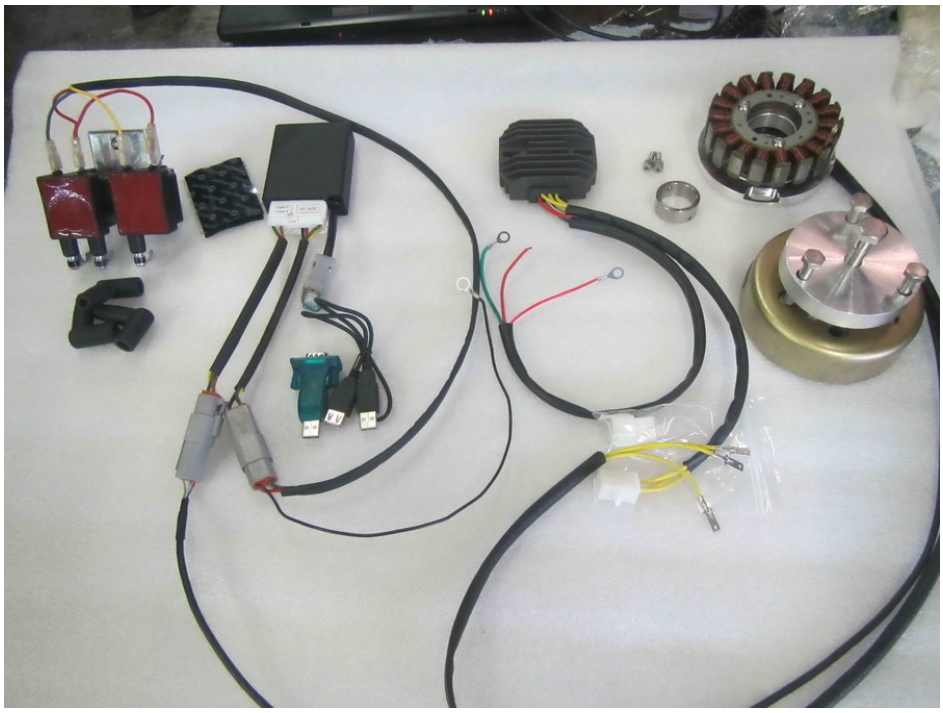
Installation and Adjustment of Redax/Ignitech 250 watt Alternator & Ignition system.

These instructions have been written for the installation of your new system to suit the earlier Bosch HKZ CDI system. Later model BTZ systems are similar and will be added as footnotes.

Donor bikes used in this document are various bikes ranging from a well used 1975 x 1000 with Bosch HKZ CDI unit ignition through to a 1980 Jota and a 79 x 1200 with BTZ ignition.



When your system arrives it should look similar to the above photo, main difference will be in what type of Ignition coils you have specified. Photo above shows a new set of Nology Pro-Fire coils.

First step, remove Alternator Cover and peen back Lock Tab that is installed behind the Alternator nut. Remember that this nut is a **LEFT HAND THREAD**. Remove Nut as required. We use a Rattle gun but it can also be removed using a suitable Socket and Breaker Bar.

To remove the Alternator it is best to use a factory Puller or a suitable Puller machined similar to the Factory Puller, external thread is 45.0mm x 1.5 . See photo on right hand side above. We understand that not everyone has access to this form of puller but in reality, it is the only one that works without doing damage to the workings.

Once Alternator Rotor is removed, unbolt the Alternator Stator/Ignition plate by undoing the two Screws and remove from the Crankshaft. At this stage also remove the Bosch Ignition Rotor by undoing the small Allen headed Grub Screw, you may have to remove the Woodruff Key from the end of the Crankshaft first but the key can generally stay in place.

You should now have the Stator hanging down on its wires. Trace the wiring back to its termination point and undo the terminals. You can now pull the wiring through the wiring access tunnel in the Alternator Cover. There is no need to memorize the wiring as nearly all the wiring is going to be replaced anyway.

Prior to removing the wiring you may wish to also remove the Air Filter Box and the Starter Motor to make life simpler later in the installation process but these items can stay in place if you wish.

At this stage you should have a bare mounting area as shown to the left.

If your Oil Seal is leaking it is advisable to change it at this point. This can be identified by oil stains or oil wet patches inside the above cover. Oil Seal is by dimensions, 35 x 47 x 7. It is also possible to purchase a 35 x 47 x 5mm Oil Seal which gives the seal more clearance to the Oil Seal nut and which works better than the 7mm wide seal.

This Oil seal can be accessed by undoing the inner Nut that can be seen above and this thread is also a **LEFT HAND THREAD**. One needs to use an extended 36mm Socket to remove this nut and is not a tool

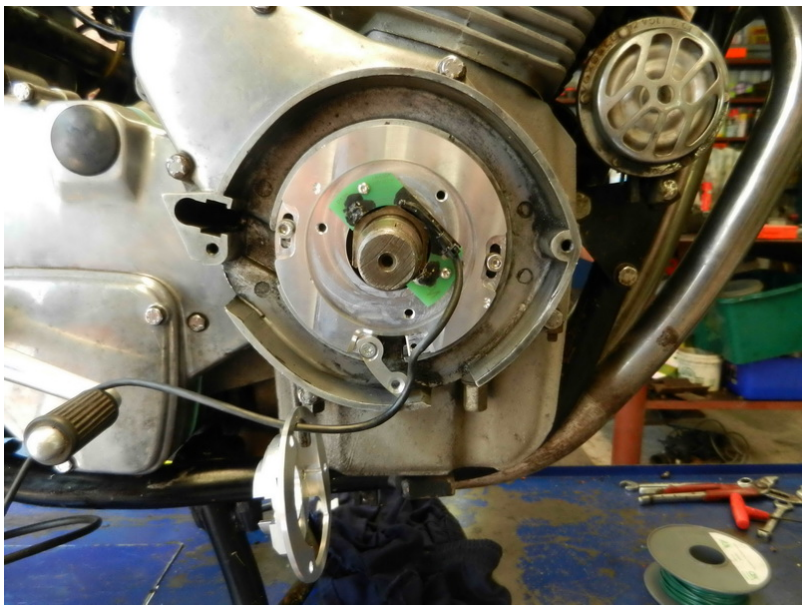
that most people will have at hand. To remove the seal, use either a Seal Pick or alternative method is to drill a very small hole, approx 2-3mm in the outer rim of the seal and then screw in a self tapping screw which will force the seal to pop out or you can use a pair of Pliers to pull the seal out by grabbing hold of the self tapping screw.

Alternative method is to just remove the Inner Alternator cover while you are there especially as you have already removed the wiring going through the cover. May as well just for a look and you can clean out and inspect the Starter Clutch while you are in there. Most times one finds broken roller springs in the Starter Clutch mechanism.

Installation of the seal is quite simple, use a soft punch and gently tap the seal back into position. It helps to grease the outside of the seal and we always apply grease to the inside of any oil seal so it is lubricated when engine starts. Note where outer edge of the seal is in relation to the inner cover prior to removing original seal. Reinstall Left Hand Nut and tighten. We always use thread sealant on the inner thread of this Left Hand Seal nut, this makes certain no oil can work its way through the thread form.

