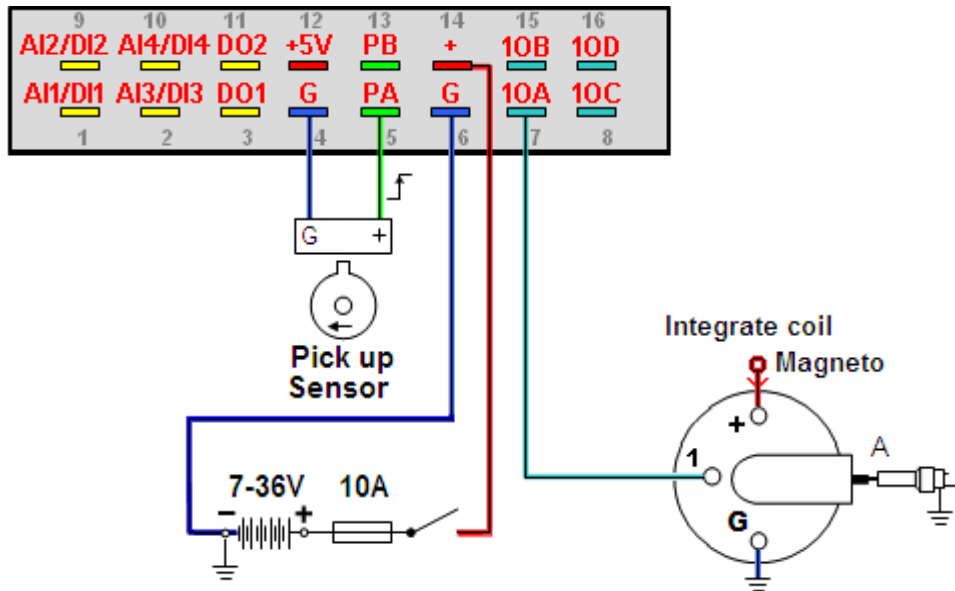
ECU MASTER 4xTCI

22. Example connecting of one INDUCTIVE pickup sensor and one Integrate coils

1x INDUCTIVE pickup sensor connected to PA

1x Integrate coil connected to 10A.

Integrated coil works with supply from Magneto or other source



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.4	Invert
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]														<input checked="" type="checkbox"/>
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]														<input type="checkbox"/>
FO.3	Injection Coil	XA= injection angle 10A..XS=10S														<input type="checkbox"/>
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]	0										300			<input type="checkbox"/>

- Out setting to angle 0°, where XA is reserved for 10A
- TCI excitation time 300us
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



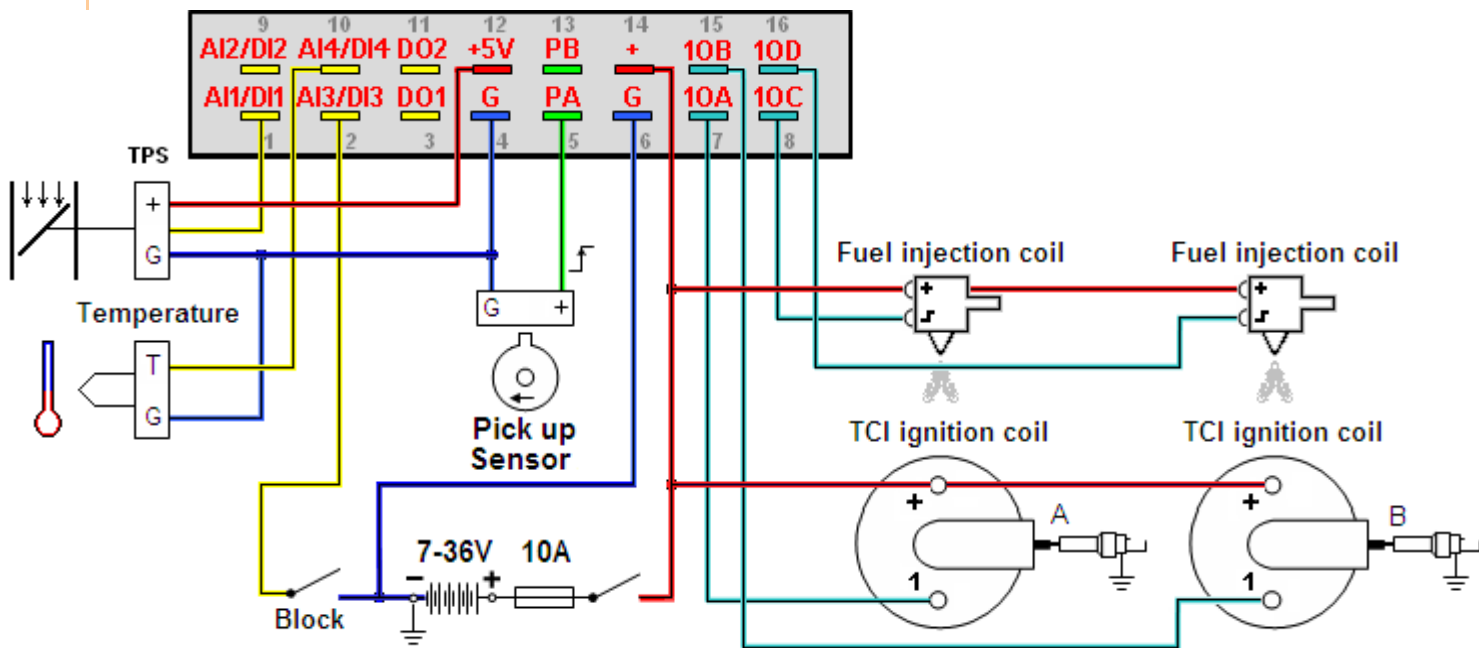
Example of Configuration FILE [*.ig]:

