SPARKER TCI-P4 version 80

SPARKER TCI-P4 is an inductive ignition unit for road motorcycle. The ignition unit can be set by a computer PC with a program TCIP4.EXE. Advance (time of ignition) can be set as a function of revolution or as a function of revolution and TPS (throttle position sensor). Ignition contains outputs for tachometer, fuel pump relay, and servo controller. It contains also two inputs for blocking of ignition and one for servo controller. It is by the time of programming connected with computer PC by serial port (COM). The program TCIP4.EXE is included to ignition unit. Standard version has two channels without servo controller. Full version has four channels and has servo controller.

HARDWARE

Pick up system.
Ignition can be programmed for many pickup systems. Most of them can be choose directly from list in program TCIP4.EXE others can be set by special procedure (also by program TCIP4.EXE).

Supply voltage +12 V input.
Supply voltage must be within 8 – 18 voltage range. In this range the unit is able to provide optimal control of all the processes. Supply voltage is connected by positive outlet to +12 V (13) and by negative outlet to GND (14).

Throttle position sensor TPS input.
An input is ready for standard TPS sensors used on motorbikes. It is designed for voltage range 0 - 5 V. Sensor settings for 0 % and 100 % is set by TCIP4.EXE software.
TPS is powered by referential voltage + 5 V (17) and SENSE GND (7, 16). Sensor outlet will be connected to connector (6).

Crankshaft position sensor CKPS input.
An input is ready for standard pickup sensors used on motorbikes as CKPS.
One outlet of the CKPS should be connected to connector (9) and the other one should be connected to SENSE GND (7, 16). See following the chart. For system with two pick-ups should be one outlet of the second pick-up connected to connector (20) and the other one should be connected to SENSE GND (7, 16). See following the chart.

Switching inputs 1 and 2.
Unit has two multiuse switching inputs. These inputs can initialize some function (for example KILL switch, CLUTCH MASTER, blocking for side stand switch ...) One outlet of first switch should be connected to connector (8) and other one should be connected to GND (14). One outlet of second switch should be connected to connector (19) and other one should be connected to GND (14). Required function can be set by software TCIP4.EXE.

Ignition coils IC 1, IC 2, IC 3, IC 4 outputs
One outlet of ignition coil 1 should be connected to key switched + 12 V and the other one should be connected to corresponding connector IC 1 (1).
One outlet of ignition coil 2 should be connected to key switched + 12 V and the other one should be connected to corresponding connector IC 2 (10).
One outlet of ignition coil 3 should be connected to key switched + 12 V and the other one should be connected to corresponding connector IC 3 (2).
One outlet of ignition coil 4 should be connected to key switched + 12 V and the other one should be connected to corresponding connector IC 4 (11).

Excitation (dwell time) of ignition coil can be set to short/long/manual/auto by software TCIP4.EXE. Short dwell time is for ignition coil with primary coil resistance less than 2 Ohm. Long dwell time is for ignition coil with primary coil resistance higher than 2 Ohm. If long time is used for coil with primary resistance less 2 Ohm, coil can be destroyed. If it is used short time for coil that desire long dwell time, the energy of spark could be

small especially in high rpm. You can set dwell time manually also. Next option is use automatics determination of dwell time. Details are in Software section.

Revolution indicator - TACHO output.
The revolution indicator output is compatible with most of board devices used on motorbikes. Pulse number for one revolution and corrections is set within TCIP4.EXE software. TACHO output should be connected to connector (15).
The revolution indicator output is not compatible with board devices used on old Hondas from about 1980. (Bike ignition units with Oki 16pinovým connector).The unit TCIP4 can be equipped revolution indicator output that is compatible with this board devices on request at an additional cost.

