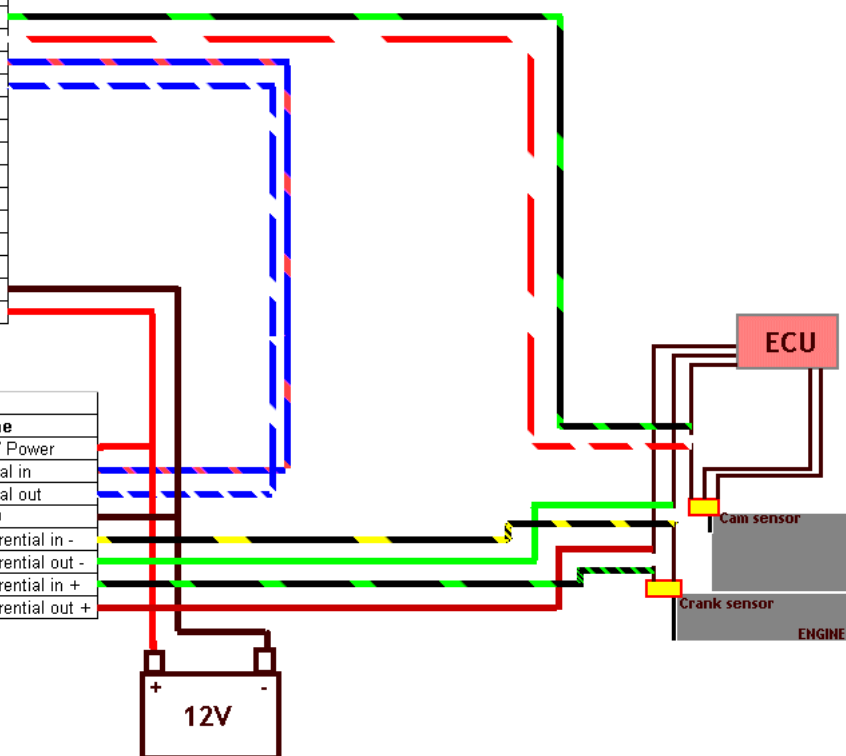![CIVINCO]

DELIVERED UNITS:

- Ignition recorder box
- Normal BC500 box
- Serial cable for communication between boxes and a Windows PC
- Engine harness with integrated coil adapter

HARNESS SPECIFICATION

Cable nr	Colour	name
1	black / white	signal GND
2	grey	5 V out
3		RS-232 TX
4		RS-232 RX
5	violette	PWM1 (boost)
6	blue	Analog 3 in
7	yellow	Analog 2 out
8	red / green	Analog 2 in
9	yellow / green	Analog 1 out
10	red / yellow	Analog 1 in
11	black / green	IgnitionB out
12	red / white	IgnitionB in
13	blue / red	IgnitionA out
14	blue / white	IgnitionA in
15	green / white	Fuel_D_OUT
16	white	Fuel_D_IN
17	brown / black	Fuel_C_OUT
18	brown / red	Fuel_C_IN
19	brown / blue	Fuel_B_OUT
20	brown / grey	Fuel_B_IN
21	brown / yellow	Fuel_A_OUT
22	brown / green	Fuel_A_IN
23	black	Power GND
24	red	12 V Power

Coil adapter pin configuration

Cable nr		Colour	Length	name
1		red	350 mm	12 V Power
2		blue / red	350 mm	Digital in
3		blue / white	350 mm	Digital out
4		black	350 mm	GND
5		black / yellow	350 mm	Differential in -
6		green	350 mm	Differential out -
7		black / green	350 mm	Differential in +
8		brown	350 mm	Differential out +

The harness is an ignition only harness with integrated coil adapter for the crank signal.
The cam signal is connected to the BC-system directly without signal conversion.

The coil adapter converts from inductive crank signals to digital and sends the digital signal to the BC-system.
The BC-system then sends the new modified crank signal to the coil adapter, which is converting the signal back to inductive type to enable connection to the stock PCM/ECU.