Before proceeding further dummy fit the new Ignition Rotor onto the Crankshaft to make certain that it can slide over the shaft freely. It is necessary to make certain that the Rotor is free to move along the shaft and rotate when in position. These cranks have been around for years and it is not uncommon to find small dings and bruises on the crank shaft that will need careful dressing with a fine file. Do this now to avoid issues later.

Next, install Backing Plate and Ignition module as provided in your kit using the supplied Allen Headed Bolts and Washers. Cable relief slot goes down as shown in photo below. Set the base plate so cable relief groove lines up with original cable relief cast into the Inner Alternator cover.



Note, before feeding the ignition wire through the Alternator cover hole make certain you feed the wire through the Stator adaptor as shown in the photo above, wire needs to be feed through the correct side, cut out area is positioned to the top, leave Stator adaptor hang loose at this stage.

Install the crankshaft nut back onto the crank end and tighten, this allows us to manually turn the engine over to set the ignition position.

At this stage we leave the installation of the Sensors and start on the wiring installation as we need the wiring completed to allow the Ignition system to be set in the correct position.

Wiring instructions

Coil selection would have been discussed when the system was ordered and at the very least Redax Laverda would have supplied a coil bracket to suit, if not a set of coils as well. BTZ equipped bikes can retain the original Nippon Denso coils with good results if the plug leads are in good condition.

Earlier CDI HKZ systems need to change out the original Coil packs mounted at the steering head for a set of new coils.

There are a number of choices with one of the best due to its 45,000 volt rating and small size is a set of Nology 3 ohm Pro-Fire coils.

Nology coils are made in Germany and sold in Europe under the PVL brand name

Other choices are 2nd hand 3 ohm coils from Jap bikes, TEK MP-08 dual coil as found on numerous Honda 4's and TEK KP-03 single coil as found on Kawasaki 250's and various other Jap bikes.

Remove Coil packs and all associated wiring as shown above and install the new Coil Mounting Plate supplied with your system. Prior to installing mount the coils to the plate.

Whichever coil choice is made, your system will be supplied with a wiring harness to suit.

Photo above shows a set of TEK coils mounted in position, original Plug leads can be reused with these coils but you need to make certain the coils come with leads installed so you can obtain the compression fittings off of the old leads.

This photo above shows a set of Nology Pro-Fire coils bolted to a Redax supplied mounting bracket, these coils are rated at 45,000 volts which is a far better choice of coil to use and due to their small size are a great fit in the headstock area.

Photo to the left shows a BTZ equipped bike that has had the Nippon Denso coils replaced with a set of Mitsubishi coils using a custom machined bracket.

This photo to the left shows a BTZ equipped bike that has had the Nippon Denso coils replaced with a set of Nology Pro-Fire coils, this custom bracket is capable of mounting either 1 x single and 1 x dual output ignition coils or 3 x single output ignition coils with the Ignitech software adjusted accordingly.
Photo shows 3 x coils mounted together

Wiring loom from the Stator and Ignition plate, thread the new cables through the Alternator cover tunnel, it is easier to feed the Ignition cable through first followed by the 3 x black sheathed yellow wires. Once cables are through you can remount the Starter Motor if you removed it but do not mount the Alternator Stator or Adaptor Plate, just leave both hang down from the cover at this stage.

Alternator wiring which are the 3 x yellow wires go to the plug installed on the cable coming from the new Regulator but as supplied are not installed in their plug as the cable needs to be installed through the engine cover first. It does not matter which yellow goes where in the plug as each yellow wire is a single phase of a 3 phase charging system. Make certain the pins are all the way through and seated correctly inside the Deutsch plug before installing the green locking wedge, you can check they are seated by grabbing hold of them with a pair of long nose pliers and giving them a pull forward.

There are 2 other wires coming from the Regulator, Black wire is Earth and can be installed on a frame Earth or direct back to Battery earth, frame earth is neater.

Red wire goes to Positive side of Battery, can go to the positive side of the battery direct or through a suitable fuse box.

It is now time to install the supplied 3 phase Regulator. It is up to the owner where you wish to install the Regulator but we recommend on the early CDI equipped bikes that it is installed on the Rear Mudguard below the Tool Tray.

For owners with BTZ ignitions, just remove your current 2 phase Regulator and install the 3 phase Regulator in the same position, mounting holes and Regulator size are the same.

In photo above, single black wire with eye connector is the Ignition system earth, connect to the frame earth or direct to the Battery earth pole, frame earth is neater but make certain that the frame has bare clean frame so earth wires obtain a good connection.

On the positive side or power to the Ignition, you need to find the orange/white wire at the coils, this wire is the feed from the kill switch, connect this wire to the single bare tab left at the coils for this purpose, joins onto the tab with the installed red wire

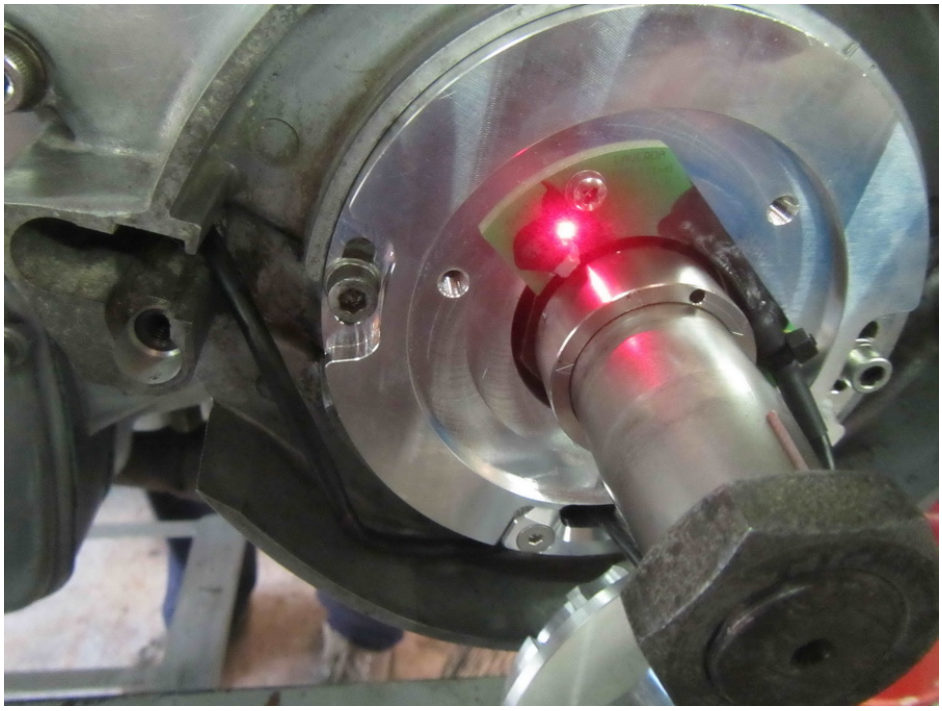
With wiring complete it is now time to set the ignition timing, left hand cylinder when sitting on the bike is No 1 cylinder on a Laverda triple. It is best to use a Piston stop and degree wheel to obtain TDC but very few people will have this equipment at hand. Alternative is to use a screwdriver and lots of patience. See attachment for further info on Degree wheel and Piston stop.

