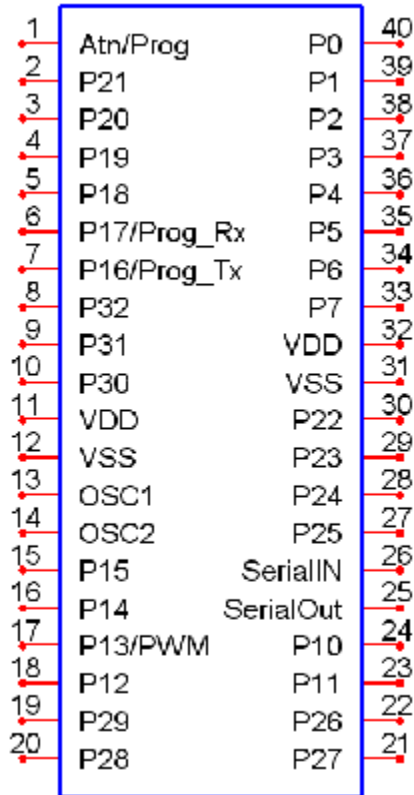




ZPU



The ZPU is a DiosPro that has been programmed by the ZeusPro software.



By attaching the ZPU (DiosPro) chip to a PC, Laptop or Pocket PC you can control up to 31 I/O Ports.

Features

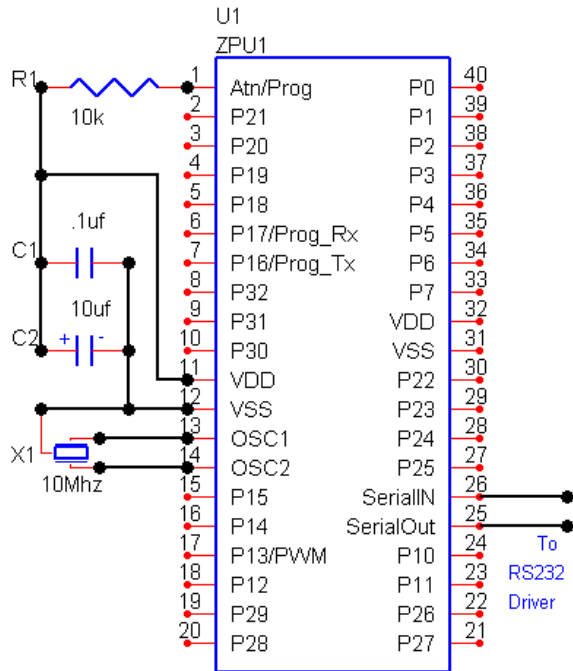
- 31 digital I/O ports, input and output.
- 13 10-Bit Analog Ports
- Hardware PWM on Port 6
- 115200 baud rate interface.
- 1Wire Interfaces
- I2c Interfaces
- Multiple Sonar Devices Supported
- Ability to connect I/O ports to other chips
- 1023 bytes of EEPROM space available
- Firmware upgradable
- Future upgrades available
- Can be programmed as KRAnalyzer chip
- Compatible with Dios Workboards
- Internal pullup option on Ports 0-7

Pin Details

Pin 1	Atn used for Updating Firmware
Pin 2	Port 21 Digital/Analog
Pin 3	Port 20 Digital/Analog
Pin 4	Port 19 Digital/Analog
Pin 5	Port 18 Digital/Analog
Pin 6	Port 17 Digital/Analog
Pin 7	Port 16 Digital/Analog
Pin 8	Port 32 Digital/Analog
Pin 9	Port 31 Digital/Analog
Pin 10	Port 30 Digital/Analog
Pin 11	Vdd
Pin 12	Vss
Pin 13	OSC1 10Mhz Resonator
Pin 14	OSC2 10Mhz Resonator
Pin 15	Port 15 Digital
Pin 16	Port 14 Digital
Pin 17	Port 13 Digital/PWM
Pin 18	Port 12 Digital
Pin 19	Port 29 Digital
Pin 20	Port 28 Digital

Pin Details Cont

Pin 21	Port 27 Digital
Pin 22	Port 26 Digital
Pin 23	Port 11 Digital
Pin 24	Port 10 Digital
Pin 25	Serial Out
Pin 26	Serial In
Pin 27	Port 25 Digital
Pin 28	Port 24 Digital
Pin 29	Port 23 Digital
Pin 30	Port 22 Digital
Pin 31	Vss
Pin 32	Vdd
Pin 33	Port 7 Digital/Analog
Pin 34	Port 6 Digital/Analog
Pin 35	Port 5 Digital/Analog
Pin 36	Port 4 Digital/Analog
Pin 37	Port 3 Digital/Analog
Pin 38	Port 2 Digital
Pin 39	Port 1 Digital
Pin 40	Port 0 Digital