Example[22]_4xTCI_1xINDUCTIVE_1xINTEGRATED

ECU MASTER 4xTCI

25. Example connecting of one INDUCTIVE sensor, two TCI and two FUEL coils and TPS sensor, Temperature measurement and Blocked run engine signal

- 1x INDUCTIVE pickup sensor connected to PA input
- 2x TCI coil connected to 10A, 10B outputs
- 2x FUEL coil connected to 10C, 10D outputs
- 1x TPS sensor
- 1x Temperature sensor
- 1x Block Run engine signal



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]															
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	180								2					
FO.3	Injection Coil	XA=injection angle 10A..XS=10S			90	240											
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]															

- Outs setting to angle 0°,180°,90°,270°, where XA is reserved for 10A (TCI)
XB is reserved for 10B (TCI)
XC is reserved for 10C (FUEL)
XD is reserved for 10D (FUEL)
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B, 10C, 10D
- Trigger wheel should contain more teeth for a precision sensing



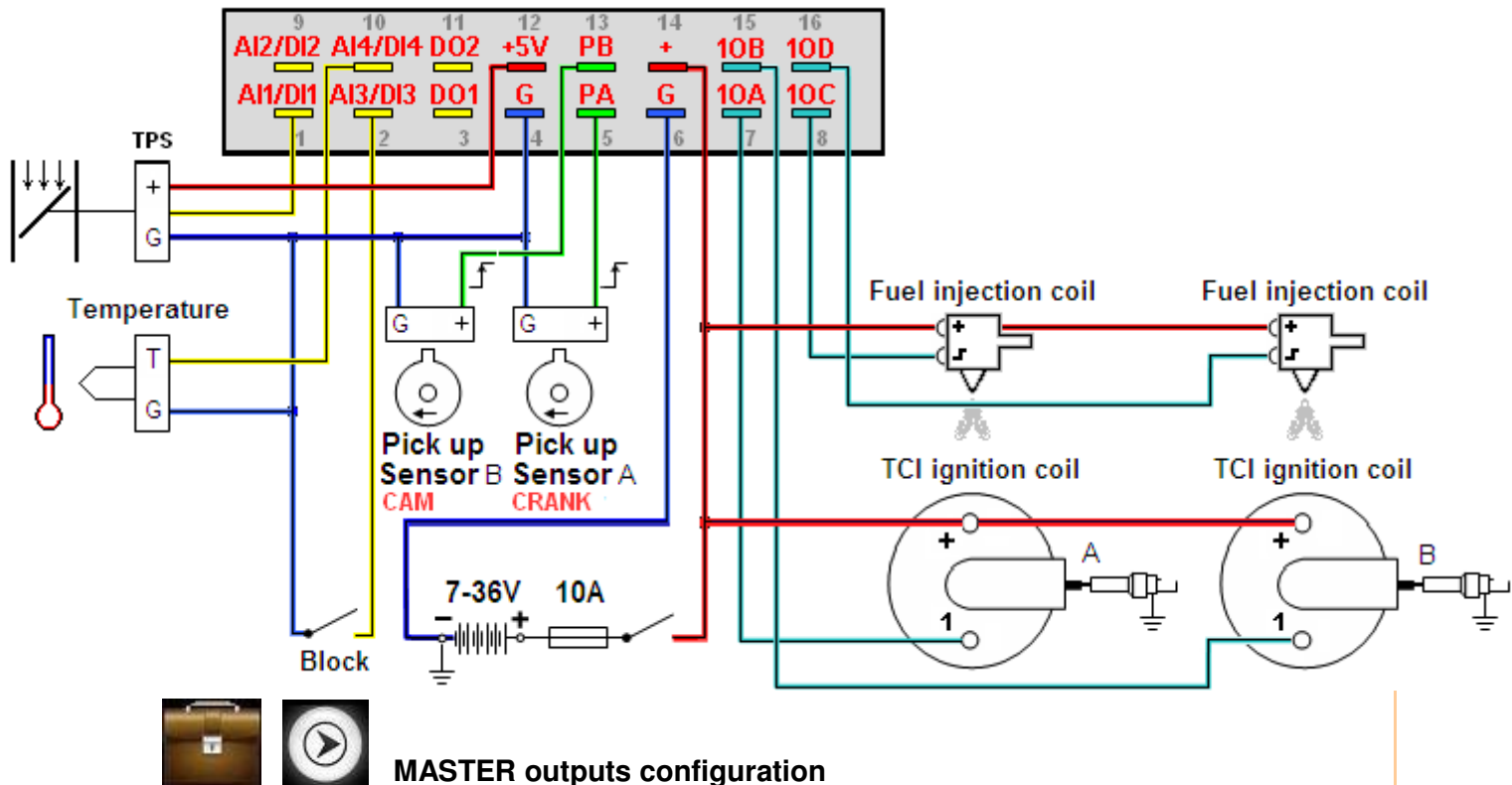
Example of Configuration FILE [*.ig]:

Example[25]_4xTCI_1xINDUCTIVE_2xTCI_2xFUEL

ECU MASTER 4xTCI

26. Example connecting of two cooperation INDUCTIVE sensor (crank and cam), two TCI and two FUEL coils and TPS sensor, Temperature measurement and Blocked run engine signal

- 2x INDUCTIVE pickups sensor connected to PA and PB input (crank and cam)
- 2x TCI coil connected to 10A, 10B outputs
- 2x FUEL coil connected to 10C, 10D outputs
- 1x TPS sensor
- 1x Temperature sensor
- 1x Block Run engine signal



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0/1	0/2								2		10B	FO.2
FO.3	Injection Coil	XA=injection angle 10A..XS=10S			90/1	90/2								10C	FO.3
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]												10D	FO.3

- Outs setting to angle 0%/1,0%/2,90%/1,90%/2, where XA is reserved for 10A (TCI)
 XB is reserved for 10B (TCI)
 XC is reserved for 10C (FUEL)
 XD is reserved for 10D (FUEL)
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B, 10C, 10D
- Trigger wheel should contain more teeth for a precision sensing



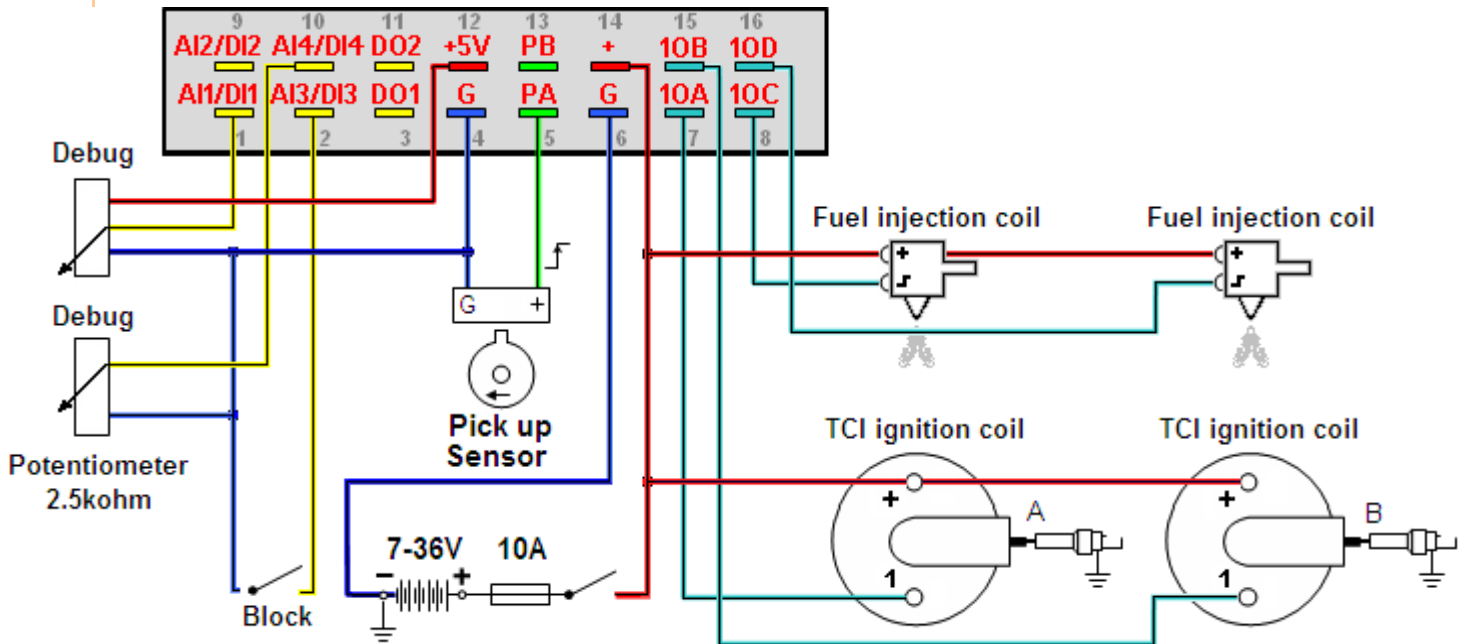
Example of Configuration FILE [*.ig]:

Example[26]_4xTCI_2xINDUCTIVE_2xTCI_2xFUEL

ECU MASTER 4xTCI

27. Example connecting of one **INDUCTIVE** sensor, two **TCI** and two **FUEL** coils and two and two **DEBUG** potentiometers