Remove all the Spark Plugs from the Cylinder Head and by using a thin screwdriver, insert the screwdriver down the left hand cylinder Spark Plug hole until it rests on the Piston. Now slowly rotate the engine by hand to find Top Dead Centre by carefully watching the screwdriver lift up with the Piston. You are trying to find TDC within +/- 0.2mm so be patient as it may take a number of attempts to finally be satisfied that you are in the correct position. Vernier Calipers can also be used by resting the depth section on the spark plug hole and the tail probe on top of the Piston.

While doing this you will note that the Piston will dwell at TDC, it is best to try and identify the area where the piston stops moving up and before it starts to move back down, you are trying to get the piston stopped at the midpoint of this dwell which is where true TDC would be.

Note that it does not matter which stroke the piston is on as the ignition system operates on the Wasted Spark principal which means that every time the Piston reaches TDC the system fires, even if it is on the Exhaust stroke. This method of ignition is the most common used on engines with crankshaft mounted ignition systems.

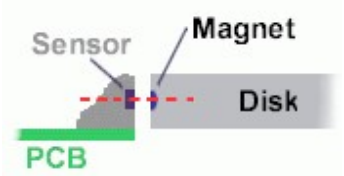
Once you are satisfied that the engine is at TDC it is now possible to turn on the ignition switch and position the Magnetic Rotor. Turn on the ignition and then slowly turn the Magnetic Rotor past the Sensor that is at the rear of the bike as shown in the photo below.



When the Rotor is in the correct position and rotated past the rear trigger so “S” passes the trigger a LED light will turn on. Markings on the Rotor “S” and “N” relate to the polarity of the magnets, Hall Effect trigger is turned on by the South magnetic polarity and turned off by the North magnetic polarity, you are trying to position the Magnetic Rotor on the crankshaft so that the moment the LED light goes off at “N” the grub

screws are tightened. At that exact point tighten one of the Grub Screws on the Rotor but not before checking to confirm that the Rotor disc is evenly spaced within the Sensor itself. See diagram below.

- With the engine at TDC as described above
- Turn on the Ignition switch and turn the rotor so the 'S'-marked Magnet approaches the Hall Effect sensor (rearward sensor). Take care that the magnets in the Rotor disk are approximately at the same height and position as the sensor.



- Go on turning the Rotor. The LED light near the sensor should light up at the 'S'-marking. (It is possible that the LED's will light up when ignition is turned on)
- Turn the disk slowly to the 'N'-marking until the LED is just switching off, at this exact point when the LED goes off the Rotor is in the correct position and can be tightened by the Grub screws.

Note: you can't switch the LED on only by turning back to the 'N'-position, to redo the positioning of the Rotor the Rotor has to be turned back far enough to allow the 'S' marked magnet to turn on the LED lights again.

It is highly recommended to use Loctite Thread Locker when you tighten the 4mm Grub Screws, is easier to tighten one first and then when installing 2nd and 3rd Grub Screws, apply a small amount of Loctite to them, tighten in position than remove the 1st Grub Screw and apply Loctite to it as well. In photo below I use the Allen Key to dab a small amount of Loctite onto it and use that dab to apply to the outside of the Grub Screw.

Loctite product 243 as shown is a medium strength Thread lock product and is recommended in favor of the high strength products that Loctite also manufacture, if the high strength products are used it can be very problematic removing the Grub Screws at a later date as the Allen Key is small and can round off when trying to loosen the Grub Screws.

At this stage there is no problem to actually start the bike as there is no need to have the Alternator/Stator connected to actually run the bike. This is of course the owner's choice but the benefit is that if there is a problem at this stage then it is easier to troubleshoot the problem while the Alternator is still removed.

Lay the Spark Plugs onto the head where they have a good contact and turn on the Ignition, crank the engine over and at the same time, check for spark on all 3 cylinders. There should be a nice fat spark on all three Plugs at this point.

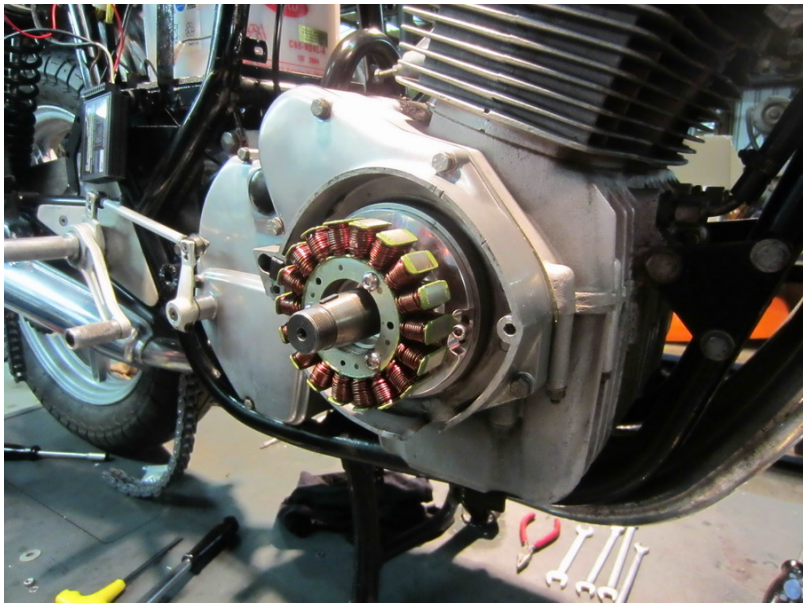
Your Ignitech system has been supplied with a pre-loaded Advance map to suit a Laverda 180 triple. It is the owner's choice as to whether they wish to delve into the Ignitech software which allows the programming of numerous different settings of the ignition system and also allows custom designed advance curves to be made, software supplied by Ignitech is quite a neat set up.

We recommend reduced total advance (30 – 32 degrees) and later advance curve slopes for engines with high compression and 32-35 degrees for lower compression engines such as 3C/ 3CE and 3CL. This of course can be adjusted at anytime by connecting a Laptop to the box and configuring the set up as required.

Now the bike is ready to start, fire the bike and run for a few minutes or so to confirm everything is working as it should then shut the bike down and continue with the Alternator installation.

Position the Stator adaptor over the Sensor plate very carefully. We find it fits in easier if you tilt the plate slightly and position the area around the cable first, the plate will slip into position quite easily that way.

You should now have something that looks like the photo above. Note where the cutouts are positioned on the Adaptor plate in the shot above. You should also have the cables inserted through the supplied cable bridge clamp at this stage but do not tighten the screws until Stator is roughly positioned.



In the shot above you can see Stator is now in position but note that the cable clamp has to be installed in position first. Position Stator over the crankshaft and lift up to allow access to the cable clamp, position both wires in behind the clamp and tighten, be careful not to pinch the ignition cable while doing this.

Once the Stator is installed slide the Alternator Rotor onto the Crankshaft end, position in line with the Woodruff Key and tighten up the outside LEFT HAND Nut, one can also use Loctite 243 on this nut if felt necessary.