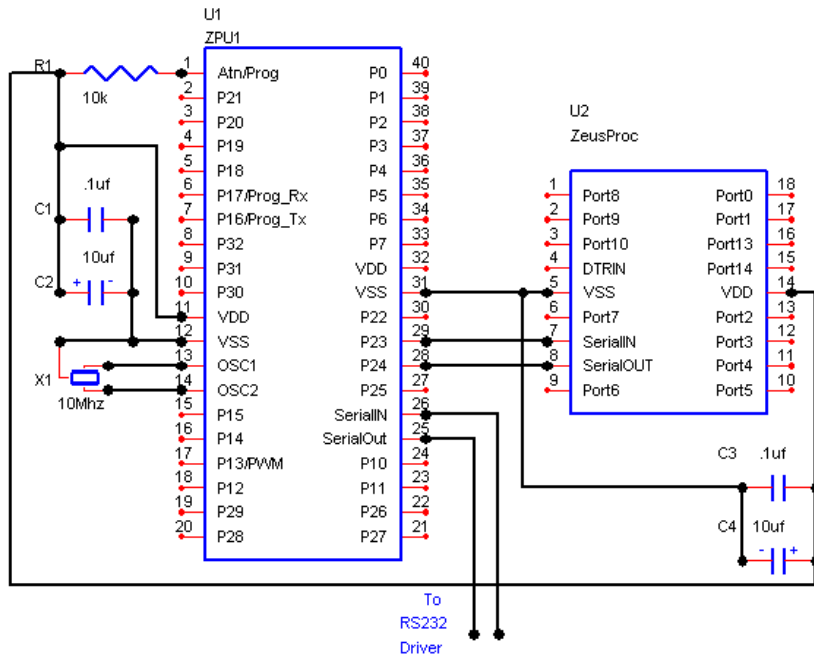


Minimum Chip Hookup

Note that Vdd must be connected to +3.5-5.5 volt source and Vss must be connected to Gnd or - of your power source.

To upgrade the firmware you must connect Ports 16,17 and Atn to the PC via an RS232 driver.

Note that all components above as well as the Drivers and firmware program options are available with the Dios Workboard.

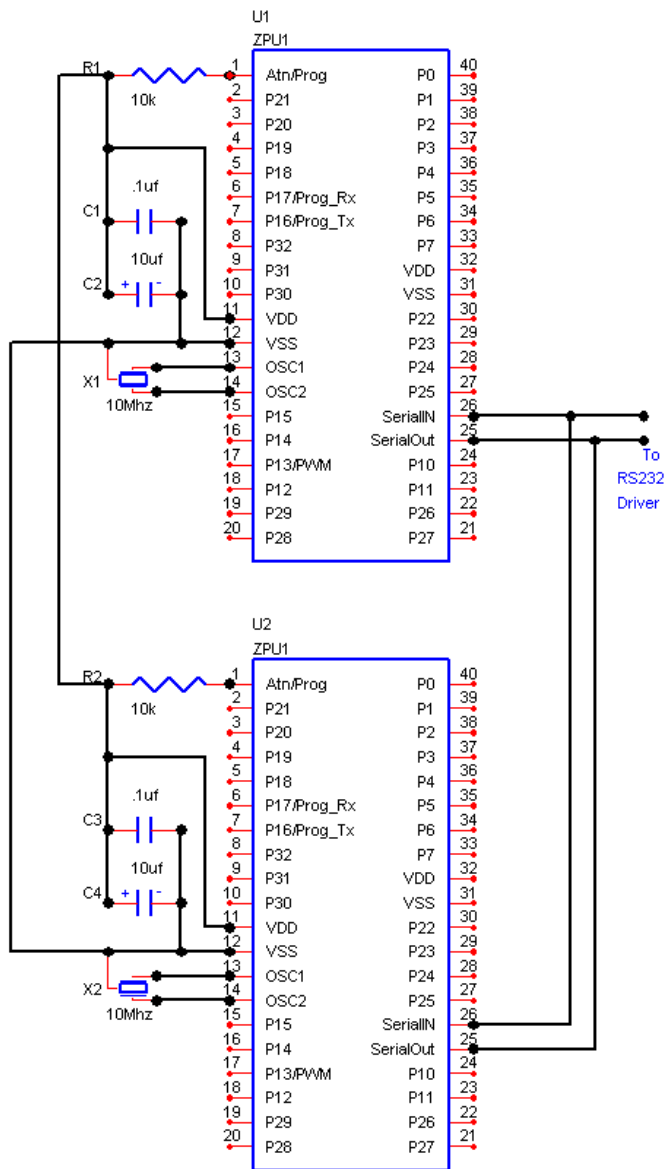


ZPU connected to ZPIO or ZPServo

Important

When connecting a ZPServo chip Replace C4 with at least a 470uF capacitor. You also may need to add a couple .1uF caps close to the power point on the servos. Also you will most likely power the Servos from the 5v source. This will tax the power system and can cause the procs to reset.

The best way is to power the whole system with a 7.2 battery and and take the power for the servos directly from Vin.



Multiple Chip Hookup

You will have to assign the chips different ID's.

Use the ZPWriteEE() command or one of the Zeus Proc utilities available on the KRMicros Website.

To assign an ID you will need to connect each chip individually. It is recommended that you label the chips somehow so you can remember the ID's.

Remember that all chips will respond to the ID of 0 regardless of the assigned ID.

Note when connecting ZP chips to the ZPU you may use any of the ZPU ports. The transmit port connected to Serial in should be set to output and the receive port connected to Serial out should be set to input.