FUEL PUMP RELAY output.
Fuel relay is switch on while the motor is running, for about 4 s after the unit is switched on and for about 4 sec. after motor has stopped. One fuel pump relay outlet should be connected to connector (3) and the other one should be connected to key switched + 12V. Connect the switched fuel pump relay circuit following the diagram.
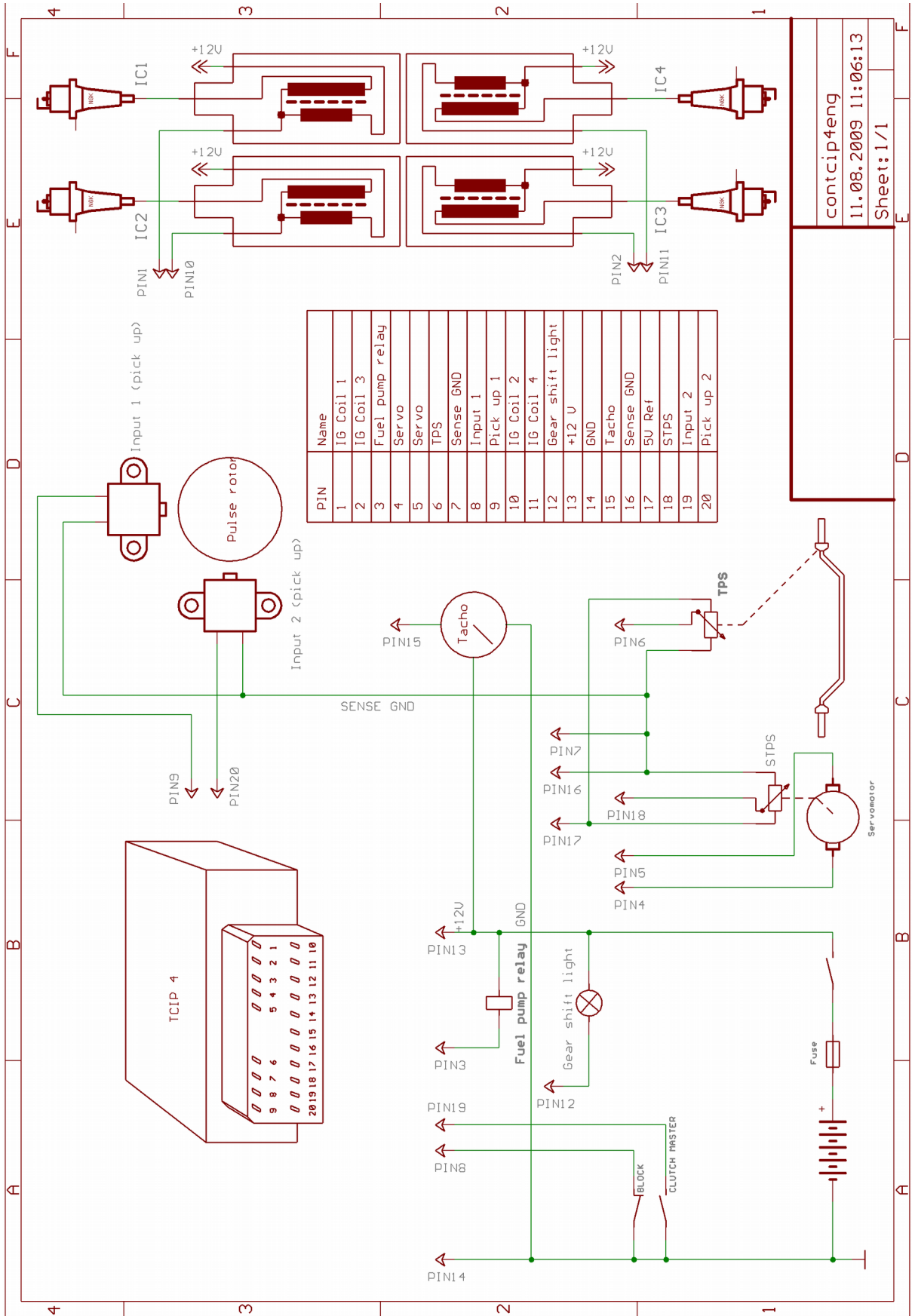
Outputs and input for SERVO.
Outputs and input for servo are compatible with most of servo used on motorbikes (e.g.. Yamaha EXUP).
The unit is equipped with servo control only in the 4 channel version. Required course of servos can be configured in software TCIP4.EXE.
Servo motor outputs are on pins (4) and (5). Power servo position sensor is connected to +5 V pin (17) and SENSE GND (7, 16). The output of position sensor is connected to the input (18).