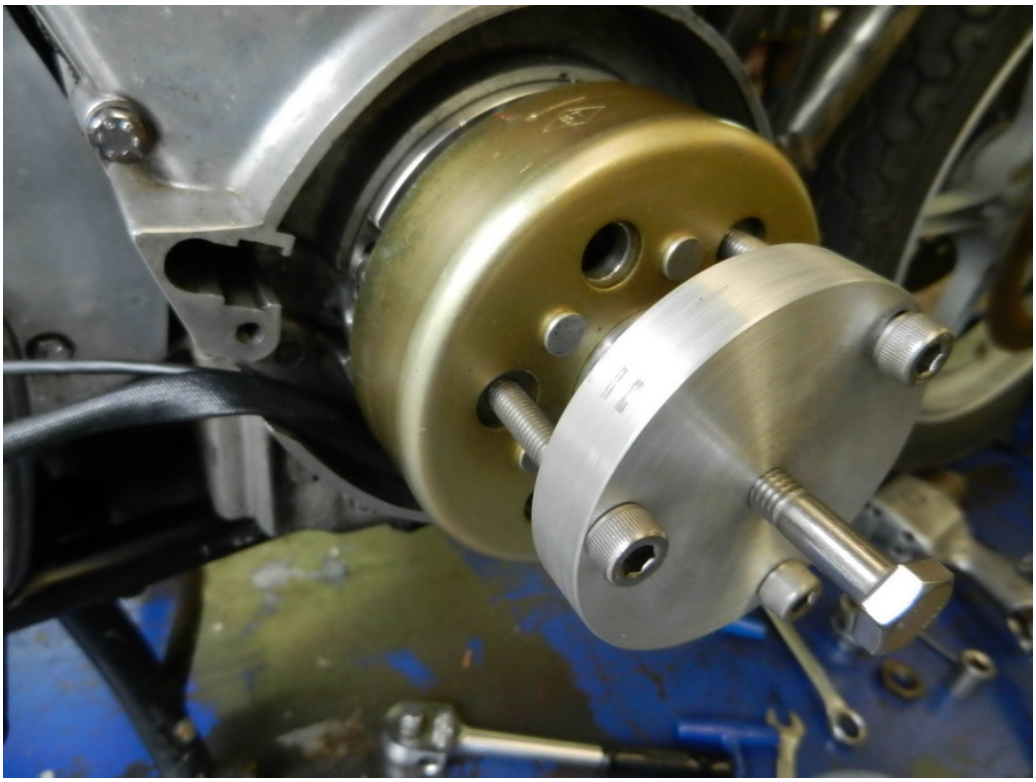
Engine shown below has the larger Dyna 3 ohm Green coils installed, this bracket is also available on order but the fit is very tight in the headstock area and will require drilling of 2 x 6.5mm holes into the alloy bracket.

Make certain that the cables are out of the way of the spinning Rotor, they will quickly wear through if they are able to touch the Rotor when the engine is operating.

It is also a good idea to check the Voltage at the Battery while the bike is running to confirm that the Charging circuit and replacement Regulator have been installed correctly. Increase the RPM through to approx 4,000 RPM at which stage you should be able to measure the Voltage at the Battery Positive post. Should be in the region of 14.5 volts if all is working correctly.

Reassemble the rest of the bike as required and get ready to go for a ride.

Note;
If using the supplied Rotor Puller to remove the Alternator Rotor for whatever reason, only screw the supplied 8mm bolts in **no more than a total of 4 turns each** or they will bottom out on the Stator windings and damage the Stator.



Timing degree wheel

Your old Bosch Alternator rotor hub can be easily converted into a handy timing degree wheel to allow accurate setting of the timing as shown in the photos below. Also shown is a simple dead piston stop made from an old Spark Plug which when used with the degree wheel allows you to find the exact TDC (Top Dead Centre) Also needed is a piece of wire bolted to one of the 6mm bolts from the Inner Alternator cover, wire needs to be long enough to act as a pointer on the Degree Wheel.

Finding TDC method.

Install the degree wheel onto the crank end with the ignition system already in place and timed as described in the main document.
Make certain pistons are not near TDC, screw in modified spark plug as shown and tighten. Now carefully turn the engine over BY HAND using a socket and bar on the crankshaft nut until the piston touches the dead stop, depending on where your wire pointer is, note the degrees, let's say it is 36 degrees.
Turn engine over nearly one full turn in the **opposite direction** until piston again touches the piston stop, note the degrees, let's say it is now 18 degrees.
You need to move the wire pointer half of the difference so 36+18=54/2=27 degrees
Set the wire pointer at 27 degrees and check both ways again, pointer is set in correct position when the reading is the same on both sides of TDC (Before Top Dead Center and After Top Dead Center).

Actual numbers will vary, I have used the figures above as an example only to illustrate the principal of using a piston stop, main thing you need to find is an equal distance both sides of the engine stop)

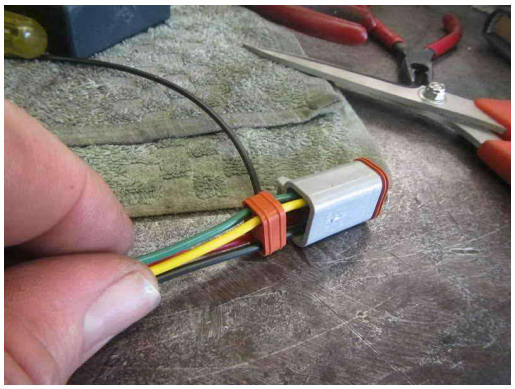
Remove Piston stop, install Spark Plugs, install Strobe light, start engine.

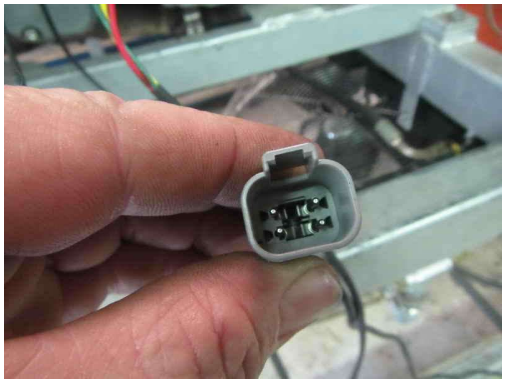
It is best to have a Laptop installed with the Ignitech ignition software open and operating when you go past this point.

Deutsch Connector wiring and assembly

Supplied 4 way Deutsch connector needs to be assembled after the Ignition wiring is feed through the engine. See photos below.