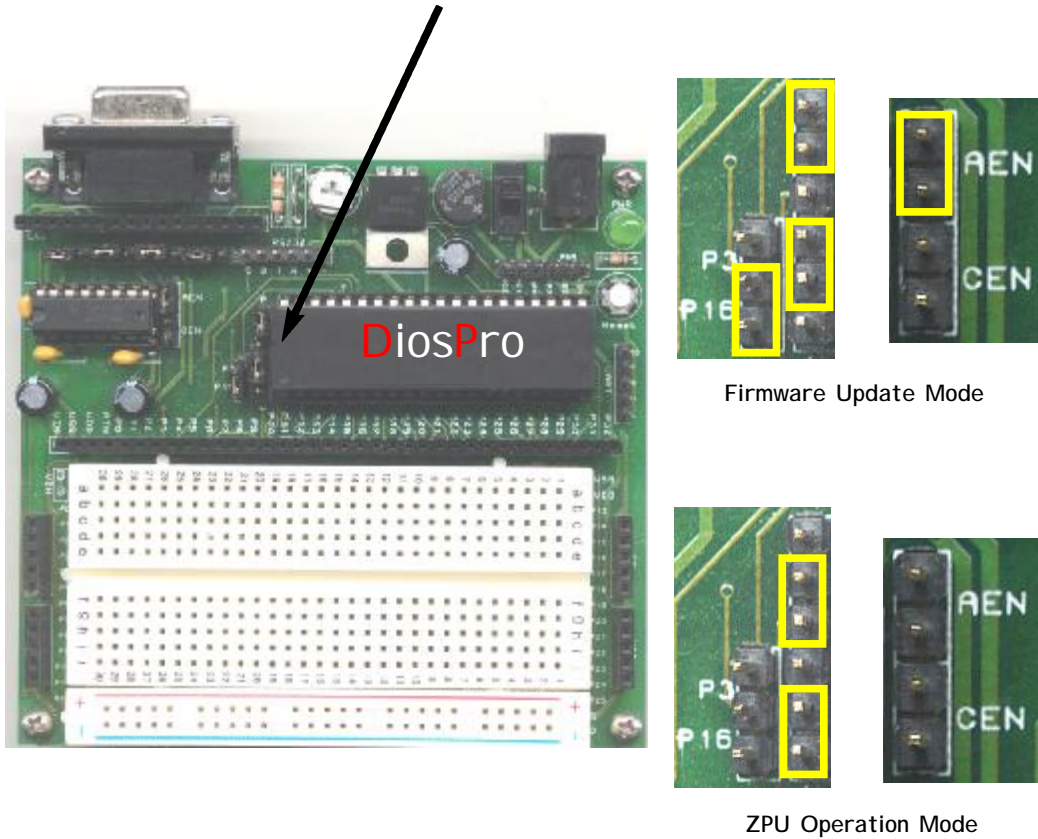
When connection to multiple ZPU's and not using the Dios Workboard you should hold the transmit pin high with a 100k resistor.

You can connect upto 30 chips. Just connect all the SerialIn, SerialOut, VSS and VDD connections as shown.

ZPU Work Board

The ZPU chip was designed to plug into the Dios Work Board Deluxe or Dios Workboard Basic. You can even use our Dios Workboard PCB.

Just plug the ZPU Proc into the socket as shown (Notch facing right).



!! IMPORTANT !!

Make sure the program jumpers are set as shown.

You need to set the type of PC your work board is communicating with. The default DCE is what you set for PC, Laptop and Bluetooth interface.

If you are connecting directly to a Pocket PC serial cable you will need to set the board to DTE mode. You will also need a Male to Male gender changer.



Workboard Connectons

Vss Gnd

Vdd5v

ATN Disabled for normal operation. Pulling low will reset the ZPU

P0 Input, Output
P1 Input, Output
P2 Input, Output
P3 Input, Output, Analog AtoD
P4 Input, Output, Analog AtoD
P5 Input, Output, Analog AtoD
P6 Input, Output, Analog AtoD
P7 Input, Output, Analog AtoD
P8 Serial Input Raw (TTL Level Inverted)
P9 Serial Output Raw (TTL Level Inverted)
P10 Input, Output
P11 Input, Output
P12 Input, Output
P13 Input, Output, PWM
P14 Input, Output
P15 Input, Output
P16 Input, Output, Analog AtoD, Upgrade Tx
P17 Input, Output, Analog AtoD, Upgrade Rx
P18 Input, Output, Analog AtoD
P19 Input, Output, Analog AtoD
P20 Input, Output, Analog AtoD
P21 Input, Output, Analog AtoD
P22 Input, Output
P23 Input, Output
P24 Input, Output
P25 Input, Output
P26 Input, Output
P27 Input, Output
P28 Input, Output
P29 Input, Output
P30 Input, Output, Analog AtoD
P31 Input, Output, Analog AtoD
P32 Input, Output, Analog AtoD

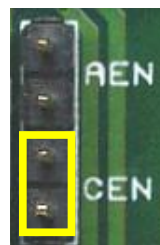
DTR Port

The DTR command is not supported on the ZPU. In normal ZPU operation the AEN jumper should be removed. In Firmware update mode the AEN jumper must be in place.

CTS Port

Note that you may connect Port 10 to CTS. This makes port 10 very fast for input because not serial command needs to be issued. Just use the ZPComCTS() function to get the CTS status.

You will need to place the jumper on the CEN header as shown for this to work.



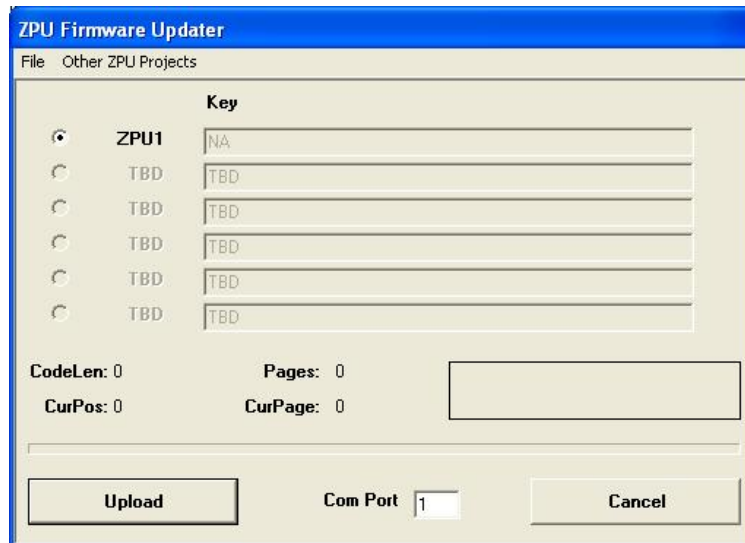
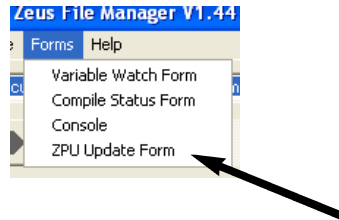
CTS is connected
to IO Port 10

Upgrading the ZPU Firmware

One of the most important features of the ZPU is that you have the ability to upgrade or change the firmware code.