- 1x **INDUCTIVE** pickup sensor connected to PA input
- 2x **TCI** coil connected to 10A, 10B outputs
- 2x **FUEL** coil connected to 10C, 10D outputs
- 2x **DEBUG** potentiometers



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.2
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]													
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]	0	180								2		10B	FO.2
FO.3	Injection Coil	XA= injection angle 10A..XS=10S			90	240								10C	FO.3
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]												10D	FO.3

- Outs setting to angle 0°,180°,90°,240°, where XA is reserved for 10A (TCI)
XB is reserved for 10B (TCI)
XC is reserved for 10C (FUEL)
XD is reserved for 10D (FUEL)
- TCI excitation time 2ms (XTIME)
- Used outputs 10A, 10B, 10C, 10D
- Trigger wheel should contain more teeth for a precision sensing



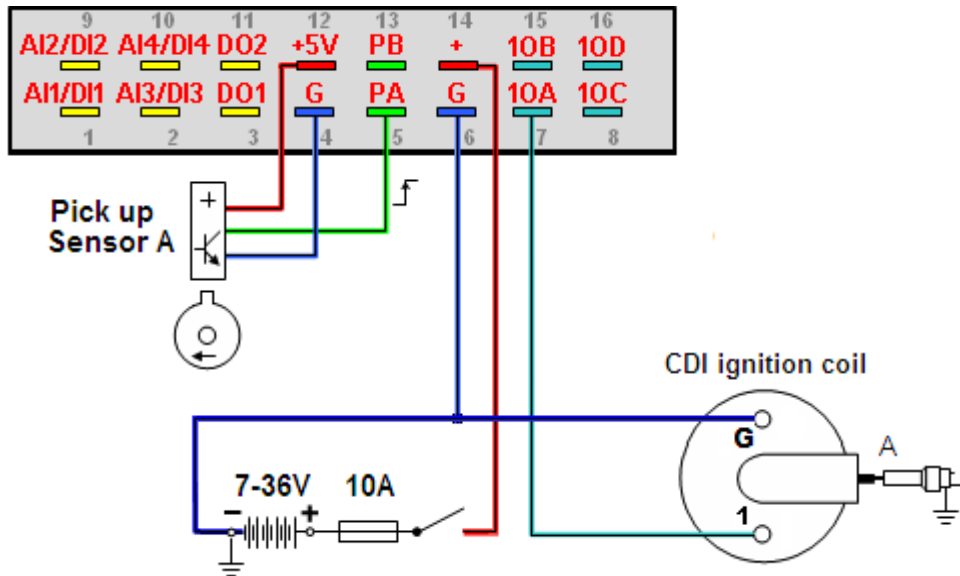
Example of Configuration FILE [*.ig]:

Example[27]_4xTCI_1xINDUCTIVE_2xTCI_2xFUEL_DEBUG

ECU MASTER 2xCDI 2xTCI

30. Example connecting of one HALL pickup sensor and CDI coil

1x HALL pickup sensor connected to PA input
 1x CDI coil connected to 10A output



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]	0										300	FO.2			
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]															<input type="checkbox"/> Invert
FO.3	Injection Coil	XA=inject angle 10A..XS=10S															<input type="checkbox"/> Invert
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]															<input type="checkbox"/> Invert

- Out setting to angle 0°, where XA is reserved for 10A
- CDI switch time 300us (XTIME)
- Used output 10A
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[30]_2xCDI_2xTCI_1xHALL_1xCDI

