

AWC

GP5 Position Sensor Kit

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Overview

The GP5 is the easiest way to read highly-accurate two-dimensional position data using an ordinary mouse. Features include:

- PS/2 mouse compatible (works with most USB-PS/2 dual-mode mice)
- Serial output can drive a serial LCD, PC, or microcontroller
- Digital output signals button activity
- True RS232 from onboard 5V supply
- EEPROM retains configuration

If You Need Help

If you require assistance, please feel free to contact us. The best way to get support is via e-mail (stamp@al-williams.com). However, you may also call between 9AM - 4PM Central Time at (281) 334-4341. You can also fax to (281) 754-4462. Be sure to check out our Web page for updates at www.al-williams.com/awce.

Building

Please follow the directions included for building the GPMPU kit. The board requires no modifications to work with the GP5. However, you may want to consider any special power supply connections or serial connections you'd like to make. For example, the onboard LED indicates a left button push. You might wish to use this output for something other than an LED. In addition, you'll need to connect the outside world to the GP5 as appropriate for your situation.

If you are prototyping, you may want to install the header at JP1 and use it to connect to a solderless breadboard. You can also

solder wires to the holes along the long edge of the board near IC1 to connect to external circuitry.

For a permanent installation, you'll want to omit the header at JP1 and simply make the connections to fit your installation.

In any event, make your connections according to this chart:

<i>Pin</i>	<i>Description</i>
JP1-1	Ground to PS/2 port (Brown wire)
JP1-11	+5V to PS/2 port (Yellow wire)
ICSP-4	Ground to reset X and Y count (note: the left mouse button will also clear the X and Y count); Note: ground is ICSP-3
RB0	PS/2 Clock (Green wire)
RB5	PS/2 Data (Red wire)
RC2	Goes high when right mouse button pressed
RC3 (LED)	Goes high (lights LED) when left mouse button pressed

Note: The colors refer to the PS/2 connector supplied with this kit which has a header connector. You can remove or cut the wires from the connector and solder them directly to the board, or use any other means of making the connections that suit your needs.

Operation

The GP5 connects to a PC, serial LCD, or other host device via the RS-232 port. The GP5 is a DCE device and only transmits data, so you can use a straight cable to connect directly to a PC. The GP5 transmits 9600 baud serial data (8 bits, 1 stop bit, no parity).

Here is a screen shot of Hyperterminal reading mouse information:



The first line shows the X position in inches and millimeters. The second line shows the Y position using the same units. You can configure the GP5 to output inches, millimeters, raw counts, or any combination of these measurements.

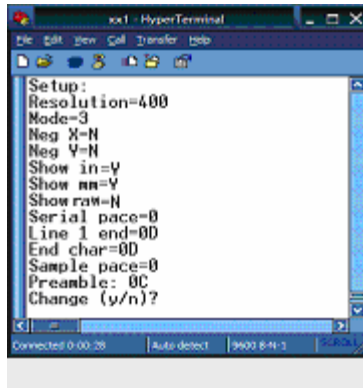
The exact resolution depends on the mouse you use and the configuration of the GP5. By default, the GP5 expects a 400 DPI mouse which allows resolution to .0025 inches. Applications that use raw counts can exploit the maximum resolution of the mouse. When the GP5 displays inch and millimeter measurements together, it uses the format 99.999 (for inches) and 999.999 (for millimeters). When displaying only inches, it uses a 999.999 format. If only millimeters are displayed, the format is 9999.999. Because the GP5 uses 16-bit integers, the maximum measurement at 400 DPI is just under 82 inches. Of course, the display for millimeters is limited to just under 1000mm when inches are also displayed.

Configuration

The GP5 stores configuration information in EEPROM. The defaults are suitable for many applications. However, you can change the defaults with any terminal program connected to the serial port.

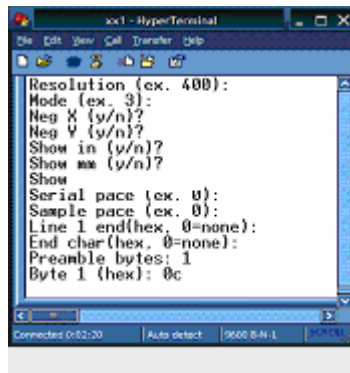
When the GP5 powers up (or resets) it waits about one second for input over the serial port. If it detects input, it enters configuration mode. Otherwise, it enters measurement mode.

