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updated 06.08.2014

program version: 25.120326

USER MANUAL

PDCI-11V PROGRAMMABLE CDI IGNITION AND PV CONTROLLER

TECHNICAL DATA

Limit values:

- minimum revs	280 RPM
- maximum revs	20000 RPM
- minimum supply voltage	9 Volts
- maximum supply voltage	18 Volts
- max idle current draw	50 mAmp
- maximum continuous current for shift light and power jet output	1 Amp
- peak current for shift light and power jet output	5 Amp
- constant spark energy from idle to 20000 RPM	>65mJ

Circuit is protected against reverse supply voltage (wrong connection).

Features:

- one channel isolated input (pickup)
- store and load function for two ignition curves
- TPS input (Throttle Position Sensor)
- shift light output
- 2 power jet outputs
- quick shift (shift kill)
- soft rev limit (three stage rev limit)
- external switch for changing ignition map while riding
- tachometer output
- easy and fast programming on the field, via hand held programmer
- programming while machine running - you can immediately see effects
- each curve can be set in 4 to 12 curve points
- 3D interpolated ignition map, if TPS selected
- signal delay compensation
- instant monitoring of rev's and angle, via LCD(hand held programmer)
- programmable power valve actuation
- store and load function for 5 PV curves
- external switch for changing PV map while riding
- programmable PV deviation
- programmable max close and max open positions
- self PV test on power-up

- PV error detecting (position sensor failure, servo motor failure)
- fast processing for high accuracy - delays from 1us
- timing calculation for every 1 RPM change (1000, 1002, .. , 9805, 9806, ...)

Very important!

Resistor spark plugs must be used, because they produce less electromagnetic disturbances.

Danger of electric shock!

Avoid connecting PDCI to 12V power supply, before connecting it to ignition coil, because high voltage is generated and touching free wires can cause electric shock, or damage of the unit.

1. HOW TO ENTER MENU

PDCI must be connected to power supply. Connect **programmer** to **PDCI** and wait few seconds for activation of **programmer** and then press . With pressing or you can move through menu and with pressing you can choose.

You can exit menu with choosing *Exit*.

2. MENU ORGANISATION

Set Ign. - set ignition parameters submenu
Set PV - set PV parameters submenu
Exit

2.1. SET IGNITION PARAMETERS SUBMENU

Load Ign. Map - load previously saved ignition curve set (from #1 to #2)
Save Ign. Map - save new ignition curve set (from #1 to #2)
Ignition Map - ignition curve parameters submenu
Advance - advance/retard whole ignition curve
Gear Shift Light - shift light
Quick Shift - quick shift parameters
Rev Limit - rev limit
Static Angle - static angle (stator position)
Compensation - signal delay compensation (from pickup to spark plug)
Power Jet 1 - power jet 1
Solenoid Output - solenoid parameters
TPS - enable, or disable TPS
TPS close [0%] - calibrating TPS close position
TPS open [100%] - calibrating TPS open position
TCT mode - reduced spark at high revs with closed throttle
Ign. Map SW - activating/deactivating external switch for selecting ignition map
Pulses Per Rev - number pulses per revolution from pickup
Stop SW Mode - stop switch mode
IgnitionTest - test ignition spark

Exit

2.2. SET PV PARAMETERS SUBMENU

<i>Load PV Curve</i>	- load previously saved curve (from #1 to #5)
<i>Save PV Curve</i>	- save new curve (from #1 to #5)
<i>Set PV Curve</i>	- valve curve parameters submenu
<i>Deviation +/-</i>	- deviation of valve position
<i>Close Position</i>	- max close valve position
<i>Open Position</i>	- max open valve position
<i>PV Test</i>	- valve position test
<i>Power-up Test</i>	- enable, or disable test cycle at power-up
<i>PV Curve SW</i>	- activating/deactivating external switch for selecting PV curve
<i>Exit</i>	

3. LOAD IGN. MAP

Enter *Set Ign.* menu and move to *Load Ign. Map* with pressing , or and then press . Select position number of previously saved ignition map, with pressing or and then press .

4. SAVE IGN. MAP

Enter *Set Ign.* menu and move to *Save Ign. Map* with pressing , or and then press . Select position number to which you want to save your ignition map, with pressing , or and then press .