Output for GEAR SHIFT LIGHT
Maximal current is 5 A (lamp max. 50 W). Revolution for gearshift light is set by software TCIP4.EXE.
One outlet of gearshift light should be connected to connector (12) and other to switched +12 V.

WIRE COLOUR	pin no. in connector	NAME	DESCRIPTION
orange	1	IC 1	inductive coil 1
yellow/black	2	IC 3	inductive coil 3
violet	3	FUEL PUMPE RELAY	output for fuel pump relay
green	4	M	output for servomotor
green	5	M	output for servomotor
grey	6	TPS	throttle position sensor
blue or light blue	7	SENSE GND	ground for sensors
black	8	INPUT 1	switching input 1
yellow	9	CKPS (1)	input for pick-up (1)
white	10	IC 2	inductive coil 2
red/black	11	IC 4	inductive coil 4
blue/white	12	GEAR SHIFT LIGHT	output for gear shift light
red	13	+ 12 V	supply 12 V
blue	14	GND	ground
green/yellow	15	TACHO	output for tachometer
blue or light blue	16	SENSE GND	ground for sensors
white/red	17	+ 5 V	supply for sensors
white/blue	18	STPS	servo position sensor
grey/red	19	INPUT 2	switching input 2
brown	20	CKPS (2)	input for pick-up (2)

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IC1 IC2 IC3 IC4

+12V +12V +12V +12V

PIN1 PIN10 PIN2 PIN11

Input 1 (pick up)

Input 2 (pick up)

Pulse rotor

PIN	Name
1	IG Coil 1
2	IG Coil 3
3	Fuel pump relay
4	Servo
5	Servo
6	TPS
7	Sense GND
8	Input 1
9	Pick up 1
10	IG Coil 2
11	IG Coil 4
12	Gear shift light
13	+12 V
14	GND
15	Tacho
16	Sense GND
17	5V Ref
18	STPS
19	Input 2
20	Pick up 2

TPS

Tacho

PIN15

PIN6

PIN7

PIN16

PIN18

PIN17

PIN5

PIN4

STPS

Servomotor

SENSE GND

PIN9 PIN20

TCIP 4

+12V   GND

PIN13

Fuel pump relay

PIN3

Gear shift light

PIN12

PIN19

PIN8

PIN14

BLOCK

CLUTCH MASTER

Fuse

+

SOFTWARE TCIP4.EXE

Pull down menus

File:
New	- default settings
New for actual page	- default settings for actual page only
Open	- to open data file
Open from exe dir	- to open a data file from the same location with the location of the control software. ` Offer 10 most recently opened data files.
Open for actual page	- to open data file for actual page only
Save	- to save data file
Save to exe dir	- save data file to the same location with the location of the control software.
Print	- prints the current settings
Exit	- exits the program

Clicking **New** results in default settings of all parameters. They value for four-stroke engine without TPS.

Com:	- includes items **Com1** to **Com30 and Com Auto** - this is for selection of communication port. For PC without COM (USB only) you need the apply a USB to RS232 adapter which we can supply.
Device:	
Read	- reads data from the unit
Verify	- compares data in PC with data in the unit
Program	- sends data to the unit and conducts verification
Tools:	- includes items of collective settings and Undo and Redo tools
Language:	- language settings: **English, German and Czech**
Help:	
Help	- opens assembly guide (this file)
About the program	- data on the software (version, date)

Icons menus

 - default settings
Warning!!! Clicking this icon results in automatic default settings of all parameters
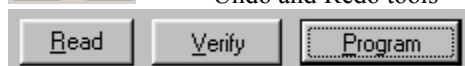
 - opens data file

 - saves data file

 - prints the current settings

 - Undo and Redo tools

 - see pull down menu **Device**

Tab sheet Miscellaneous

Limiter	- sets revolution of classic starting limiter
Clutch master time	- sets ignition switch off period during gear shift
Clutch master pause	- sets time of insensibility after gear shift
Revolutions without ignition	- sets number of starting revolution without ignition
Sensor	- choose sensor input – no or TPS. That input can be used for advance maps definition.