Note that you may also load a Dios Pro 40 chip with ZPUfirmware.

To upload firmware programs and changes to the ZPU or DiosPro load ZeusPro and select the ZPU Update Form option as shown.

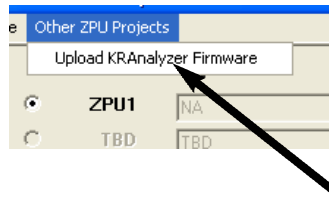


The ZPUupdate form will allow you to upload various features as they become available. Some may be free and some may require you to purchase a software key to unlock. This form is also where you update the ZPU1 when new commands are added.

Simply select the appropriate update and click the Upload button. The ZPU should be plugged into the Dios Workboard and the jumpers set to program mode as indicated earlier.

You will also need to make sure the Comport is set correctly to the comport communicating with the ZPU.

You may also upload special program firmware to the ZPU or DiosPro as they become available.



Here is shown the KRAAnalyzer firmware. This firmware as well as the Zeus KRAAnalyzer software will create a KRAAnalyzer tool for you.

Parts

DiosPro (ZPU)

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16428>

ZeusPro

<http://www.krmicros.com/Development/ZeusPro/ZeusPro.htm>

Dios Workboards Basic

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16453>

Dios Workboards Deluxe

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16452>

Other Products

USB to Serial Adapter	www.jameco.com	#387954CE
	www.cyberguys.com	#104 0475
6' Serial Cable	www.jameco.com	#199638CE
Gender Changer	www.jameco.com	#18497CE
Bluetooth Adapter	www.cyberguys.com	#202 5618
BlueTooth to RS232	www.expansys.com	#112190

Other Links

Be sure to visit our online forums at

<http://www.kronosrobotics.com/forums/>

Specifications

Chip Default I D	101
Baud Rate	115200
I O Ports	31
AtoD Ports	13
Sink Current	25ma per port
Source Current	25ma per port
Power Supply	3.5-5.5V

Analog Port input can not exceed 5v. The voltage can not fall below 0. Connecting a voltage outside this range will damage the chip.

EE Addresses

0 = I D

1-1023 Free to use

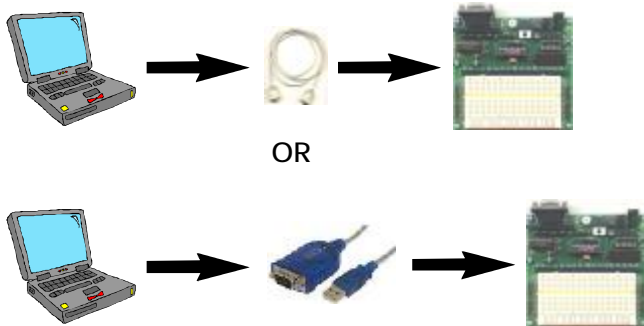
Direct Connections

PC Direct Connection to Workboard



To connect a PC to the workboard is very simple. All that is needed is a 9 male to female straight through cable. You will need Zeus Pro on the PC and a Zeus Proc on the workboard. If your computer does not have a serial port you will need a USB to serial adapter. (See below)

Laptop Direct Connection to Workboard



This type connection is very similar to the PC. New laptops do not have a serial connector. In this case you will need a USB to serial adapter. Many come with cables that can be connected up to the workboard. You will need Zeus Pro on the Laptop and a Zeus Proc on the workboard.

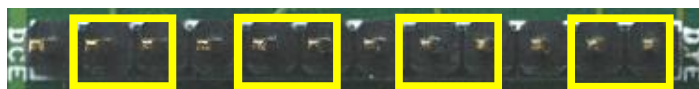
Pocket PC Direct Connection to Workboard



In order to make a direct connection from the Pocket PC to the workboard you need a couple things. First you need a cable specifically designed for your model pocket PC. Early Pocket PC's used this cable to connect the Pocket PC to the PC.

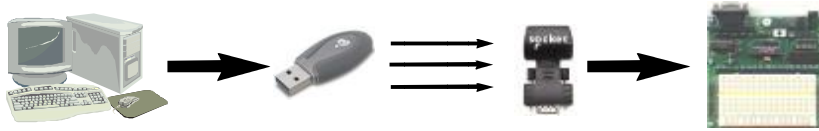
Next you will need a male to male gender changer in order to connect this cable to the workboard. A gender changer simply changes the sex of the cable to male which is needed to connect to the workboard.

The workboard also needs to be configured as a DTE device by changing the four jumpers as shown below.