5. Change IGNITION MAP (if TPS disabled)

Enter *Set Ign.* menu and move to *Set Ignition Map* with pressing , or and then press . You are in submenu for setting ignition map.

Submenu organisation:

<i>Nr. of Points</i>	- number of ignition map points (from 4 to 12)
<i>1)</i>	- first ignition map point
<i>2)</i>	- second ignition map point
<i>...</i>	...
<i>...</i>	...
<i>Exit</i>	- exit submenu

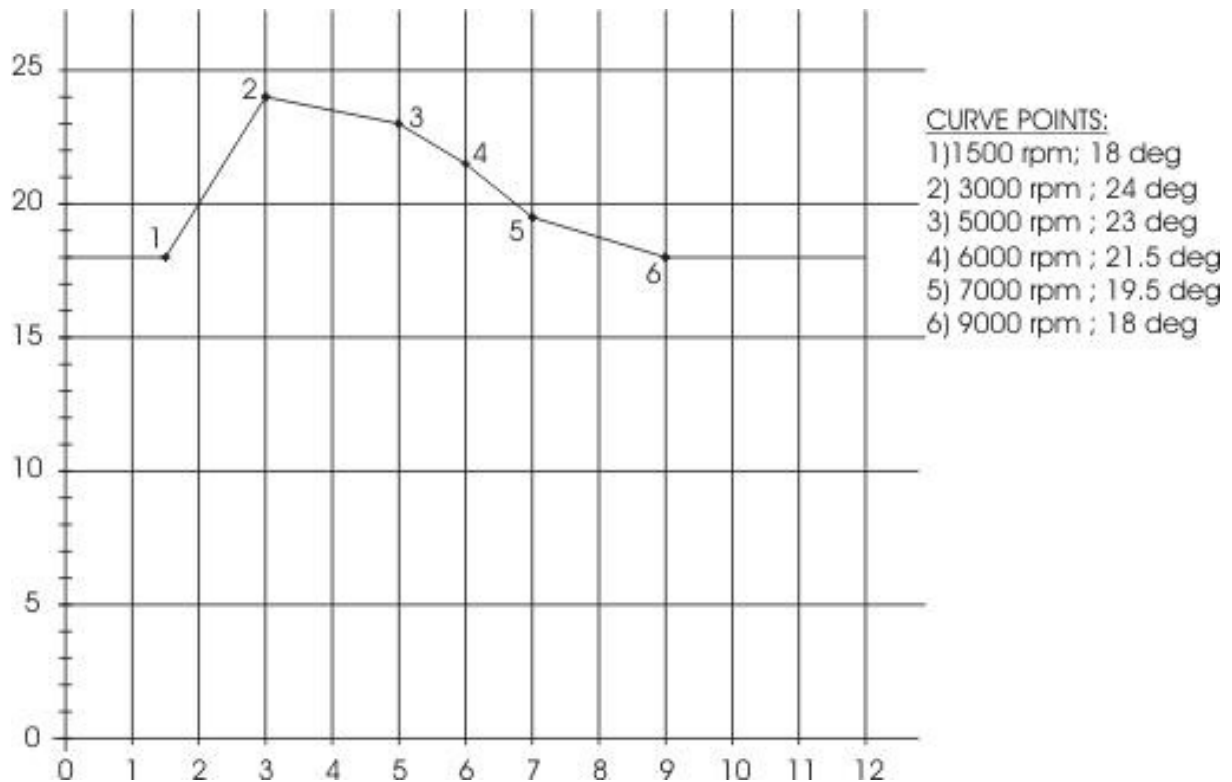
Important!

To avoid wrong processing, don't make unreasonable map course.

Every time you make any changes to ignition map, it is automatically saved to position #0.

Then you can save it to any other position number #1 or #2.

Ignition map example with six curve points:



5.1. Set IGNITION MAP (if TPS enabled)

Three ignition curves must be programmed for different TPS positions. **PDCI** does not only switch between ignition curves, but also calculate timing between programmed curves for all TPS positions above 33% (3D map interpolation). From 0% to 33% TPS is used only one ignition curve.

Enter **Set Ign.** menu and move to **Ignition Map** with pressing **+**, or **-** and then press **enter**. You are in submenu for selecting ignition curve.