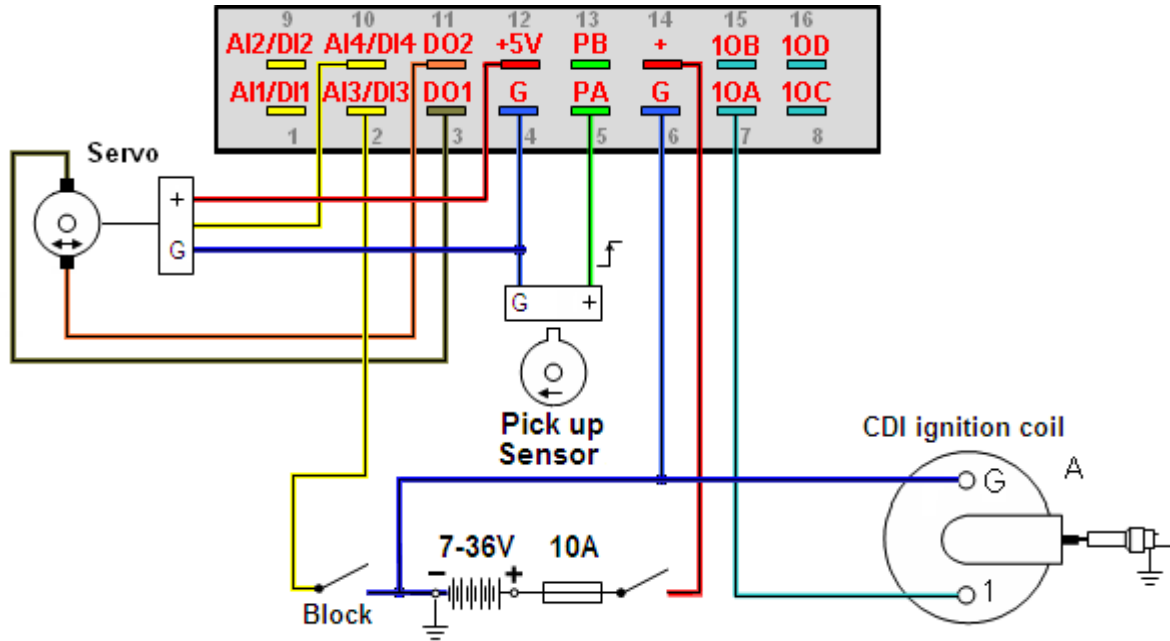
ECU MASTER 2xCDI 2xTCI

32. Example connecting of one Inductive pickup sensor, CDI coil and Servo

1x Inductive pickup sensor connected to PA input

1x CDI coil connected to 10A output

1x Servo (exhaust throttle) connected to DO1,DO2 outputs



MASTER outputs configuration

FO.11	Turbo regulation	XA=mode, XB=RPM, XC=PWM, XE..XG = PID																		10R	---	<input type="checkbox"/> Invert
FO.12	Temp. regulation	XA=mode																		10S	---	<input type="checkbox"/> Invert
FO.13	Exhaust throttle	XA=mode, XC=PWM, XE..XG = PID, Adv.map [8]	1		100	50	48	0		45	65									DO1	FO.13	<input type="checkbox"/> Invert
FO.14	Signal output	XA=mode, XB=signal index, XC=PWM																		DO2	FO.13	<input type="checkbox"/> Invert
FO.15	Charge regulation	XA=mode, XB=des.voltage, XC=PWM, XE=P																				
FO.16																						

- Out setting to angle 0°, where XA is reserved for 10A
- CDI switch time 300us (XTIME)
- Used outputs 10A, DO1, DO2
- Pick up tooth is setuped to peak of advance or use more teeth for a precision sensing



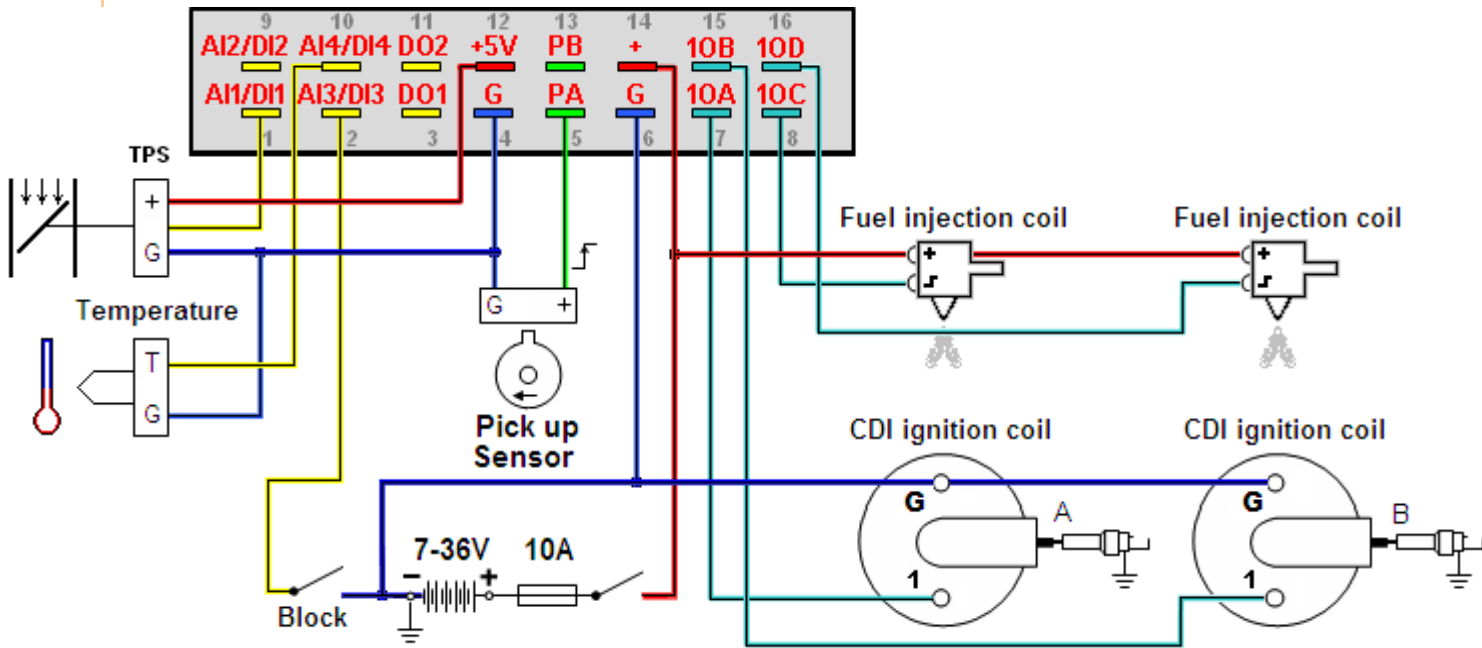
Example of Configuration FILE [*.ig]:

Example[32]_2xCDI_2xTCI_1xINDUCTIVE_1xCDI_1xSERVO

ECU MASTER 2xCDI 2xTCI

35. Example connecting of one INDUCTIVE sensor, two CDI and two FUEL coils and TPS sensor, Temperature measurement and Blocked run engine signal

- 1x INDUCTIVE pickup sensor connected to PA input
- 2x CDI coil connected to 10A, 10B outputs
- 2x FUEL coil connected to 10C, 10D outputs
- 1x TPS sensor
- 1x Temperature sensor
- 1x Block Run engine signal



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	10B	10C	10D
F0.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]	0	180									300	FO.1	FO.1		
F0.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]															
F0.3	Injection Coil	XA= injection angle 10A..XS=10S			90	240											
F0.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]															

- Outs setting to angle 0°,180°,90°,240°, where XA is reserved for 10A (CDI)
XB is reserved for 10B (CDI)
XC is reserved for 10C (FUEL)
XD is reserved for 10D (FUEL)
- CDI excitation time 300us (XTIME)
- Used outputs 10A, 10B, 10C, 10D
- Trigger wheel should contain more teeth for a precision sensing



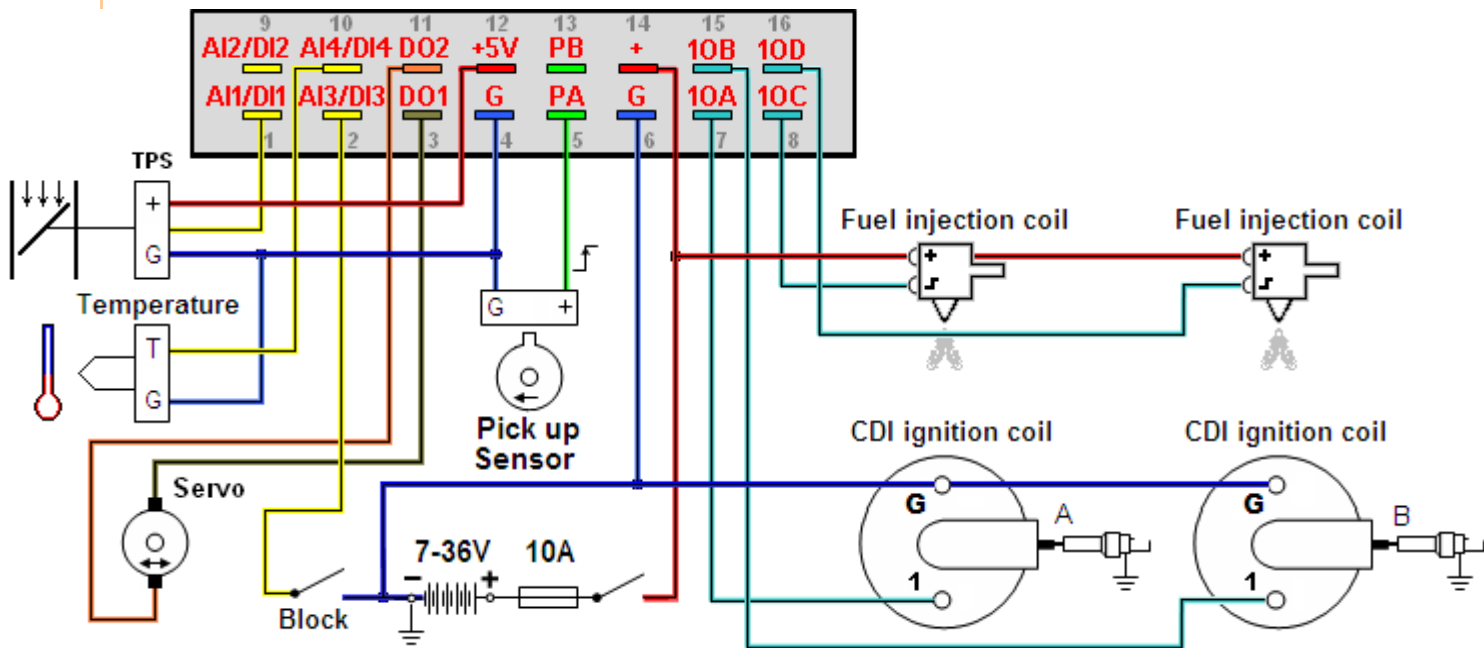
Example of Configuration FILE [*.ig]:

Example[35]_2xCDI_2xTCI_1xINDUCTIVE_2xTCI_2xFUEL

ECU MASTER 2xCDI 2xTCI

36. Example connecting of one INDUCTIVE sensor, two CDI and two FUEL coils and Servo motor, TPS sensor, Temperature measurement and Blocked run engine signal

- 1x INDUCTIVE pickup sensor connected to PA input
- 2x CDI coil connected to 10A, 10B outputs
- 2x FUEL coil connected to 10C, 10D outputs
- 1x Servo motor connected to DO1, DO2 outputs (engine speed regulation)
- 1x TPS sensor
- 1x Temperature sensor
- 1x Block Run engine signal