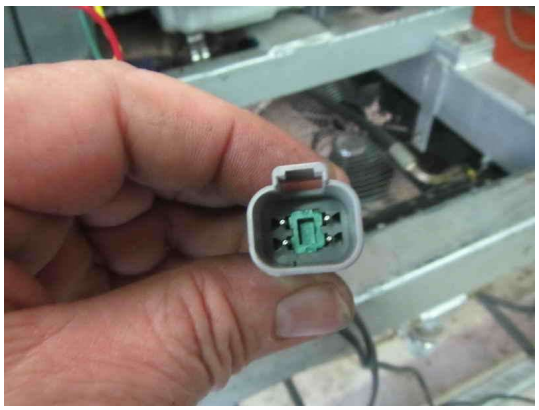
After running the trigger cable through the Alternator cover it is necessary to assemble the Deutsch plug. Use a small screwdriver to insert some grease into each of the seal rubber plug holes before inserting the small wires. Push them in as far as possible by hand and then use a small flat bladed screwdriver to fully push them into position.
Make certain to match their wiring colors to the plug installed on the adaptor made to convert the 20 pin connector to 2 x 4 pin Deutsch plugs





Use a small set of Long Nose pliers to pull against each pin to make certain they are fully seated. Now using same Pliers hold the green locking wedge and clip it into place

Note, to remove the Green wedge use a 45° Seal pick, insert it into the hollow part of the Wedge and give it a sharp pull, Wedge will unseat



SPARKER TCIP4 version 96

SPARKER TCIP4 is an ignition unit for road motorcycles. The ignition principle is inductive. The unit is four-channel (has four ignition outputs). In past we produced also two-channel version, but we produce only four-channel version from 1.1.2021.
The unit is programmable through PC. The unit is fully adjustable regarding the ignition timing. It contains two switchable ignition advance curves / maps dependent on RPM and position of throttle or under pressure in the intake manifold. The ignition also contains output for tachometer, two multifunctional outputs, two multifunctional inputs, outputs and an input for the servomotor exhaust throttle.
The unit is also equipped with some racing features - mainly Quickshift and Gear shift light.
During programming, the ignition unit is connected to a computer via a serial port.

To download the TCIP4 software go to the Ignitech website
https://www.ignitech.cz/en/vyrobky.htm

Unit are produced in several further modifications related to the inputs for engine position sensors. The inputs for position sensors are two and each of them can be custom-made in the following versions:
1) For inductive sensor (marked IND or unmarked)
2) For inductive sensor with a pulsed rotor with more than 12 protrusions (**marked 24-2**)
3) For inductive sensor with a pulsed rotor with more than 36 protrusions (**marked 48-2 or 60-2**)
4) For HALL sensor or optical sensor (marked **HALL**)
5) For inductive sensors and pulse rotor with one pulse lobe (marked **ONE LOBE** or **DUCATI KOKUSAN**)

Unit are also produced in two further modifications related to the output for ignition coils:
A) For standard ignition coils (unmarked). This output provide ground when coil is excited.
B) For ignition coils with integrated driver (marked **SPA**). This output provide +5V when coil is excited.

HARDWARE

Supply voltage +12 V input
The nominal power supply voltage should be 12 V. The supply voltage must be between 8-18 V. In this range the unit is able to provide control of all the processes. Above 20 V the unit stops controlling the coils (overvoltage protection).
Supply voltage is connected with the positive pole to +12V (pin 13) and with the negative pole to GND (pin 14). Pins 14, 16 and 7 are interconnected in the unit. They can all be used either to connect the power (power supply) ground or to connect the ground for sensors. Ground for sensors should be connected from unit and it should not be interconnected with power ground or with engine or chassis mass.

Input for the engine load sensor
The input for engine load sensor can be realized by the throttle position sensor (TPS) or by intake air pressure sensor (IAPS).
An input is ready for standard TPS or IAPS sensors used on motorbikes. It is designed to bear voltage up to 5V. Setting up the voltage levels of the TPS for 0% and 100% or IAPS for 0-999 kPa is included in software.
TPS or IAPS are powered by reference voltage +5V (pin 17) and SENSE GND (pins 7 or 16). Ground for sensors should be connected from unit and it should not be interconnected with power ground or with engine or chassis mass. Sensor outlet will be connected to TPS/IAPS (6).

Crankshaft position sensor CKPS
The ignition unit can be used for almost all known and still unknown motor position pickup systems. Most of the systems can be chosen directly by selecting relevant motorcycle type from the list included in software. Different pickup system can be set following a special procedure in software.
An input is ready for standard pickups (inductive, reluctant type) used on motorbikes. On request, we can also deliver inputs for HALL sensors.
One outlet of the CKPS will be connected to CKPS 1 (pin 9) and the other outlet will be connected to SENSE GND (pins 7 or 16). In double-pickup systems the other sensor's one outlet will be connected to CKPS2 (pin 20) and the

other outlet will be connected to SENSE GND (pins 7 or 16). Ground for sensors should be connected from unit and it should not be interconnected with power ground or with engine or chassis mass.
In the case of HALL type sensor the sensor can be powered by +5V (pin 17) or by +12 V.

Multifunctional inputs The unit contains two multifunctional inputs. Inputs should be activated using switch with respect to ground. The inputs can be assigned different functions:

KILL SWITCH	- the unit will stop ignition when input is grounded
BLOCKING	- the unit will stop ignition when input is ungrounded (security circuit of sidestand)
QUICKSHIFT	- activate Quickshift sequence (gear shift up with full gas)
RETARD	- decrease ignition advance with preselected value in full range
START LIMTER	- activate Starting limiter (launch control)

2nd ADVANCE CHART - switch to 2nd ignition advance curve/map
One outlet of the switch will be connected to M IN 1 (pin 8) and the other outlet will be connected to ground.
One outlet of the switch will be connected to M IN 2 (pin 19) and the other outlet will be connected to ground.

Outputs for induction coils IC 1, 2, 3, 4
One outlet of the induction coil IC 1 will be connected to IC 1 (pin 1) and the other one to the switched +12V.
One outlet of the induction coil IC 2 will be connected to IC 2 (pin 10) and the other one to the switched +12 V.
One outlet of the induction coil IC 3 will be connected to IC 3 (pin 2) and the other one to the switched +12 V.
One outlet of the induction coil IC 4 will be connected to IC 4 (pin 11) and the other one to the switched +12 V.
Dwell mode of the ignition coils can be set to short/long/manual/auto using software. When setting up the dwell it is necessary to check whether the used induction coil is suitable for the chosen configuration. Short dwell is generally used for ignition coils with primary coil resistance less than 2 Ohm. Long dwell time with these ignition coils can result in their destruction. On the contrary, if short dwell time is used for coils that need long dwell time, the energy of spark could be reduced especially in high RPM. You can also set the dwell time manually or automatically for specific induction coil. For more details see the Software section.

Tachometer output TACHO
The tachometer output is compatible with most on-board devices used on motorbikes. Number of pulses per one revolution and possible corrections are set using software.
TACHO is supplied by 12 V voltage and GND. TACHO output will be connected to TACHO (pin 15).
The revolution indicator output is not compatible with on-board devices used on old Honda motorcycles from the 1990s (ignition units with OKI 16pin connector). Unit can be equipped with revolution indicator output compatible with these on- board devices (marked HONDA TACHO).

Multifunctional outputs
The unit contains two multifunctional outputs (Power Outs). Outputs are type NPN opek collector (it provide ground when is switched on). Outputs can switch resistive or inductive load up to 2 A. Outputs can work with various modes preselected with software:

Fuel pump	- it is switched on for 4 seconds after unit switch on and always when engine is running.
Gear shift light	- two stage gear shift light.
PowerJet Honda	- behavior like PowerJet at Honda RS125.
Special (powerjet).	- switch on and switch off according curve/map with pulse-width modulation possibility
Special PWM	- continuous control with pulse-width modulation according curve/map (powerjet for example).
Speciál pulse	- continuous control using the pulse length according curve/map (oil master for example).