Submenu organisation:

- Nr. of Points** - number of ignition curve points (from 4 to 10)
- Curve 0-33%** - ignition curve from 0 to 33% TPS
- Curve 66%** - ignition curve for 66% TPS
- Curve 100%** - ignition curve for 100% TPS
- Exit** - exit submenu

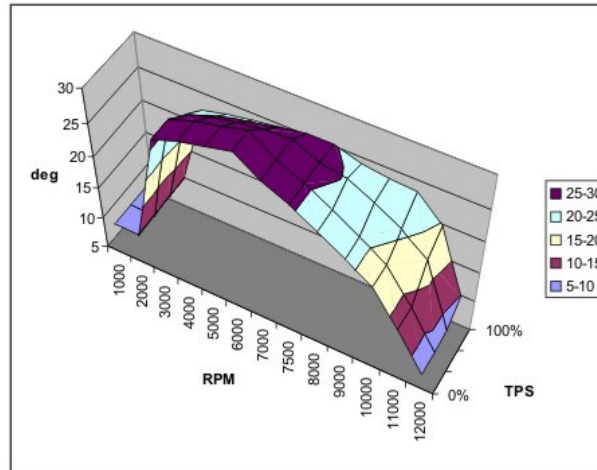
Important!

To avoid wrong processing, don't make unreasonable curve course.

Every time you make any changes to ignition curve, it is automatically saved to position #0.

Then you can save it to any other position number #1 or #2.

Ignition map example:



5.2. Change NUMBER OF IGNITION CURVE POINTS

Move to *Nr. of Points* with pressing , or and then press .
Select number of ignition points, with pressing , or and then press .

5.3. Change PARAMETERS OF IGNITION CURVE POINT

Move to point you want to change, with pressing , or and then press .
Change rev point with pressing , or (in 100 rpm steps) and then press .
Change advance angle with pressing , or (in 0.1deg steps) and then press .

6. Set ADVANCE

With this setting is possible to advance, or retard whole ignition curve. When setting is positive, then ignition curve is advanced and when setting is negative than ignition curve is retarded. With *Advance 0.0deg*, ignition curve is unchanged.

Enter menu and move to *Advance* with pressing , or and then press .
Set advance with pressing , or (in 0.1deg steps) and then press .

7. Set GEAR SHIFT LIGHT

Enter *Set Ign.* menu and move to *Gear Shift Light* with pressing , or and then press .

Change rev point with pressing , or (in 100 rpm steps) and then press .

8. QUICK SHIFT

Enter *Set Ign.* menu and move to *Quick Shift* with pressing , or and then press .
...you entered submenu for quick shift settings.

Submenu organisation:

Shift Kill Time - basic kill time

Smart Shift - activating/deactivating automatic kill time for different revs

Exit - exit submenu

8.1. SHIFT KILL TIME

Enter *Quick Shift* menu and move to *Shift Kill Time* with pressing , or and then press .

Change kill time with pressing , or (in 10 ms steps) and then press .

8.2. SMART SHIFT

Smart shift function automatically adjusts kill time for different revs. Shift kill time must be always set, as basic kill time.

Enter *Quick Shift* menu and move to *Smart Shift* with pressing , or and then press .

Enable, or disable function with pressing , or and then press .

9. Set REV LIMIT

Enter *Set Ign.* menu and move to *Rev Limit* with pressing , or and then press .

Change rev limit with pressing , or (in 100 rpm steps) and then press .

10. Set STATIC ANGLE

Enter *Set Ign.* menu and move to *Static Angle* with pressing , or and then press .

Set static angle with pressing , or (in 0.1deg steps) and then press .

11. Set COMPENSATION

It is compensation of signal delay from pickup to spark plugs. You can check this delay with stroboscope lamp. Without this compensation, ignition advance angle decreasing with rising revs.

Compensation helps that advance angles in ignition map are accurate.

How to check, if compensation is correct?

First you must set flat ignition curve. Then measure with stroboscope lamp, if mark at flywheel moving when changing revs. If mark moving, then you must change compensation delay.

Default value is 30us and is correct for most applications.

Change Compensation:

Enter menu and move to **Compensation** with pressing , or and then press .

Change compensation delay with pressing , or and then press .

12. Set POWER JET 1 parameters

Enter **Set Ign.** menu and move to **Power Jet 1** with pressing , or and then press .
...you entered submenu for **Power Jet 1**.

12.1. Power Jet 1 Mode

Power jet 1 can operate in simple, or advanced mode. Simple mode, have only one 'on' and 'off' point. Advanced mode has multiple on/off points.