MASTER outputs configuration

Index	Function Name	Description	XA	XB	XC	XD	XE	XF	XG	XH	XR	XS	XTIME	10A	FO.1
FO.1	Capacitive - CDI	XA=out angle 10A..XS=10S,XTIME=switch[us]	0	180									300		FO.1
FO.2	Inductive - TCI	XA=out angle 10A..XS=10S,XTIME=excit[ms]													FO.1
FO.3	Injection Coil	XA= injection angle 10A..XS=10S			90	240									FO.3
FO.4	Integrate Coil	XA=out angle 10A..XS=10S,XTIME=switch[us]													FO.3

- Outs setting to angle 0°,180°,90°,240°, where XA is reserved for 10A (CDI)
XB is reserved for 10B (CDI)
XC is reserved for 10C (FUEL)
XD is reserved for 10D (FUEL)
- CDI excitation time 300us (XTIME)
- Used outputs 10A, 10B, 10C, 10D, DO1, DO2
- Trigger wheel should contain more teeth for a precision sensing



Example of Configuration FILE [*.ig]:

Example[36]_2xCDI_2xTCI_1xINDUCTIVE_2xTCI_2xFUEL_1xSERVO

ECU MASTER 10xTCI

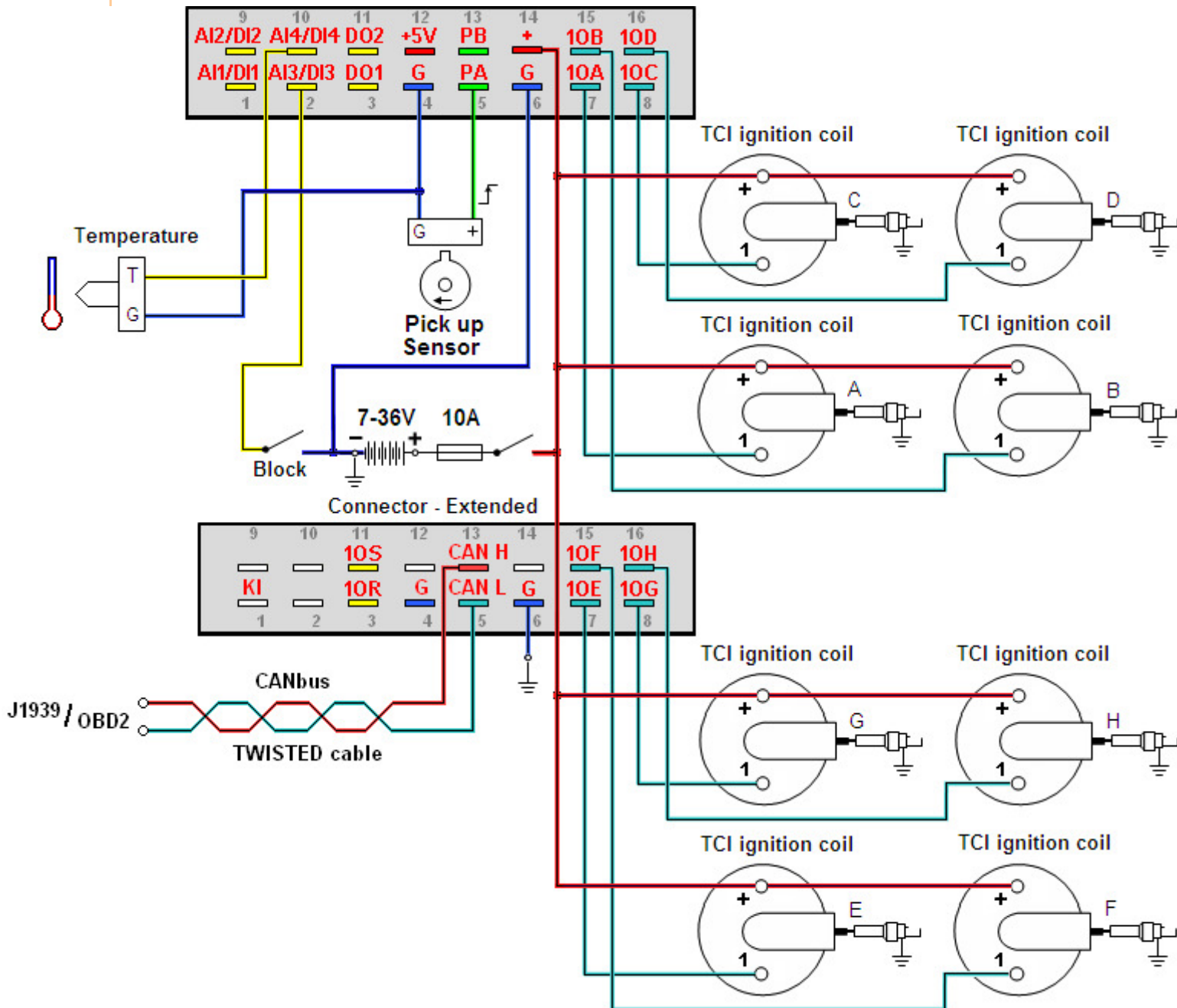
50. Example connecting of one INDUCTIVE pickup sensor, eight TCI coils and Temperature measurement and Blocked run engine signal