Bluetooth Connections

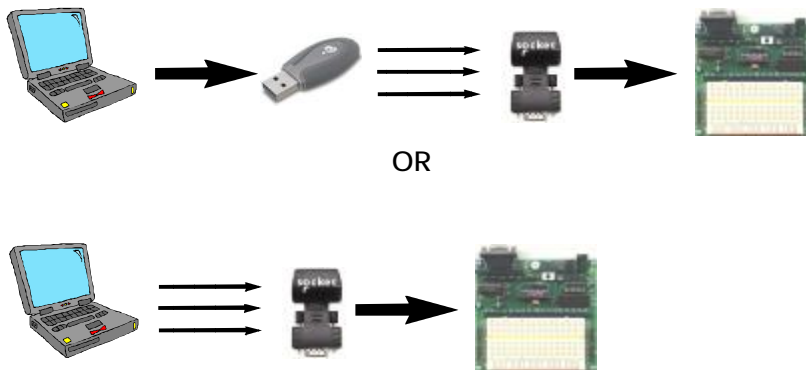
PC Bluetooth Connection to Workboard



If you want a wireless connection from your PC to the workboard the best way to go is with Bluetooth. You will need a USB to Bluetooth adapter (Dongle) and a Bluetooth to RS232 adapter.

Warning Bluetooth can be a pain to setup and get it working. It is also prone to interference. Start with PC direct connection when working with the workboard then migrate to bluetooth and Pocket PC.

Laptop Bluetooth Connection to Workboard



This type connection is very similar to the PC. However many laptops have built-in Bluetooth so only the Bluetooth to RS232 adapter is needed.

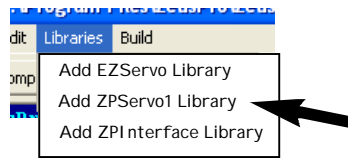
Pocket PC Bluetooth Connection to Workboard



Many new Pocket PC's have built-in Bluetooth, this works the same as the laptop with builtin bluetooth. If your Pocket PC does not have built in Bluetooth then you will have to purchase an I Ocard that adds it to your Pocket PC. Other than that you may have to use a direct connection.

ZPU1 Command Library

To include the ZPU1 command library select the Add ZPU1 Library option on the Libraries Menu. Note that this option does not exist on the light versions of the software.



This will add the ZPU library include file at the end of your document. The ZPU Library automatically includes the generic Zeus Interface Library.

Once the library has been included you are free to use the following commands.

ZPU1 Specific Commands

ZPUInit(1, 1)

ZPUInitInterface Channel,ComPort

ZPUInitInterface exp,exp

Description

The ZPUInit command is required to use the ZPU chip. This command sets up the com port to talk to the ZPU chip. It sets the baudrate to 115200.

Channel - The Zeus communications channel 1-5 to use. Generally this is 1 unless you are using this channel for something else. If you omit the channel it will automatically use channel 1.

ComPort - The PC,Laptop or Pocket PC Comport that you are connecting to the Zeus Proc. You will need to consult your particular devices manual for available com ports.

ZPUAtoDinit()

ZPUAtoDinit([Channel, I D,] Ports)

ZPUAtoDinit([exp,exp,] exp)

Description

Sets the number of Ports to assign as analog. 0-13 is valid

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPUInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Ports - The number of ports to assign as analog. The following table maps to the individual ports based on this setting.

Ports	Port7	Port8	Port6	Port4	Port5	Port30	Port31	Port32	Port16	Port19	Port18	Port20	Port21
13	A	A	A	A	A	A	A	A	A	A	A	A	A
12	D	A	A	A	A	A	A	A	A	A	A	A	A
11	D	D	A	A	A	A	A	A	A	A	A	A	A
10	D	D	D	A	A	A	A	A	A	A	A	A	A
9	D	D	D	D	A	A	A	A	A	A	A	A	A
8	D	D	D	D	D	A	A	A	A	A	A	A	A
7	D	D	D	D	D	D	A	A	A	A	A	A	A
6	D	D	D	D	D	D	D	A	A	A	A	A	A
5	D	D	D	D	D	D	D	D	A	A	A	A	A
4	D	D	D	D	D	D	D	D	D	A	A	A	A
3	D	D	D	D	D	D	D	D	D	D	A	A	A
2	D	D	D	D	D	D	D	D	D	D	D	A	A
1	D	D	D	D	D	D	D	D	D	D	D	D	A
0	D	D	D	D	D	D	D	D	D	D	D	D	D

ZPUAtoD()

ZPUAtoD([Channel, ID,] Port)

ZPUAtoD([exp,exp,] exp) as Integer

Description

Reads an analog port and returns a value between 0 and 1023 depending upon the value.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - Must be a valid AtoD port 3,4,5,6,7,16,18,19,20,21,30,31,32

ZPUI2cin()

ZPUI2cin([Channel, ID,] SDA, CLK, SlaveAddress, Address)

ZPUI2cin([exp,exp,] exp, exp, exp, exp)

Description

Retrieves a byte from a memory mapped I2c device. The device must have a single byte address.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

SDA - The Data Port on the I2c Bus. This port should be held high with a 1K resistor.

CLK - The Clock Port on the I2c Bus. This port should be held high with a 1K resistor.

SlaveAddress - This is the control code for the slave device. The read/write bit is set automatically for you.

Address - The 8-bit address to read.

ZPUI2cin2()

ZPUI 2cin2([Channel, ID,] SDA, CLK, SlaveAddress, Address)
ZPUI 2cin2([exp, exp,] exp, exp, exp, exp)

Description

Retrieves a byte from a memory mapped I2c device. The device must have a dual byte address.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

SDA - The Data Port on the I2c Bus. This port should be held high with a 1K resistor.

CLK - The Clock Port on the I2c Bus. This port should be held high with a 1K resistor.

SlaveAddress - This is the control code for the slave device. The read/write bit is set automatically for you.

Address - The 16-bit address to read.