12.2. Power Jet 1 Simple Mode

Power Jet 1 ON RPM	- revs for activating power jet 1
Power Jet 1 OFF RPM	- revs for deactivating power jet 1
Power Jet 1 ON TPS (if TPS enabled)	- throttle position for activating power jet 1
Power Jet 1 OFF TPS (if TPS enabled)	- throttle position for deactivating power jet 1
Exit	- exit submenu

Example:

Power jet 1 ON (RPM) = 8000rpm

Power jet 1 OFF (RPM) = 10000rpm

Power jet 1 ON (TPS) = 70%TPS

power jet 1 OFF (TPS) = 90%TPS

Power jet is switched on when revs are between 8000-10000rpm and throttle position is between 70-90%, otherwise power jet is switched off.

12.2. Power Jet 1 Advanced Mode

Power Jet Advanced mode can be used only when TPS enabled!

Power Jet Range 1:

Press to program range 1 parameters.

- TPS range ... press , or to select upper TPS value ... press to confirm

- move to switch point from 1, to 6 with pressing , or

- press to program switch point

- press , or to select revs ... press to confirm

- press to switch 'off' power jet, or press to switch 'on' power jet
- to exit **Power Jet Range**, move to **Exit** with pressing , or and press to confirm

Power Jet Range 2:

Press to program range 2 parameters.

- TPS range ... press , or to select upper TPS value ... press to confirm
- move to switch point from 1, to 6 with pressing , or
- press to program switch point
- press , or to select revs ... press to confirm
- press to switch 'off' power jet, or press to switch 'on' power jet
- to exit **Power Jet Range**, move to **Exit** with pressing , or and press to confirm

Power Jet Range 3

Press to program range 3 parameters.

- move to switch point from 1, to 6 with pressing , or
- press to program switch point
- press , or to select revs ... press to confirm
- press to switch 'off' power jet, or press to switch 'on' power jet
- to exit **Power Jet Range**, move to **Exit** with pressing , or and press to confirm

Example:

Power jet Range 1 ... 0-40%TPS (takes control when TPS position is between 0%, 40%)

- 1) 0RPM ... on (PJ 'on' when engine not running)
- 2) 3000RPM ... off (PJ switch 'off' when revs rise and pass 3000rpm)
(PJ switch 'on' when revs drop and pass 3000rpm)
- 3) 5000RPM ... off (PJ remain 'off' position)
- 4) 8000RPM ... off (PJ remain 'off' position)
- 5) 10000RPM ... off (PJ remain 'off' position)
- 6) 12000RPM ... on (PJ switch 'on' when revs rise and pass 12000rpm)
(PJ switch 'off' when revs drop and pass 12000rpm)

Power jet Range 2 ... 41-80%TPS (takes control when TPS position is between 41%, 80%)

- 1) 0RPM ... on (PJ 'on' when engine not running)
- 2) 3000RPM ... off (PJ switch 'off' when revs rise and pass 3000rpm)
(PJ switch 'on' when revs drop and pass 3000rpm)
- 3) 5000RPM ... off (PJ remain 'off' position)
- 4) 8000RPM ... on (PJ switch 'on' when revs rise and pass 8000rpm)
(PJ switch 'off' when revs drop and pass 8000rpm)
- 5) 10000RPM ... off (PJ switch 'off' when revs rise and pass 10000rpm)
(PJ switch 'on' when revs drop and pass 10000rpm)
- 6) 12000RPM ... off (PJ remain 'off' position)

Power jet Range 3 ... 81-100%TPS (takes control when TPS position is between 81%, 100%)

- 1) 0RPM ... on (PJ 'on' when engine not running)
- 2) 3000RPM ... on (PJ remain 'on' position)
- 3) 5000RPM ... off (PJ switch 'off' when revs rise and pass 5000rpm)
(PJ switch 'on' when revs drop and pass 5000rpm)
- 4) 8000RPM ... on (PJ switch 'on' when revs rise and pass 8000rpm)
(PJ switch 'off' when revs drop and pass 8000rpm)

- 5) 10000RPM ... off (PJ switch 'off' when revs rise and pass 10000rpm)
 (PJ switch 'on' when revs drop and pass 10000rpm)
- 6) 12000RPM ... off (PJ remain 'off' position)

13. SOLENOID OUTPUT

Enter **Set Ign.** menu and move to **Solenoid Output** with pressing , or and then press .