1x INDUCTIVE pickup sensors connected to PA input

8x TCI coils connected to 10A,10B,10C,10D,10E,10F,10G,10H outputs

1x Temperature sensor

1x Block Run engine signal



- Trigger wheel should contain more teeth for a precision of sensing

Example of Configuration FILE [*.ig]:

Example[50]_10xTCI_1xINDUCTIVE_8xTCI

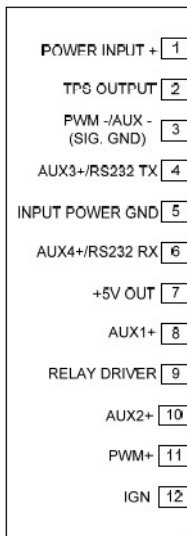
ECU MASTER 4xTCI + LAMBDA + WOODWARD

60. Example connecting of one HALL pickup sensor, four TCI coils, two WOODWARDS for speed / gas regulation, one LAMBDA sensor and Temperature measurement

- 1x HALL pickup sensors connected to PA input
- 4x TCI coils connected to 10A,10B,10C,10D outputs
- 2x WOODWARD connected to DO1 and DO2 outputs controlled by PWM
- 1x LAMBDA LSU 4.9 with sensor BOSCH 0 281 004 044
- 1x CANbus J1939

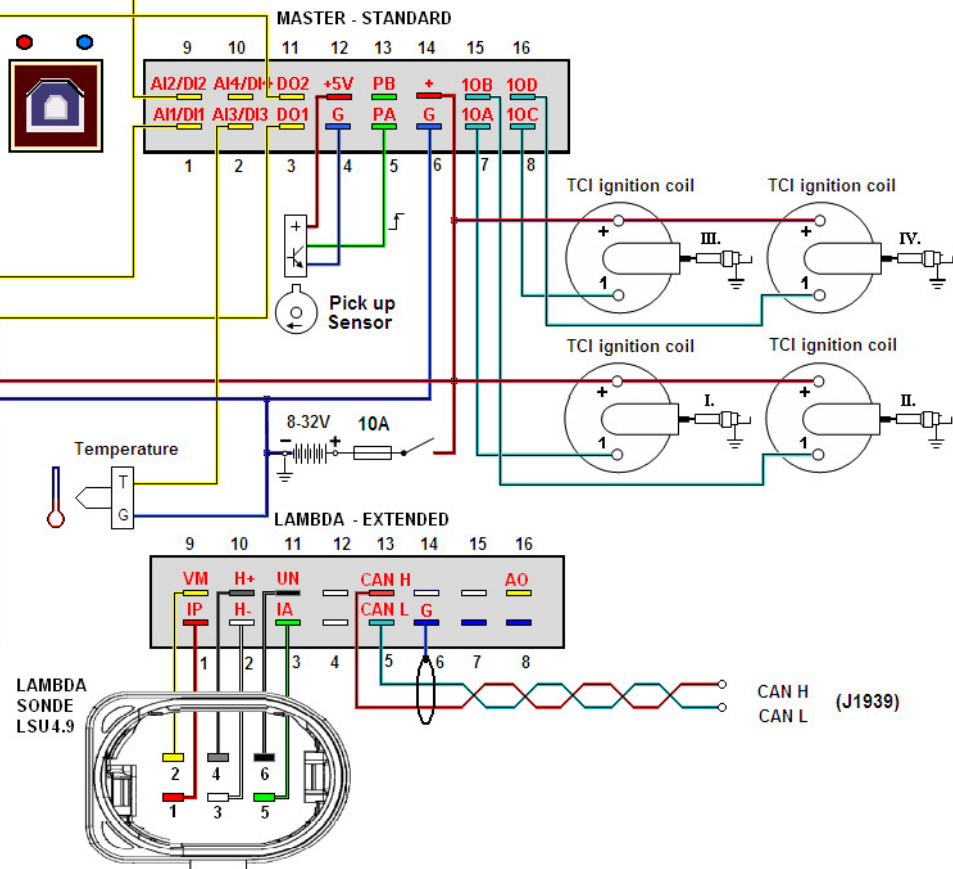
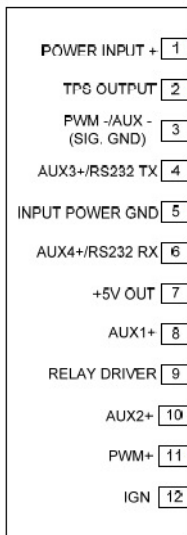
GAS - THROTTLE

Woodward L-Series



AIR - THROTTLE

Woodward L-Series



ECU MASTER 4xTCI + LAMBDA controller

61. Example connecting of one HALL pickup sensor, four TCI coils and one external LAMBDA controller

- 1x HALL pickup sensors connected to PA input
- 4x TCI coils connected to 10A,10B,10C,10D outputs
- 1x LAMBDA controller LSU 4.9 with sensor BOSCH 0 281 004 044
- 1x CANbus J1939