ZPUI 2cout()

ZPUI 2cout([Channel, ID,] SDA, CLK, SlaveAddress, Address, Value)
ZPUI 2cout([exp, exp,] exp, exp, exp, exp, exp)

Description

Sends a byte to a memory mapped I2c device. The device must have a single byte address.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

SDA - The Data Port on the I2c Bus. This port should be held high with a 1K resistor.

CLK - The Clock Port on the I2c Bus. This port should be held high with a 1K resistor.

SlaveAddress - This is the control code for the slave device. The read/write bit is set automatically for you.

Address - The 8-bit address to write.

Value - The 8-bit value to write.

ZPUI 2cout2()

ZPUI 2cout([Channel, ID,] SDA, CLK, SlaveAddress, Address, Value)
ZPUI 2cout([exp, exp,] exp, exp, exp, exp, exp)

Description

Sends a byte to a memory mapped I2c device. The device must have a dual byte address.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may

be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

SDA - The Data Port on the I2c Bus. This port should be held high with a 1K resistor.

CLK - The Clock Port on the I2c Bus. This port should be held high with a 1K resistor.

SlaveAddress - This is the control code for the slave device. The read/write bit is set automatically for you.

Address - The 16-bit address to write.

Value - The 8-bit value to write.

ZPUIRin()

ZPUIRin([Channel, ID,] Port)

ZPUIRin([exp, exp,] exp)

Description

This command returns a 16-bit value that represents the command and device code of a Sony remote. The high 8 bits is the device and the lower 8 bits is the command. If the 16-bit value is a 0 then no code was received.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI niI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - The Port the IR Module is connected to.

ZPOWReset()

ZPUOWReset([Channel, ID,] Port)

ZPUOWReset([exp, exp,] exp) as Integer

Description

Resets a 1Wire device on a particular port.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI niI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - The port that the 1 wire device is connected to.

ZPOWSendByte()

ZPUOWSendByte([Channel, ID,] Port, Byte)

ZPUOWSendByte([exp, exp,] exp, exp) as Integer

Description

Sends a byte to a 1Wire device on a particular port.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - The port that the 1 wire device is connected to.

Byte - The byte to send.

ZPOWRead()

ZPUOWRead([Channel,ID,] Port)
ZPUOWRead([exp,exp,] exp) as Integer

Description

Retrieves a byte from a 1Wire device on a particular port.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - The port that the 1 wire device is connected to.

ZPUPulseOut()

ZPUPulseOut([Channel,ID,] Port,Interval)
ZPUPulseOut([exp,exp,] exp,exp,exp)

Description

Toggles a port from current state to the other then back again.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - The port to pulse

Interval - This is the pulse value. The interval value is in microseconds and can be between 0-65365. Note that the pulseout command has an overhead of 788us due to the time it takes to transmit the command to the ZPU.

ZPUPullupsOn()

ZPUPullupsOn([Channel,ID,])
ZPUPullupsOn([exp,exp])

Description

Turns the pullups on ports 0-7 on.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitI nterface command. Note that Channel may

be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPullupsOff()

ZPUPullupsOff([Channel, ID])
ZPUPullupsOff([exp,exp])

Description

Turns the pullups on ports 0-7 off.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPulsein()

ZPUPulsein([Channel, ID,] port, state, timeout)
ZPUPulsein([exp,exp,] exp,exp,exp)

Description

Issues a pulsein command and returns the 16bit value in .1 us units

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - The port to test.

state - The state to test for.

- 0: measure interval of next low state.
- 1: Measure interval of next high state.
- 2: Measure interval of next low state after one complete cycle.
- 3: Measure interval of next high state after one complete cycle.

timeout - The number of passes to make looking for the port to change state.

ZPUPWM()

ZPUPWM([Channel, ID,] Range,Period,Duty)
ZPUPWM([exp,exp,] exp,exp,exp)

Description

Sets up a fire and forget signal. That is once it is set up the signal will continue until power is removed from the chip. Note that you must place port 6 in output mode.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPUI nit command. Note that Channel may be

omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Range - Sets the range the PWM will perform. 0-2 is valid.

Range 0 Each unit .1us. EG 0,255,128 will give a 25.5us period with a 12.8us high time.

Range 1 Each unit .4us. EG 0,255,128 will give a 102us period and a 51.2us high time.

Range 2 Each unit 1.6us. EG 0,255,128 will give 408us period with a 204.8us high time.

Period - The Period of the signal. See Range

Duty - This is the time the signal is high. See Range.

ZPUSonar()

ZPUSonar([Channel, ID,] Trigger, Echo)

ZPUSonar([exp,exp,] exp, exp)

Description

This command sends a pulse to a Sonar sensor and starts a counter that will read the amount of time it takes to get the echo.

Returns 0 if error or timeout. The value returned is in 1/64 inch units.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Trigger - This is the port number that the trigger is connected to. The command will place the port in output mode.

Echo - This is the port number that the Echo or Return lead is connected to. The command will place the port in input mode.

ZPUVexSonar()

ZPUVexSonar([Channel, ID,] Trigger, Echo)

ZPUVexSonar([exp,exp,] exp, exp)

Description

This command sends a pulse to a Vex Sonar sensor and starts a counter that will read the amount of time it takes to get the echo.

Returns 0 if error or timeout. The value returned is in 1/64 inch units.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitI nterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Trigger - This is the port number that the trigger is connected to. The command will place the port in output mode. On the Vex this is the Yellow connector on the Input cable.

Echo - This is the port number that the Echo or Return lead is connected to. The command will place the port in input mode. On the Vex this is the Orange connector on the Output cable.