...you entered submenu for setting **Solenoid Output** parameters.

Submenu organisation:

- | | |
|------------------------------------|--|
| Output type | - select output type (Power Jet 2, or Duty Solenoid) |
| Power Jet 2 (if selected) | - set Power Jet 2 parameters |
| Duty Solenoid (if selected) | - set Duty Solenoid parameters |
| Exit | - exit submenu |

13.1. OUTPUT TYPE

Solenoid output function can be configured as Power Jet 2, or Duty Solenoid. Duty solenoid is used for adjusting A/F ratio on some carburetors.

Enter **Solenoid Output.** menu and move to **Output type** with pressing , or and then press .

Change solenoid **Output type** with pressing , or and then press .

13.2. POWER JET 2 (if selected in Output Type menu)

Same settings as **Power Jet 1 Simple Mode**...look at section 12.2.

13.3. DUTY SOLENOID (if selected in Output Type menu)

Three duty cycle curves for different throttle positions can be programmed. Each curve can be programmed in 8 rev points.

Enter **Solenoid Output** menu and move to **Duty Solenoid** with pressing , or and then press .

...you entered submenu for setting **Duty Solenoid** parameters.

Submenu organisation:

- | | |
|----------------------|--|
| Curve 0-33% | - duty cycle curve from 0 to 33% TPS |
| Curve 34-66% | - duty cycle curve from 34 to 66% TPS |
| Curve 67-100% | - duty cycle curve from 67 to 100% TPS |
| Exit | - exit submenu |

13.3.1 Set PARAMETERS FOR DUTY SOLENOID CURVE POINT

Move to point you want to change, with pressing , or and then press .
Change rev point with pressing , or (in 100 rpm steps) and then press .
Change duty cycle with pressing , or (in 1% steps) and then press .

14. Set TPS

Enabling, or disabling Throttle Position Sensor.

Enter **Set Ign.** menu and move to **TPS** with pressing , or and then press .
Enable, or disable TPS with pressing , or and then press .

15. Set TPS close [0%] (if TPS enabled)

For correct operation, TPS close position must be calibrated!

Enter **Set Ign.** menu and move to **TPS close [0%]** with pressing , or and then press .

Leave throttle at close position and confirm calibrating with pressing , or exit calibration with pressing . Displayed number should be between 0 and 500.

16. Set TPS open [100%] (if TPS enabled)

For correct operation, TPS open position must be calibrated!

Enter **Set Ign.** menu and move to **TPS open [100%]** with pressing , or and then press .

Move throttle to maximum open position and confirm calibrating with pressing , or exit calibration with pressing . Displayed number should be between 500 and 1010.

17. TCT mode

Throttle Close spark Termination mode, reduces number of sparks (spark is active every third revolution) above 8000rpm, when throttle is closed. TCT mode ensure better engine cooling.

Enter **Set Ign.** menu and move to **TCT mode** with pressing , or and then press .
Enable, or disable **TCT mode** with pressing , or and then press .

TCT mode is primarily for race use, for normal road use the recommended setting is 'DISABLED'.

If you get errors on the rev counter then 'DISABLE' TCT mode.

18. Set Ignition Map SW

Enabling, or disabling external switch for changing ignition curves while riding.

Enter *Set Ign.* menu and move to *Ign. Map SW* with pressing , or and then press .

Enable, or disable external switch with pressing ,or and then press .

19. Set PULSES PER REV

It is number of pulses per rev from pickup coil and is important for correct rev reading. Set 1 for single cylinder engines. Set 2 for all twins with wasted spark ignition system.

Enter *Set Ign.* menu and move to *Pulses Per Rev* with pressing , or and then press .

Change nr. of pulses per rev with pressing , or and then press .

20. Set STOP SWITCH MODE

Stop switch can be set as 'low stop', or as 'high stop'.

Low stop operation ... engine stops with low level signal (stop switch connected to the ground)

High stop operation ... engine stops with high level signal (stop switch is opened)

Enter *Set Ign.* menu and move to *Stop SW Mode* with pressing , or and then press .

Change stop switch mode with pressing , or and then press .

21. IGNITION TEST

Enter *Set Ign.* menu and move to *Ignition Test* with pressing , or and then press , to activate spark test...spark will be generated for few seconds.