In configuration mode, the unit displays its current configuration:



```
xx1 - HyperTerminal
File Edit View Call Transfer Help
Resolution=400
Mode=3
Neg X=N
Neg Y=N
Show in=Y
Show mm=Y
Show raw=N
Serial pace=0
Line 1 end=00
End char=00
Sample pace=0
Preamble: 0C
Change (y/n)?
Connected 0:00:26 Auto detect 9600 8-N-1
```

If you press “y” or “Y” on the terminal keyboard, the GP5 will allow you to change each parameter:



```
xx1 - HyperTerminal
File Edit View Call Transfer Help
Resolution (ex. 400):
Mode (ex. 3):
Neg X (y/n)?
Neg Y (y/n)?
Show in (y/n)?
Show mm (y/n)?
Show
Serial pace (ex. 0):
Sample pace (ex. 0):
Line 1 end(hex, 0=none):
End char(hex, 0=none):
Preamble bytes: 1
Byte 1 (hex): 0c
Connected 0:02:20 Auto detect 9600 8-N-1
```


When in configuration mode, you can press Enter to keep the current value of a parameter. You may use backspace to correct decimal or hex entries. The case of letters is not important. When you are done, the GP5 will show you the configuration again and ask if you want to change it. You may make further corrections at this point. If you answer “n” or “N” the GP5 will begin normal operations.

Each parameter allows you to change the operation of the GP5:

- Resolution – This allows you to set the resolution of your mouse in dots per inch. The default is 400 DPI. If this number is wrong, your measurements will be incorrect (for example, if you use an 800 DPI mouse with a setting of 400, every measured inch will be a half inch).
- Mode – Mice can accept one of 4 modes (0 to 3). Mode 3 is usually the highest possible resolution. The other modes will allow lower resolution. If you change this, you must also enter a resolution parameter that matches the mouse’s new resolution. The default is 3.
- Neg X and Neg Y– If you answer “y” or “Y” to this question, the GP5 will compute inches and millimeters so that negative counts are to the right (or up, in the case of Y). The default is “N”.
- Show in – Causes the GP5 to display measurements in inches. If present, the inch measurement always appears first. The default is “Y”.
- Show mm – Causes the GP5 to display measurements in millimeters. If present, the millimeter measurement always appears after the inch measurement (if any). The default is “Y”.

- Show raw – Causes the GP5 to display measurements in raw counts. That is, for a 400 DPI mouse, an inch would read 400 counts. This measurement always appears last, if enabled. The default is “N”.
- Serial pace – The GP5 can delay between serial output characters (this does not affect serial output during configuration). The parameter is in milliseconds and defaults to 0. The maximum pacing is 255 ms.
- Sample pace – The GP5 can delay between mouse readings. This parameter is in milliseconds and defaults to 0 (no delay). The maximum pacing is 65535 ms.
- Line 1 end – At the end of the X coordinate output line, the GP5 can insert a character. This character is specified in hex and defaults to 0D (carriage return). If the character is 0, then the GP5 does not send any character.
- End char – At the end of the Y coordinate output line (the end of the output data), the GP5 can insert a character. This character is specified in hex and defaults to 0D (carriage return). If the character is 0, then the GP5 does not send any character.
- Preamble bytes – You can specify between 0 and 16 hex bytes that are sent before each data packet begins. The default is 0C. This is a form feed and clears Hyperterminal and many serial LCD displays. If you enter a non-zero number, the GP5 will prompt you for each byte. A byte of 0 is a special case; it causes the GP5 to pause 75 ms before sending any more data. Note: if you press Enter when prompted for the preamble bytes, the GP5 will not ask you to change the individual bytes.

You can use any terminal program to configure the GP5. If you are using Windows Hyperterminal, you'll want to select the File |

Properties menu and then open the Settings tab. On this page you'll find an ASCII Setup button. Pushing this button will open a dialog box You should make sure the dialog you see matches this one:



In particular, you want to echo local characters and append line feeds to incoming line ends.

Tips

- A pin header or switch between ICSP-3 and ICSP4 will allow you to reset the X and Y count.
- You can use the GP5 with common serial LCD displays very easily. Just set the display for 9600 baud. For a 2x16 display, you can set both end characters to 0 (the inch and millimeter readings are exactly 16 characters wide). Alternately, you can set the device to only output inches or millimeters.
- If using a SEETRON G12032, try this preamble sequence: 0C, 00, 1B, 46, 42, 0E. This will turn on the backlight, select a large font, and clear the LCD. Also set the Line 1 End to 0D and the End Char to 00. You can see a picture of this display on the cover of this manual.
- If you show only inches or millimeters, bringing RB7 low will toggle the display between inches and millimeters. The change will not take effect until the next display update.

Schematic