Remote Commands

The ZPU has a set of commands for dealing with remote devices connected to the ZPU. Each port can be used communications port and baud rates from 1200-115200 can be set. The default is 19200. Some things to keep in mind. Serial commands sent to the ports are bit-banged which mean they are susceptible to interruptions caused by interrupts. When a command is sent the chip is paused until the data has been sent. Small 1 millisecond delays are added after each command sent to a remote chip.

ZPUSetRemoteOutput()

```
ZPUSetRemoteOutput([Channel, ID,] ZPUPort, ZPID, ZPPort)  
ZPUSetRemoteOutput([exp, exp,] exp, exp, exp)
```

Description

Turns a remote ZP chip port into an output port. This is a transmit only command so only one port is needed.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPort - The transmit port connected to the remote ZP chip. Note that you need to set this port to output before use.

ZPID - This is the ID of the remote proc. A zero addresses any port. You may have up to 30 chips connected at once.

ZPPort - This is the port on the remote ZP chip to set.

ZPUSetRemoteInput()

```
ZPUSetRemoteInput([Channel, ID,] ZPUPort, ZPID, ZPPort)  
ZPUSetRemoteInput([exp, exp,] exp, exp, exp)
```

Description

Turns a remote ZP chip port into an input port. This is a transmit only command so only one port is needed.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPort - The transmit port connected to the remote ZP chip. Note that you need to set this port to output before use.

ZPID - This is the ID of the remote proc. A zero addresses any port. You may have up to 30

chips connected at once.

ZPPort - This is the port on the remote ZP chip to set.

ZPUSetRemoteHigh()

ZPUSetRemoteHigh([Channel, ID,] ZPUPort, ZPID, ZPPort)

ZPUSetRemoteHigh([exp,exp,] exp,exp,exp)

Description

Sets a remote ZP chip port to a high state. This is a transmit only command so only one port is needed.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPort - The transmit port connected to the remote ZP chip. Note that you need to set this port to output before use.

ZPID - This is the ID of the remote proc. A zero addresses any port. You may have up to 30 chips connected at once.

ZPPort - This is the port on the remote ZP chip to set.

ZPUSetRemoteLow()

ZPUSetRemoteLow([Channel, ID,] ZPUPort, ZPID, ZPPort)

ZPUSetRemoteLow([exp,exp,] exp,exp,exp)

Description

Sets a remote ZP chip port to a low state. This is a transmit only command so only one port is needed.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPort - The transmit port connected to the remote ZP chip. Note that you need to set this port to output before use.

ZPID - This is the ID of the remote proc. A zero addresses any port. You may have up to 30 chips connected at once.

ZPPort - This is the port on the remote ZP chip to set.

ZPUSetRemoteServo()

ZPUSetRemoteServo([Channel, ID,] ZPUPort, ZPID, ZPPort)

ZPUSetRemoteServo([exp,exp,] exp,exp,exp)

Description

Sets a remote ZP chip port to a high state. This is a transmit only command so only one port is needed.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPort - The transmit port connected to the remote ZP chip. Note that you need to set this port to output before use.

ZPID - This is the ID of the remote proc. A zero addresses any port. You may have up to 30 chips connected at once.

ZPPort - This is the port on the remote ZP chip to set.

ZPUSetRemoteServoValue()

ZPUSetRemoteServoValue([Channel,ID,] ZPUPort,ZPID,ZPPort,Value)
ZPUSetRemoteServoValue([exp,exp,] exp,exp,exp,exp)

Description

Sets a remote servos value. This is a 16 bit value in microseconds generally between 1000 and 2000 with 1500 placing the servo in the center position.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPUPort - The transmit port connected to the remote ZP chip. Note that you need to set this port to output before use.

ZPID - This is the ID of the remote proc. A zero addresses any port. You may have up to 30 chips connected at once.

ZPPort - This is the port on the remote ZP chip to set.

Value - The servo value in microseconds.

ZPUStoreString()

ZPUStoreString([Channel,ID,] string)
ZPUStoreString([exp,exp,] sexp)

Description

Sends a string to the ZPU buffer. The buffer is 256 bytes. If you send more than 256 bytes it simply wraps. The string will not be sent until you issue the ZPUSendBuffer command.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

string - The string to add to the buffer.

ZPUAddString()

ZPUAddString([Channel, ID,] string)

ZPUAddString([exp, exp,] sexp)

Description

Adds a string to the ZPU buffer. The string is added to the end of the buffer. The buffer is 256 bytes. If you send more than 256 bytes it simply wraps. The string will not be sent until you issue the ZPUSendBuffer command.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

string - The string to add to the buffer.

ZPUSendBuffer()

ZPUSendBuffer([Channel, ID,] txport)

ZPUSendBuffer([exp, exp,] exp)

Description

Sends all the data in the buffer out the indicated port.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

txport - The port to send the data to. This port should be configured as an output.

ZPUSendnWaitByte()

ZPUSendnWaitByte([Channel, ID,] txport, rxport)

ZPUSendnWaitByte([exp, exp,] exp, exp)

Description

Sends all the data in the buffer out the indicated port. It then waits up to 500ms for a byte of data. Returns a -1 on timeout.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

txport - The port to send the data to. This port should be configured as an output.

rxport - The port to receive the data from. This port should be configured as an input.

ZPUSendnWaitWord()

ZPUSendnWaitWord([Channel, ID,] txport, rxport)
ZPUSendnWaitWord([exp, exp,] exp, exp)

Description

Sends all the data in the buffer out the indicated port. It then waits up to 500ms for a 2 bytes of data. Returns a -1 on timeout.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

txport - The port to send the data to. This port should be configured as an output.

rxport - The port to receive the data from. This port should be configured as an input.