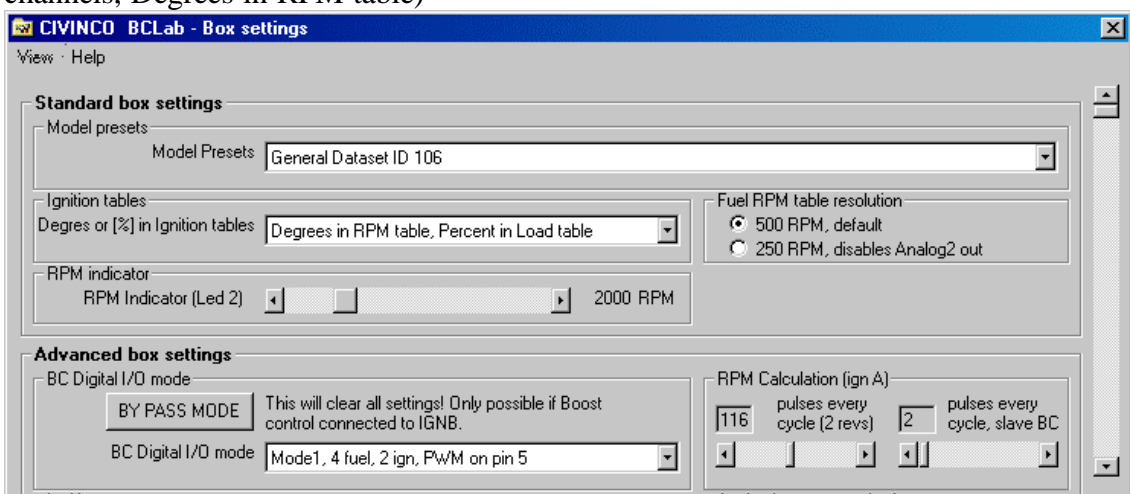# Installation of ignition recorder or BC500

We recommend that you first install the BCLab software to become familiar with it.
You will then install the harness, which is the same for BC500 and the ignition recorder, but you will first use the BC500 as normal to verify that the installation was ok. You will then be able to retard the ignition as a first test before continue to the recording step.

Harness installation

1. Connect the red wire to +12V
2. Connect the black and black/white wire to Gnd
3. Connect the serial cable between the BC-system and the PC.
4. From BCLab press the "Info" button and make sure that you can communicate with the BC-system. **Make sure this works before continuing to next step !!!**
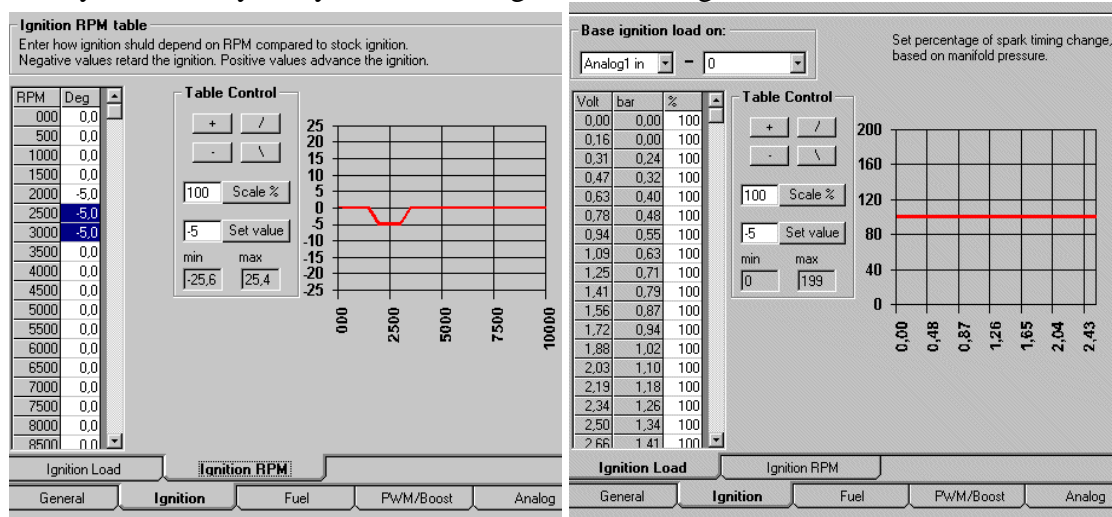
5. Connect wire 5 from the coil adapter to one of the pin from the inductive crank sensor
6. Connect wire 7 from the coil adapter to the other pin from the inductive crank sensor
7. Make sure the settings in BCLab is right regarding number of pins per engine cycle (For normal crank 60-2 wheel enter 116 pulses per engine cycles, Mode1 2 ignition channels, Degrees in RPM table)

8. Start the engine and start logging in BCLab and make sure the right RPM is indicated. **Make sure this works before continuing to next step !!!**

9. Cut the two wires from the crank sensor to the PCM/ECU, so that the coil adapter still are connected to the sensor.
10. Connect wire 6 from the coil adapter to the newly cut wire that goes to the PCM/ECU. (Use the same wire as was previous connected to wire 5 so that you keep + and – right)
11. Connect wire 8 from the coil adapter to the newly cut wire that goes to the PCM/ECU. (Use the same wire as was previous connected to wire 7 so that you keep + and – right)
12. Start the engine and start logging in BCLab and make sure the right RPM is indicated, and that the engine is still running OK.