Multifunctional output 1: Load should connected with one outlet to POWER OUT 1 (pin 3) and second outlet to +12 V.
Multifunctional output 2: Load should connected with one outlet to POWER OUT 2 (pin 12) and second outlet to +12 V.

Outputs and input for SERVO
Servo outputs and input are compatible with most of servomotors used on motorbikes for exhaust throttle (e.g. Yamaha EXUP). The unit is equipped with servo control only in the full (4-channel, 4CH) version. Required dependency of servo position on RPM and engine load can be configured in program.

Servomotor outputs are M (pins 4 and 5). Power supply for servo position sensor is connected to +5V (pin 17) and SENSE GND (pins 7 or 16). The output of position sensor is connected to STPS (pin 18).

Connector adapter, basic harness
For many motorcycles we manufacture so-called **connector adapter**. This is a short bundle, on one side equipped with a connector fitting into unit and on the other side equipped with a connector fitting the original ignition unit. This connector adapter provides **plug and play** connection possibility with the original cable harness.
Next connection possibility is **Basic harness**. This is counterpart connector with all wires with pins crimped. Length is 1.3 m.

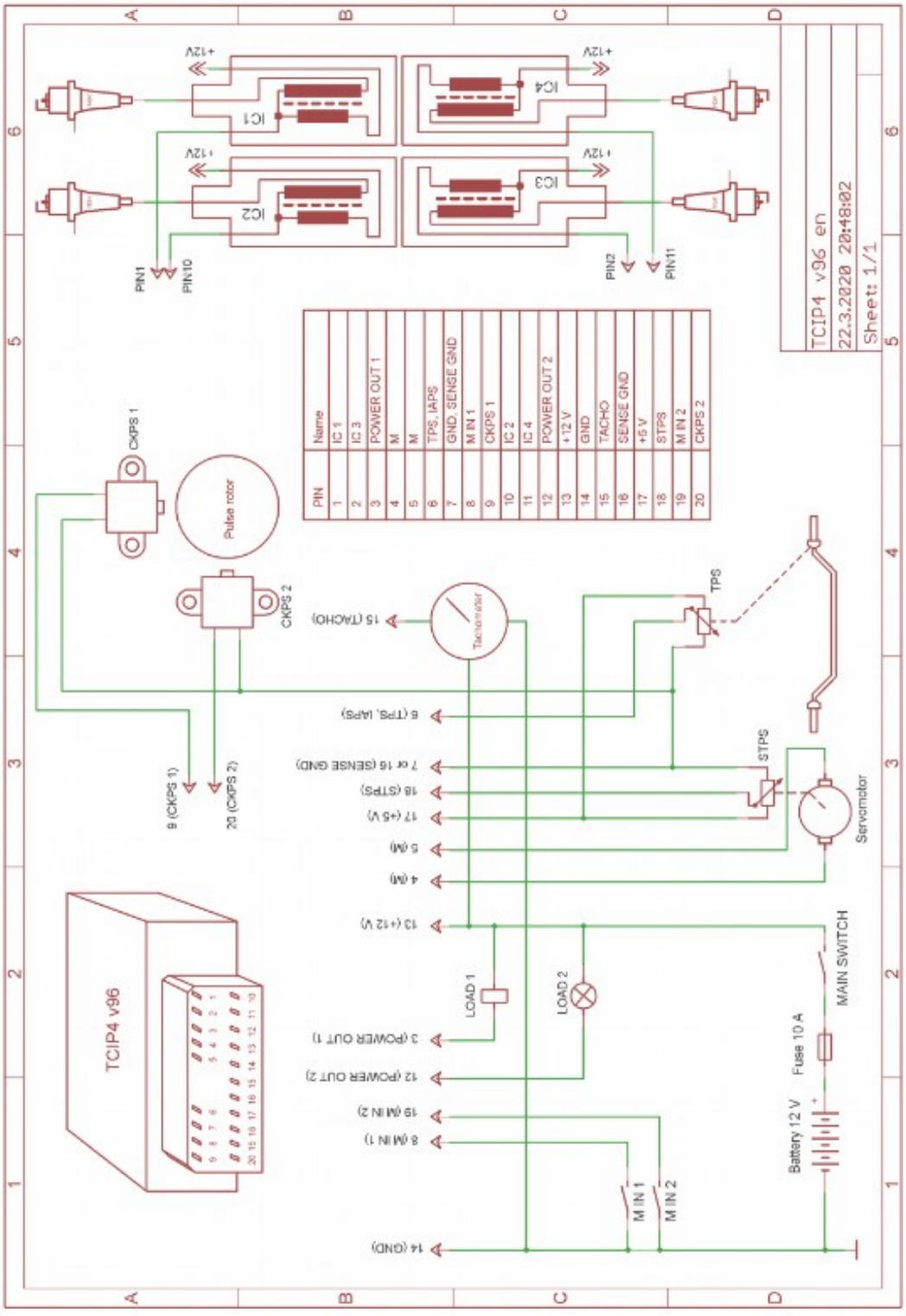
We offer also **Reduced basic harness**. This contains only wires necessary for basic work of ignition.

Wire colors TCIP4.

Wire colour	Connector pin number	Name	Description
Orange	1	IC 1	Induction coil 1
Yellow/black	2	IC 3	Induction coil 3
Purple	3	Power out 1	Multifunction output 1
Green	4	M	Servomotor output
Green	5	M	Servomotor output
Grey	6	TPS, IAPS	Engine load sensor
Blue or light blue	7	GND, SENSE GND	GND, SENSE GND
Black	8	INPUT 1	Multifunction input 1
Yellow	9	CKPS 1	Crankshaft position sensor 1
White	10	IC 2	Induction coil 2
Red/black	11	IC 4	Induction coil 4
Blue/white	12	Power out 2	Multifunction output 2
Red	13	+12 V	Power supply 12 V
Blue	14	GND	Ground
Green/yellow	15	TACHO	Revolution indicator output
Blue or light blue	16	SENSE GND	Sensor ground
White/red	17	+5 V	Power supply of sensors
White/blue	18	STPS	Servo position sensor
Grey/red	19	INPUT 2	Multifunction input 2
Brown	20	CKPS 2	Crankshaft position sensor 2

Note that wire colours listed above do not match the supplied wiring harness as used by Redax Laverda

Recommended connection diagram



TCIP4 software

Pull down menus
File - includes items:

New - default data setting.
New for current tab - default data settings only for the current tab.
Open - opens data file.
Open from exe dir - opens data file from the same directory as the control software.
Open for current tab - opens data file for the current tab only.
Save - saves data file.
Save to exe dir - saves data file to the same directory as the control software.
Nine last opened data files
Print - prints current settings of the current tab.
Exit - exits the program.
Clicking **New** results in automatic default settings of all parameters. These correspond to four-stroke engine without TPS.
Port - includes items to select the communication line.
COM offline - communication off.
COM XX - list of useable serial ports.
COM auto - automatic connection
For PCs without serial port (USB only) it is necessary to use USB/RS232 adapter.