ZPUSerBaud()

ZPUSerBaud([Channel, ID,] baud)
ZPUSerBaud([exp, exp,] exp)

Description

Sets the baud rate for all remote commands.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPI nitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

baud - Valid baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

ZP Interface Commands

The following commands are available on most of the ZP processor chips. Some chips may have fewer or more IOports. To use the commands you must included the ZPI nterface library if you have not already included one of the other ZP libraries.

IO Commands

ZPPortInput()

ZPPortInput([Channel, ID,] Port)
ZPPortInput([exp, exp,] exp)

Description

Sets a port as a digital input. The port will read 1 or 0 when the ReadPort command is called.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - Must be a valid ZPU IO port 0-32. Note that Ports 8 and 9 are reserved.

ZPReadPort()

ZPReadPort([Channel, ID,] Port)

ZPReadPort([exp,exp,] exp) as integer

Description

Returns the state of a input port. Will return 1 or 0. Actually this command returns a 48 if the port is low and a 49 if the port is high.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - Must be a valid ZPU IO port 0-32. Note that Ports 8 and 9 are reserved.

ZPReadPorts()

ZPReadPort([Channel, ID])

ZPReadPort([exp,exp]) as integer

Description

Returns the state of input ports 0-7. Will return 0-255 with each bit representing a given port state.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPPortOutput()

ZPPortOutput([Channel, ID,] Port)

ZPPortOutput([exp,exp,] exp)

Description

Sets a port as an output. Once set you can use the PortHigh and PortLow to set the given port high or low.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - Must be a valid ZPU IO port 0-32. Note that Ports 8 and 9 are reserved.

ZPPortHigh()

ZPPortHigh([Channel, ID,] Port)

ZPPortHigh([exp,exp,] exp)

Description

Sets an output port to high state.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - Must be a valid ZPU IO port 0-32. Note that Ports 8 and 9 are reserved.

ZPPortLow()

ZPPortLow([Channel, ID,] Port)

ZPPortLow([exp,exp,] exp)

Description

Sets an output port to low state.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Port - Must be a valid ZPU IO port 0-32. Note that Ports 8 and 9 are reserved.

SetPorts()

ZPSetPorts([Channel, ID,] Value)

ZPSetPorts([exp,exp,] exp)

Description

Sets the state of ports 0-7 depending on the bit in the passed 8 bit value. If bit 0 is 1 then port 0 will be set high. If bit 0 is 0 then the port will be set low.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Value - Each bit in this parameter is mapped to a one of the ports 0-7. If the bit is high the port will be set high.

SetDTRHigh()

ZPSetDTRHigh([Channel, I D])
ZPSetDTRHigh([exp,exp])

Description

This command sets DTR port to the high state. On the Workboard if AEN jumper is in place the ATN port will go high.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

SetDTRLow()

ZPSetDTRLow([Channel, I D])
ZPSetDTRLow([exp,exp])

Description

This command sets the DTR port to the low state. On the Workboard if AEN jumper is in place the ATN port will go low.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPReadDTR()

ZPReadDTR([Channel, I D])
ZPReadDTR([exp,exp]) as integer

Description

This command will return the state of the DTR lead on the Zeus chip.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPReadCTS()

ZPReadCTS([Channel, I D])
ZPReadCTS([exp,exp]) as integer

Description

This command will return the state of IO port 10 on the Zeus chip. Note that this is a high speed command as no serial command needs to be sent to the Zeus chip. You must set the port to input mode and enable the CEN jumper on the workboard.

Note that CTS is inverted. If it is low it will return 1 and high will return 0.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may

be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Other Commands

ZPReadVersion()

ZPReadVersion([Channel, ID])
ZPReadVersion([exp, exp]) as integer

Description

This command will return the version of the targeted chip.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPReadID()

ZPReadID([Channel, ID])
ZPReadID([exp, exp]) as integer

Description

This command will return the ID of the targeted chip.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPReadEE()

ZPReadEE([Channel, ID], Address)
ZPReadEE([exp, exp,] exp) as integer

Description

This command will return the value of a given EEPROM address in the chip. The ZPU has 1023 available bytes to use. Use the ZPReadEE not the ZPReadEE command.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Address - This is the address of the internal EEPROM located in the ZP processor. Note that not all locations will be available so refer to the spec sheet at the end of this document for valid locations.

ZPUWriteEE()

ZPUWriteEE([Channel, ID], Address, Value)

ZPUWriteEE([exp,exp,] exp,exp)

Description

This command will return the value of a given EEPROM address in the chip. Warning writing to some addresses can change functionality of the chip. The ZPU has 1023 available bytes to use. Use the ZPReadEE not the ZPWriteEE command.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

Address - This is the address of the internal EEPROM located in the ZP processor. Note that not all locations will be available so refer to the spec sheet at the end of this document for valid locations.

Address - This is the value to write to the given address.

ZPReset()

ZPReset([Channel,ID])

ZPReset([exp,exp])

Description

This command will reset the chip to the startup state of the chip. Turns off all servos and sets all IO ports to input mode.

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.

ZPReadType()

ZPReadType([Channel,ID])

ZPReadType([exp,exp]) as integer

Description

This command will return a number that represents the type of chip.

Type 1 = ZPServo1

Type 2 = ZPIO1

Type 3 = ZPAtoD

Type 4 = ZPBotProc

Channel - The Zeus communications channel 1-5 to use. If you omit the channel it will automatically use the channel set by the last ZPInitInterface command. Note that Channel may be omitted but if included you must include all remaining parameters.

ID - This is the chip ID. If ID is omitted a value of 0 will be used. This ID is recognized by all chips. See the section on changing ID at the end of this document.