13. Find the cam sensor signal (Normally one signal is Gnd, one is +5V, and one is the signal). Cut the wire.
14. Connect the red/white wire no12 from the BC-system to the cam sensor
15. Connect the black/green wire no11 from the BC-system to the cam sensor input at the ECU/PCM.
16. Start the engine and start logging in BCLab and make sure the right RPM is indicated, and that the engine is running OK.
17. Now you are ready to try to retard the ignition in the ignition table in BCLab.

Example of retarding ignition 5 deg between 2000-3000rpm for all loads.

18. After verifying that the installation was OK, you can turn off the engine and change box to the Ignition recorder box. See next step for how to handle the ignition recording.

IGNITION RECORDER USAGE

The ignition recorder will record the shape of the cam and crank signal and send a data stream to a PC. This data should at the same time be recorded in the normal Windows Hyper terminal program and stored to a file, which later will be analysed by Civinco.

When Civinco has received the data, Civinco will prepare a car specific ignition software, which will be sent back as a firmware update for the BC500 box. The current BC500 can only retard the ignition, but after firmware update it will also handle advancing of ignition.
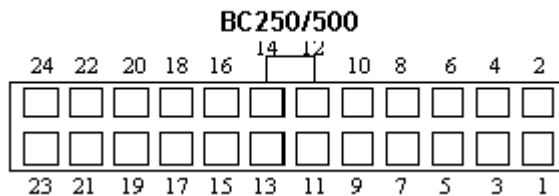
Recording

1. Start and set up Hyper Terminal
   a. Press Windows menu:
      Start/Program/Accessories/Communication/HyperTerminal
   b. Select new connection
   c. Select direct via Com1 (if the BC is connected to Com1)
   d. Select 115200, 8 bit, No parity, 1 stop bit, No flow control
2. As soon as the Ignition recorder power is on, you will see received data like below. If not check power and serial connection.
3. Start the engine and let it idle
4. Select "Transfer" menu and "Capture text".
   You will be prompt to type a name of the file.
5. Record text for about 10 sec and then select "Transfer" menu and "Stop".
6. Send the recorded text file to Civinco

BC500 CONNECTOR SPECIFICATION

Cable nr	Colour		name
1		black / white	signal GND
2		grey	5 V out
3			RS-232 TX
4			RS-232 RX
5		violette	PWM1 (boost)
6		blue	Analog 3 in
7		yellow	Analog 2 out
8		red / green	Analog 2 in
9		yellow / green	Analog 1 out
10		red / yellow	Analog 1 in
11		black / green	IgnitionB out
12		red / white	IgnitionB in
13		blue / red	IgnitionA out
14		blue / white	IgnitionA in
15		green / white	Fuel_D_OUT
16		white	Fuel_D_IN
17		brown / black	Fuel_C_OUT
18		brown / red	Fuel_C_IN
19		brown / blue	Fuel_B_OUT
20		brown / grey	Fuel_B_IN
21		brown / yellow	Fuel_A_OUT
22		brown / green	Fuel_A_IN
23		black	Power GND
24		red	12 V Power

BC250/500

```
24  22  20  18  16  14  12  10   8   6   4   2
┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐
└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘
┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐
└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘
 23  21  19  17  15  13  11   9   7   5   3   1
```

Power connections: Pin 1, 2, 23, 24:

1, 23	Grounding. It's very important to achieve a good solid grounding. Use shortest possible wires and always use both wires.
24	12V power. Connect this to a 12V power source which is switched by the ignition. The current is less than 0.5 Amps.
2	5V output to power auxiliary sensors, max 50mA.

Fuel injectors: Pins 15, 16, 17, 18, 19, 20, 21, 22:

The BC250/500 can connect up to 5 injectors (cylinders A-E). You will connect the BC between the ECU and the injector. The in/outputs must be connected in pairs according to: A(22-21), B(20-19), C(18-17), D(16-15), E(12-11).

(12), 16, 18, 20, 22	Fuel signal inputs to the BC-box from the ECU. The fuel signal shall be connected to the BC-box instead of the injector. Pin 11,12 FI_E_IN/OUT is only used on 5cylinder engines (instead of IgnitionB).
(11), 15, 17, 19, 21	Injector driver output from the BC-box. The injectors are connected here instead of to the ECU.

Ignition : Pin 11, 12, 13, 14:

It's possible to control 2 ignition modules at the same time, IGNITION_A and IGNITION_B with their in- and outputs. If only one ignition channel is required, then IGNITION_B can be used for other purposes such as: a 5th fuel channel or control of the boost valve.