Ignition - includes items
Read - reads data from the unit.
Verify - compares data in PC with data in the unit.
Program - sends data to the unit and performs verification.
Reset - resets the unit.
Tools – includes tools to set the advance, UNDO and REDO.

Language - language settings: English, Czech, German

Help - includes items **Help** - opens Assembly guide (this file).
About the program - information on the software (version, date).

Icons menus
- sets default values. Warning!!! Clicking this icon results in automatic default settings of all parameters.
- opens data file.
- saves data file.
- prints the current settings.
- tools for going back or forward step by step when changing the settings.
- see pull down menu Ignition.

Tab sheet Miscellaneous
Limiter – engine speed limiter value settings (limits with all ignitions off).
Start limiter - Start limiter value settings (limits with all ignitions off)

Start limiter delay - Start limiter activation delay value settings. This is useful when Start limiter switch is located at clutch lever. Start limiter is activated with delay, so that are not problems if clutch is used for next driving.
Quickshift time - sets ignition switch off period during gear shift.
Quickshift pause - sets time of clutch master insensitivity after gear shift.
Retard - sets the value for ignition advance retard if the function is active.

Dwell - sets dwell mode of induction coils.

Short - for coils with resistance lower than 2 Ohm. Dwell time 1 ms with the dynamic addition 12%.
Long - for coils with resistance higher than 2 Ohm. Dwell time 3 ms with the dynamic addition 12%.
Manual - possibility to manually configure the excitation time.
Auto - automatic dwell time determination. The unit itself determines optimal dwell time by measure dynamic current in channel 1. With this choice the ignition coil has to be connected to channel 1.
Dwell time - dwell time required with manual settings [µs].
Dwell correction - automatically determined dwell time can be corrected by percentage [%].
Dynamic dwell addition - dwell addition to compensate uneven engine running at low RPM [%].
Max. dwell time - dwell time limitation, including dynamic addition [µs].
Min. spark time - minimum unchangeable spark duration [µs].
Max rpm for dwell by lobe - determination of the revolutions into which the ignition uses the starting sequence of dwelling the coils(excitation by a fixed angle given by a virtual lobe. This virtual lobe is defined in the settings of the pickup system (see tab Bike).
Inputs for neutral and side stand - logic of neutral and side stand inputs is set so that BLOCK function is activated when both inputs are used (if at least one multifunction input is grounded, the bike is not blocked).
Multifunctional Input 1, 2
Off - no function.
Kill switch - when input is grounded - the unit will stop ignitions.
Blocking - when input is not grounded - the unit will stop ignitions.
Quickshift - function to interrupt or retard the ignition when gear up shifting. Settings is at tab sheet Race.
Retard - function to decreases the ignition advance by preset value.
Start limiter - function to activate Start limiter.
2nd advance chart - function to change ignition advance from curve/map 1 to curve/map 2.
Inverse polarity - standard polarity is that input is activated by grounding. With inverse polarity will input activated by ungrounding.
Input = - visualisation of input activation.
Sensor - here you can find the selection of engine load sensor.
None - no load sensor is in use.
TP - throttle position sensor is used.
IAP - inlet air pressure sensor in the intake manifold is used.
TPS sensor - here you can set values of the TPS voltage [mV] for 0% and 100% opening of throttle.
IAP sensor - here you can set characteristic of IAPS using two points voltage/pressure.
Set TPS 0 - by pushing it measures and sets voltage for 0% TPS (unit connected with PC, no gas).
Set TPS 100 -by pushing it measures and sets voltage for 100% TPS (unit connected with PC, full gas).
After determining the limit values, it is necessary to store these values in the ignition by pushing the "program" button, otherwise they will not be executed.

Tab sheet Bike
Motorcycle type - crankshaft position sensing system selection for specific motorbike.
Tachometer output
Number of pulses per revolution - basic tachometer output settings.
Corrections - percentage corrections of tachometer values [%].
Compensation - frequency compensation of the phase error of engine position inputs. The phase error is due to the frequency dependency of trigger level of input and the delay that occurs when processing the input signal. The phase error is mainly dependent on the number of lobes of the pickup system of the motor position.
RPM without ignition - sets the number of starting revolutions without ignition. For a kick start system this value represents the number of revolutions when all channels ignite together.
Sensor polarity - Sensor polarity selection (Plus/Minus/Auto).
Plus - designed for pickup connection, where - as the pulse lobe is getting near to the sensor, it generates positive voltage, and when the lobe is moving away it generates a negative voltage.
Minus - designed for pickup connection, where - as the pulse lobe is getting near to the sensor, it generates negative voltage, and when the lobe is moving away it generates a positive voltage.
Auto - unit itself determines correct polarity automatically (the algorithm is based on the assumption that the sum of pulse lobe angles is lower than the sum of gaps in between).

Pickup interchange - interchanges the engine position sensor inputs (pins 9 and 20).
No polarity check - the unit controls polarity of the sensor using shape of the signal. If the actual polarity of the sensor is different from the selected one, the unit will block ignition. This option cancels the blocking of ignition.
Interlock input - this option works only for pickup system 1 lobe, 2 pickups. With elevated levels of electromagnetic interference (e.g. at the time of ignition) on some motorcycles (e.g. Ducati) unwanted activation of the pickup input may occur, especially that input which at the moment is not active. This option prevents unwanted activation blocking input 2 during activation of input 1, and vice versa: blocking input 1 during the activation of Input 2. This option, however, may cause problems, when combined with automatic determination of sensor polarity.
Spark possible before lobe - during standard operation of the unit ignition can take place only in the section after the start of the virtual lobe. This option allows to burn even before the virtual lobe. Unfortunately this is at the cost of the virtual lobe being 360 °, which significantly affects the accuracy of ignition especially at low revolutions.
Lower advance at start (next edge) - this option decreases (moves) advance to the next start pulse edge compared to the standard starting position in advance. Valid only for starting speed (speed less than 500 RPM). This option can be used especially for large volume single-cylinder engines to prevent kick-back when starting el. starter. You can use this option only for some pickup systems.
Lower advance at start (%) - this option delayed starting advance upon angle. This angle is determined as % part of virtual lobe. Valid only for starting speed (speed less than 500 RPM). This option can be used especially for large volume single-cylinder engines to prevent kick-back when starting el. starter. You can use this option for most pickup systems.
Special dwell by start - this option can be used to reduce the current load on the ignition coils when starting for pickup systems where the virtual lobe is too wide. As a standard the unit in starting revolutions excites the ignition coil from the start of the virtual lobe to the ignition at the end of the virtual lobe. With this option the dwell starts at the end of the virtual lobe, gives 2 ms and then ignition takes place. Valid only for starting speed (speed less than 500 RPM). This option partially reduced advance for the starting speed (due to delay of 2 ms).
Description of synchronization - here the current pickup system can be modified, or new one created (only when selecting
Special settings in the **Motorbike type menu**). Each item allows you to define the so-called Virtual pulse lobes. The virtual pulse lobe can be either a single pulse lobe or a sequence of several pulse lobes and spaces between them. BEWARE: only for very experienced users. Please consult with us any atypical configurations of pickup systems.
Some settings in this menu are only active if a special type motorcycle is selected.
On the bottom left of this tab there are some statistical data collected from the unit. These data are read out even in the case when the version of the unit control firmware and software are not compatible. It is sufficient when the connection is established and active. The following data are read: The name of TCIP4 unit, firmware version date, number of programming sessions.