Before making spark test, connect PDCI to ignition coil!

22. LOAD PV CURVE

Enter *Set PV* menu and move to *Load PV Curve* with pressing , or and then press .

Select position number of previously saved ignition curve set, with pressing ,or and then press .

23. SAVE PV CURVE

Enter *Set PV* menu and move to *Save PV Curve* with pressing ,or and then press .
Select position number to which you want to save your ignition curve set, with pressing ,
or and then press .

24. Set PV Curve

Enter *Set PV* menu and move to *Set PV Curve* with pressing ,or and then press .
...you entered submenu for setting valve curve.

Submenu organisation:

<i>Nr. of Points</i>	- number of valve curve points (from 2 to 8)
1)	- first valve position point
2)	- second valve position point
...	...
...	...
<i>Exit</i>	- exit submenu

Important!

To avoid wrong processing, don't make unreasonable curve course.

Every time you make any changes to valve curve, it is automatically saved to #0 position.

Then you can save it to any other position number from #1 to #5.

24.1. Change Number of Curve Points

Move to *Nr. of Points* with pressing , or and then press .
Select number of curve points, with pressing , or and then press .

24.2. Change Parameters of Valve Position Curve Points

Move to point you want to change, with pressing , or and then press .
Change rev point with pressing , or (in 100 rpm steps) and then press .
Change valve position from 0% to 100%, with pressing , or (in 1% steps) and then
press .

25. Set Deviation

Enter *Set PV* menu and move to *Deviation* with pressing , or and then press .
Change deviation from 2% to 20% with pressing , or (in 1% steps) and then press
 .

Deviation means how accurate valve is moved to calculated position. If deviation is too low then servo motor won't be stable – it will always search for calculated position in small movements. Default setting is +-2% and should meet in most cases.

26. Set MAX CLOSE POSITION

Enter *Set PV* menu and move to *Close Position* with pressing , or and then press .

Set close position with pressing , or and then press .

Max close position is when curve is set to 0%. Close position can be moved to any position.

27. Set MAX OPEN POSITION

Enter *Set PV* menu and move to *Open Position* with pressing , or and then press .

Set open position with pressing , or and then press .

Max open position is when curve is set to 100%. This open position can be moved to any position.

28. PV Test

Enter *Set PV* menu and move to *PV Test* with pressing , or and then press .

Set valve position with pressing , or and then press .

PV test can be used for testing, or measuring valve position. Valve can be moved to any position from 0% to 100%, without engine running.

29. Set POWER-UP Test

Enabling, or disabling test cycle of PV servo at power-up.

Enter *Set PV* menu and move to *Power-up Test* with pressing , or and then press .

Enable, or disable power-up test with pressing , or and then press .

30. PV CURVE SW

Enabling, or disabling PV curve switch for changing PV curves while riding.

Enter *Set PV* menu and move to *PV Curve SW* with pressing , or and then press .

Enable, or disable *PV Curve* switch with pressing , or and then press .

31. MECHANICAL SETTINGS (Static Angle)

Static Angle is ignition advance angle, set with stator (generator).

Measure this angle with dial gauge. This measured **Static Angle** is your maximum advance angle you can set with **PDCI**.

Calculating mm to deg or vice versa:

α = ignition advance in degrees

T = ignition advance in mm

R = engine stroke divided by 2 in mm

L = conrod length in mm

$P = R + L - T$

$$\alpha = \cos^{-1} \left(\frac{P^2 + R^2 - L^2}{2 \cdot P \cdot R} \right)$$

$$T = L + R \cdot (1 - \cos \alpha) - \sqrt{L^2 - (R \cdot \sin \alpha)^2}$$

32. MONITORING

Connect **programmer** to **PDCI** and wait few seconds for activation of **programmer**. First information displayed on the **programmer** is firmware version.

With **programmer** you can watch revs, calculated advance ignition angle, selected ignition curve, TPS position...depends on setting in the menu.

Information!

You can connect, or disconnect **PDCI** unit from **programmer** any time you want, without any harm. It is not important, if motor running, or not and if power supply is connected, or not.

Important!

Do not use too much force when connecting, or disconnecting **programmer** unit!

33. ERROR REPORTS

PVerr 1 – position sensor error or servo motor disconnected

PVerr 2 – servo motor error (short connection)