In many cases there is no need to tune the ignition, in such cases it's sufficient to only sense the rpm. This signal can be from the ignition system, the cam sensor or the crank sensor. Depending on the used signal you may have to connect an amplifier to achieve the correct voltage level.

12, 14	Ignition signal inputs to the BC-box from the ECU. The ignition signal shall be connected to the BC-box instead of the ignition module.
11, 13	Ignition outputs from the BC-box to the ignition modules (The BC-box cannot drive ignition coils directly without an ignition module). The ignition modules are connected here instead of to the ECU.

Analog signals: pins 6, 8, 10, 7, 9:

10, 8, 6   0-5V analog signals Analog1-3. Normally used for measuring Manifold absolute pressure, Mass airflow, knock sensor, throttle position or temperature. The BC-box can use all these signals to tune fuel, boost, ignition etc. in the BCLab software.

9	Analog1-output, an analogue output signal which can be voltage limited. It can be used to hide the high MAP or Mass airflow value from the ECU. The output voltage is the same as the input voltage at pin8(analog1) up to a certain maximum value. Any input above this maximum value will only produce that maximum output value. The maximum value is selected in BCLab at page Analog out-Analog1 out.
7	Analog2-output. This output can be controlled in three ways: The output can be a function of the Analog2 input value. For every input there will be a certain output according to how you have tuned this function in BCLab. The output can be voltage limited in the same manner as analog1. When controlling the boost via PWM_IN/OUT (pins 11,12) this signal can be voltage limited in a smarter way called limit trim.

Driver outputs: pins 5,11:

The boost valve is controlled by a PWM output. Which pin you use for this is selected in the BCLab-Configurations. The PWM output can also be used to control other devices compatible with the PWM-type output (lamps, valves, motors etc.)
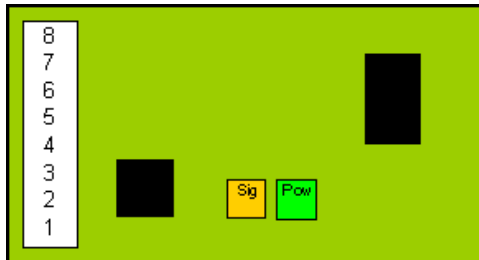
The outputs can handle 3 Amps.

11	PWM output. Normally used to control the boost valve when the ECU boost control signal is connected to the PWM_IN BC-box input.
5	PWM output. Can be used to control the boost valve.

PWM input: pin 12:

12	PWM input. Can be used to connect the ECU boost control signal to the BC-box. This is used for logging purposes or when you wish to use the Analog2-out "limit trim" function.

COIL ADAPTER SPECIFICATION

Coil adapter pin configuration					
Cable nr			Colour	Length	name
1			red	350 mm	12 V Power
2			blue / red	350 mm	Digital in
3			blue / white	350 mm	Digital out
4			black	350 mm	GND
5			black / yellow	350 mm	Differential in -
6			green	350 mm	Differential out -
7			black / green	350 mm	Differential in +
8			brown	350 mm	Differential out +

The Coil adapter converts inductive signals to digital 0-5V signals for connection of inductive signals to the BC-system.
The Coil adapter also converts 0-5V signals back to inductive signals to be able to send back the signal to the stock PCM/ECU.

Normal installation of coil adapter

Make sure you have a inductive sensor. Typically the crank sensor is inductive. Sensors with 3 connections are normally not inductive.

1. Connect wire 1 to +12V
2. Connect wire 4 to Gnd
3. Connect wire 5 to one of the pin from the inductive sensor
4. Connect wire 7 to the other pin from the inductive sensor
5. Connect wire 3 to the ignition-in pin on the BC-system
6. Make sure the settings in BCLab is right regarding number of pins per engine cycle
   (For normal crank 60-2 wheel enter 116 pulses per engine cycles)
7. Start the engine and start logging in BCLab and make sure the right RPM is indicated.
   Make sure this works before continuing !!!

8. Connect wire 2 to the ignition-out pin on the BC-system
9. Cut the wires from the sensor to the PCM/ECU so the coil adapter still are connected to the sensor.
10. Connect wire 6 to the newly cut wire that goes to the PCM/ECU.
    (Use the same wire as was previous connected to wire 5 so that you keep + and – right)
11. Connect wire 8 to the newly cut wire that goes to the PCM/ECU.
    (Use the same wire as was previous connected to wire 7 so that you keep + and – right)
12. Start the engine and start logging in BCLab and make sure the right RPM is indicated.
13. Now you are ready to try to retard the ignition in the ignition table in BCLab.