Tab sheet Advance map
It contains two sub tab sheets of switchable ignition advance curves/maps Advance 1 and Advance 2.

Advance map 1 and 2
The advance map contains up to 15x10 adjustable points depending on revolutions and the engine loads (TPS or IAP) value. If no load map is used, the advance map becomes just a 15-point curve of advance depending on the revolutions. Number of the columns is possible to set with tool at right side of curve/map.
Setting of the advance map (curve) can be done in several ways.
- by writing individual values directly into the edit boxes of the PC keyboard.
- by using graphic tools up / down arrow (always to the right from the value of the edit field).
- using +/- buttons. This option allows you to change only the current edit box in the engine running mode(the active field is green) or when **ALL** option is activated the entire map (curve) can be moved in both running and off modes.
- by pressing F4 and F5, F4 has the same function as the button "-" and F5 has the same function as the button "+".
- using the scroll wheel of the mouse – by tapping the edit box the option to change by scrolling is activated.
- in display mode of the advance map **TAB** and **2D** it is also possible (using the mouse) to pull individual points of the curve.
Base advance - is the angular difference between the position when the crankshaft position sensor is directed to the end of the virtual pulse lobe pulse and the top dead centre position (see angle "base advance" in the picture below).

This value is always determined by the mechanical constitution of pickup system and shall never be changed by software settings!!!
The field **"Base advance"** thus is not there to change the base advance: into this field the value must be entered that corresponds to the physical condition of the engine. Use stroboscope lamp for check of base advance value.
To the first point of the revolution of advance curve the unit ignites on the value of base advance (at the end of the virtual pulse lobe). The exception is the **"Start of lobe system"** that can ignite at the beginning of the of the virtual pulse lobe. Therefore for revolutions lower than the first point of advance curve early ignition point cannot be set, as it is derived from the mechanical design of the pickup system!!! The first revolution point of the curve in most cases should be chosen above idle speed!!!
Please contact us in case of any uncertainties regarding the design of the pickup systems and their functioning with unit.

BASE ADVANCE
Correction - Correction of the advance of individual cylinders [°].

Tab sheet Power Out

Contains settings for two multifunctional outputs Power out 1, 2
Off - the output is not active.
Fuel pump - to control the fuel pump relay, after the ignition is activated for 4 s, when engine running always activated.
Gear shift light - to control the two-state gear shift indicator. One state blinking, second state lighting.
Power jet Honda - to control PowerJet. The output is switched to ground according to truth table (marked cell) after the comparison limits derived from values on table axes are exceeded. Settings is predefined as original control at motorcycle Honda RS125.
Special - to control specific devices (pair valve, Powerjet). The output is switched to ground according to truth table (marked cell) after the comparison limits derived from values on table axes are exceeded.
Hysteresis [RPM] - engine speed hysteresis. Difference of RPM for switch on and switch off. (for Special and Power jet Honda).
PWM [%] - percent value of duty for pulse-width modulation (for Special). Frequency of modulation is 10 Hz.
Special PWM - to control specific devices (pair valve, Powerjet) using PWM (pulse-width modulation). Values of PWM you can set in curve/map. Frequency of PWM can be set 2-20 Hz.
Special pulse - to control specific devices (oil master) using repeated pulses. Period of pulses you can set in curve/map. Length of pulses can be set 5-500 ms.
POUT1, POUT2 - Power out work visualisation.

Tab sheet Servo
Servo on - Software activation of servo controller.
Map of positional requirements - of servo controller has up to 15x10 adjustable points depending on revolutions and engine load (TPS angle or the pressure in the intake manifold IAP). If no load map is used, the map becomes only (up to) 15-point curve. Number of the columns is possible to set with tool at right side of curve/map.
The requirement for the position of the servo controller has two modes.
Voltage (option "percent" is not checked) - the servo controller searches for the calculated voltage resulting from the map (or curve). After the ignition is switched on the unit checks the servo controller so that it must find the highest and lowest required voltage value, which is located on the map (or the curve) of voltage requirements. When these voltage values are not found (whether due to mechanical obstructions or due to wrong settings), the servo is shut down.
2) Percent (option "percent" is checked) - the servo controller searches for the calculated percentage values resulting from the map (or the curve). After the ignition is switched on the unit finds (through mechanical stops - must be available!!!) lower position, which is marked as 0% and the upper position, which is marked as 100%. The servo controller then moves between these points according to calculated current requirements.
1/P[mV] - this is the voltage deviation from which there is linear decrease of the performance of the servo controller towards the required value. Size must be set so that the engine does not tremble and at the same time it

must have the smallest regulation deviation. In practice 100 - 600 mV. BEWARE - in case you set too low value there is a risk of servo oscillation.
Off [mV] - voltage deviation from which the servo is completely switched off towards the required value of servo position. In practice 5-50 mV.
Servo = - actual demanded/measured value of servomotor position [mv].

Tab sheet Tests
Here you can manually perform some actions that are used to test the outputs of the unit.
Ignition - test of individual ignition outputs.
Servo - test of servo outputs (both directions). The parameter Time specifies the time period during which the servo test is carried out.
Rpm - test of tachometer output. Rpm parameter specifies the engine speed with which the output will be tested.
Powerouts - test of multi-function outputs 1 and 2.
Hour meter - running hours counter
Monitor PickUps - run window for pickups signals monitoring.

Monitor
The monitor is located in lower section. Sensor values and engine's operational characteristics can be observed here. Should there be **No connection with PC** prompt displayed in the upper right corner, the unit is not connected, switched on, or it correct COM port is not selected.
When unit start communication - software reads data from unit and compare it with current data in software. If data in unit and in software are different - software will notice you.
If you will open setting data file - you can see full path to file location at upper toolbar.

Programming after a change - automatic programming settings (after every change).
Not Reading - reading is not allowed (after programming with this option data cannot be retrieved from the unit).
COM - signal of currently used communication port.
RPM - current engine speed.
TP/IAP - current throttle position.
Pickup 1 and 2 - pickup work or error of pickup system visualisation.
U - current supply voltage.
ADVANCE 1 to 4 - current ignition advance of individual cylinders.
Kill switch - visualisation of Kill switch function activation.
Blocking - visualisation of Blocking function activation.
Quickshift - of Quickshift function activation.
Retard - visualisation of Retard function activation.
Limiter - visualisation of rev Limiter activation.
Start limiter - visualisation of Start rev limiter activation.
2nd advance chart - visualisation of switch to 2nd advance chart.
Dwell - real (and optimal) dwell time of induction coil. Real dwell is presented including the dynamic addition or during startup sequence). Optimal dwell is computed in unit according to current feedback with ignition coil at ignition output 1 (pin 1). Optimal dwell is presented without dynamic addition. Optimal dwell is used when automatic dwell is applied