TPS	Voltage
0 %	0.7 V
100 %	3.79 V
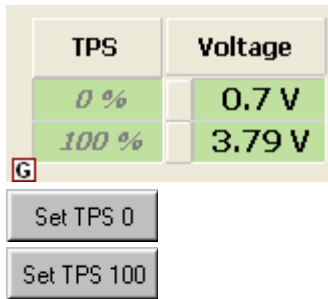
— limit TPS voltage values can be set here [mV]

Set TPS 0 — measures and sets 0% TPS (supply on, unit connected with PC, no gas)

Set TPS 100 — measures and sets 100% TPS (supply on, unit connected with PC, full gas)

Dwell — sets excitation of induction coils
   Short — for coils with resistance lower than 2 ohms. dwell time 1 ms with the dynamic addition 12%.
   Long — for coils with a resistance greater than 2 ohms. dwell time 3ms with the dynamic addition 12%.
   Manual — the ability to manually determining the excitation time
   Auto — automatic dwell time determination. Unit determines optimal dwell time by measure dynamic current in channel 1. With that choice the spark-coil has to be connected to channel 1.
Dwell correction parameter [%] — automatically determined dwell time can be corrected percentage.
Dwell time parameter [μs] — requested dwell time
Dwell dynamic addition [%] — dwell addition to compensate uneven engine running at low speed
Max dwell time [μs] — Dwell time limitation, including dynamic addition
Max rpm for dwell by lobe — max rpm definition - the start ignition sequence of coils excitation will be used up to the speed. Generating by a fixed angle with the virtual lobe definition. The virtual lobe is defined in the configuration of the sensor system (see tab sheet Bike).

Inputs for neutral and side stand — Logic of inputs is set for neutral and side stand. The ignition is not blocked if at least one input is grounded.
Input 1 — choice of input 1 function
Input 2 — choice of input 2 function

No reading — reading is not allowed (after programming with this option data cannot be retrieved from the unit)
Gearshift light [rpm] — sets revolution of gearshift light

Correction — correction of advance for cylinders [°]
Compensation — fervency compensation of unit inputs (for compensation of various delays of input signal for various sensor systems).

Tab sheet Bike

Choice of Motorbike — motorbike type selection
Tachometer output:
   pulses per revolution — pulses for tachometer per revolution
   correction — percentage tachometer correction
Polarity of pickup — sensor polarity selection
   Plus — designed for sensor connection, where: lobe is getting near to sensor - generates positive voltage, lobe is moving away of sensor - generates a negative voltage
   Minus — designed for sensor connection, where: lobe is getting near to sensor - generates negative voltage, lobe is moving away of sensor - generates a positive voltage
   Auto — Unit determines correct polarity automatically. (Algorithms supposes the summary of lobes angles is less to 180 degrees)

Pickup interchange - exchanges the inputs for the crankshaft position sensor (pin 9 and pin 20).

No polarity check - the unit (according to the shape of the signal) controls the polarity of the pickup sensor. If the actual polarity of the sensors is other than that selected, the unit block the ignitions. This option cancels this blocking of the ignition.

Interlock input - This option only works with the pickup system "1 lobe, 2 pickup sensors". With some motorcycle (e.g. Ducati) during the increased level of the elektromagnetic interference (eg during ignitions) can occur an unwanted activation the pickup input (especially the input which is not active at the moment). This option prevents this unwanted activation, because during activation of input 1 is input 2 is blocked for activation (and vice versa). In combination with automatic means for determining of polarity sensors, this option can cause problems.

Spark possible before lobe - standard operation of the unit is such that the spark can take place only after the beginning of the section for the virtual lobe. This option lets you ignite even before the beginning of the virtual lobe. Unfortunately, than the virtual lobe is 360° long, which significantly affects the accuracy of ignition (especially at low revolutions).

Lower advance by start - this option decreases (shifts) the start advance to the next pulse edge over the standard position in of start advance.
Valid only for starting revolutions (revolutions less than 500 RPM). This option can be used especially for large single-cylinder engines to prevent kick-back when starting el. starter. You can use this option only for some pickup systems.

Special dwel by start - This option can be used to reduce the current load of the ignition coil at the start of the pickup systems where the virtual lobe is too wide.
Commonly unit at starting revolutions loads the ignition coil from the beginning of the virtual lobe until the ignition at the end of the virtual lobe. With this option, the unit begins to load at the end of the virtual lobe, loads 2 ms and then comes the ignition. Valid only for starting revolutions (revolutions less than 500 RPM). This option partially reduced the advance for the startup revolutions (due to delay of 2 ms). .

Compensation - units input circuits respond differently to pickup systems with different numbers of pulse lobe. The result can be a slight deviated from the desired advance dependent on revolutions. Dependence on revolutions can be corrected by this compensation.

Choice of pickup system	- Choice of pickup system for certain motorcycle
Pulses per revolution	- Setting of tachometer output
Correction	- Correction of tachometer in %
Synchronization description	- Here you can create a special specification of synchronization (only for choice „Special petting" in Motorbike type) – Attention, experienced users only.

In the left side down are some statistic values of unit. That is read out even if versions of PC software and firmware are not compatible, the correct connection is necessary.
- TCIP4 unit name
- Date of firmware version
- Number of times the unit has been programmed

Tab sheet Advance map

Advance map
TP map includes 100 adjustable advance options (in relation revolution and throttle position). If TPS is not used, map is degraded to 10 point curve. When motor is running the actual segment is highlighted in map (curve). Tools for group manipulation and view tools are on the top of sheet. For group selection (rows, columns, free shape group), dragging and stretching use mouse (adding with ctrl) as commonly is used in office spreadsheet.

Mouse wheel or pop-up buttons can increment and decrement also all group. Right mouse click shows pull-down menu with all available functions.

Base advance   - setting of base advance
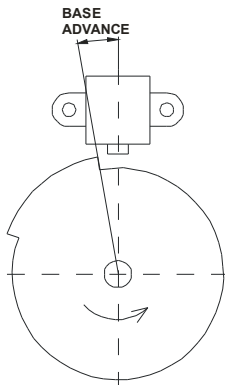
Tab sheet Servo

Servo enable   - software activation of servo controller

Servo curve
10 adjustable options for revolution/required voltage of servo position sensor. When the motor is running current segment is highlighted in the servo curve. Tools for group manipulation and view tools are on the top of sheet. For group selection (columns, free shape group), dragging and stretching use mouse (adding with ctrl) as commonly is used in office spreadsheet. Mouse wheel or pop-up buttons can increment and decrement also all group. Right mouse click shows pull-down menu with all available functions.

Hysteresis   - fineness of servo driver steps can be set here
!!!Warning!!! - in case you set too low value there is a risk of servo oscillation

Monitor

Monitor is located on the right and lower side of the screen – sensor values and motor 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.

File: - full path of using file
Programming after a change   - automatic programming settings (after every change)

RPM   - Motor revolution [1/min]
TP   - Throttle position [%]
Advance 1 to 4   - Ignition advance of each cylinder [°]
Pick up 1   - Display whether pick up 1 is running or stopped
Pick up 2   - Display whether pick up 2 is running or stopped
U   - Supply voltage [V]
Servo required   - Required value of servo position sensor
Servo measured   - Measured value of servo position sensor
Blocking   - Blocking activation signal
Gear shift light   - signalization of switching gear shift stump
Fuel pump   - signalization of switching fuel pump stump
Clutch master   - signalization of activation of clutch master
Kill switch   - signalization of activation of blocking