

APPLICATION NOTE

Wasp Data Logger Sample Application

Version 0.90

Introduction

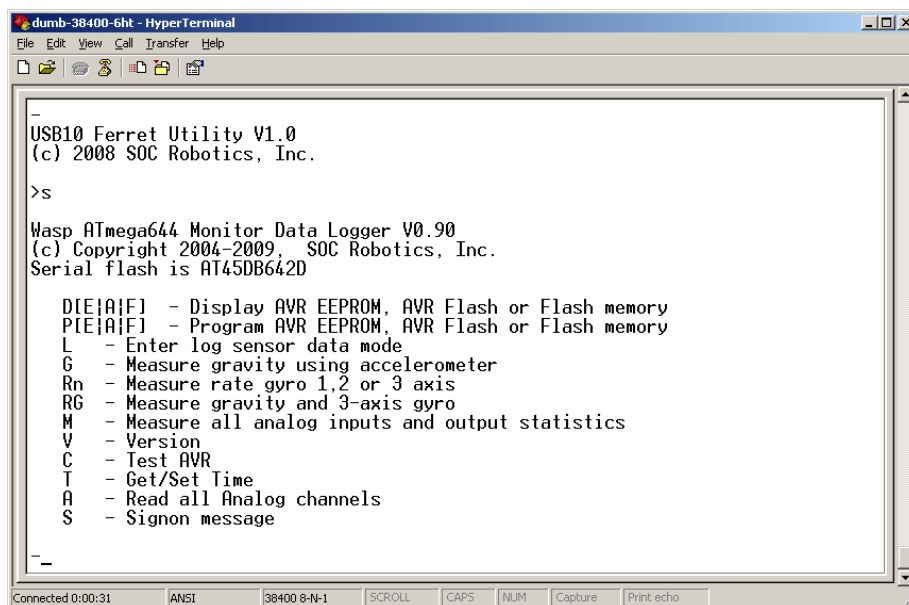
The Wasp data logger application is an embedded data logger that runs on an Atmega644 Wasp Embedded processor. The application allows the user to set log rate (samples per second) that are recorded to a small onboard Serial Flash. The Wasp can be shipped with a 3-axis accelerometer, 3-axis rate gyro (WS12/RG30 optional daughter card) and a digital compass (mounts to WS12). The default Serial Flash is 1Mx8 but an 8Mx8 version can be installed.

The data logger can be started using the console interface or by pressing a switch pulled high attached to data port pin PD2. The data logger erases any stored data in the serial flash before starting to log new data. The Wasp can be shipped with a coin cell option or attached to a USB10 USB 2.0 interface board. Configuration options are stored in on chip EEPROM. If standalone operation is required then the device can be configured using the USB10 interface with the PD2 pin armed.

A typical configuration is a Wasp attached to a USB10 that is in turn connected to a Windows PC. To setup the Wasp/USB10 download the myUSB package from the www.soc-robotics.com download page. Plug the Wasp/USB10 into the PC's USB port. You will be prompted for a driver that is located in the myUSB distribution under the USB10 project folder. Once installed the USB10 will be allocated a COM port (start control panel, select system and display hardware configuration). The USB10 should show up as a COMX port where X is the port id.

Example Session

Start Hyperterminal and set communications to 38,400,N,1 with no hardware flow control and the correct COM port selected. The USB10 will output a sign-on message. Type "s" return at the command prompt - this starts the Wasp Data Logging Application Monitor which outputs the menu below.

A screenshot of a HyperTerminal window titled 'dumb-38400-6ht - HyperTerminal'. The window shows the following text:

```
USB10 Ferret Utility V1.0
(c) 2008 SOC Robotics, Inc.

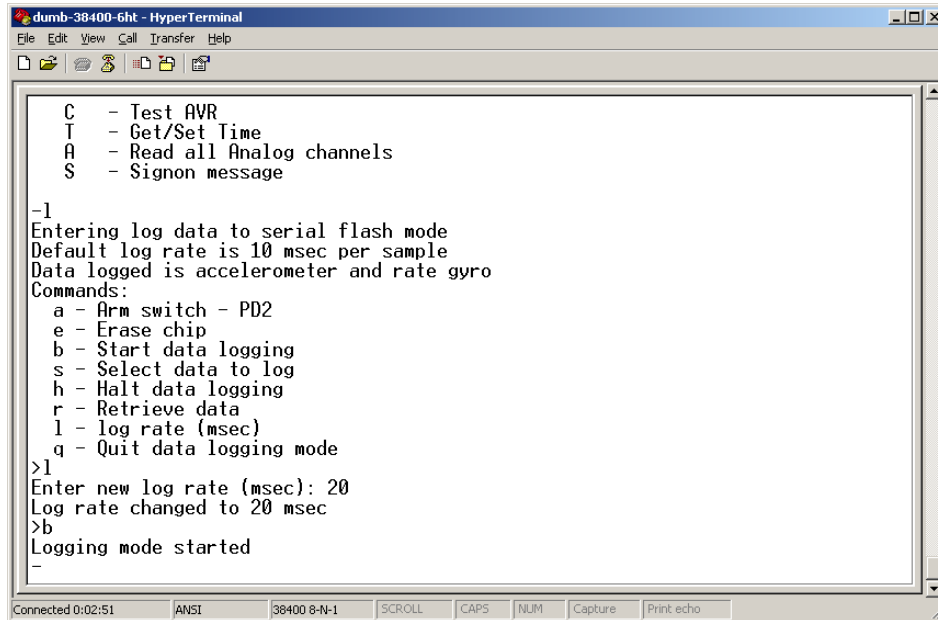
>s

Wasp ATmega644 Monitor Data Logger V0.90
(c) Copyright 2004-2009, SOC Robotics, Inc.
Serial flash is AT45DB642D

D[E|A|F] - Display AVR EEPROM, AVR Flash or Flash memory
P[E|A|F] - Program AVR EEPROM, AVR Flash or Flash memory
L - Enter log sensor data mode
G - Measure gravity using accelerometer
Rn - Measure rate gyro 1,2 or 3 axis
RG - Measure gravity and 3-axis gyro
M - Measure all analog inputs and output statistics
V - Version
C - Test AVR
T - Get/Set Time
A - Read all Analog channels
S - Signon message
```

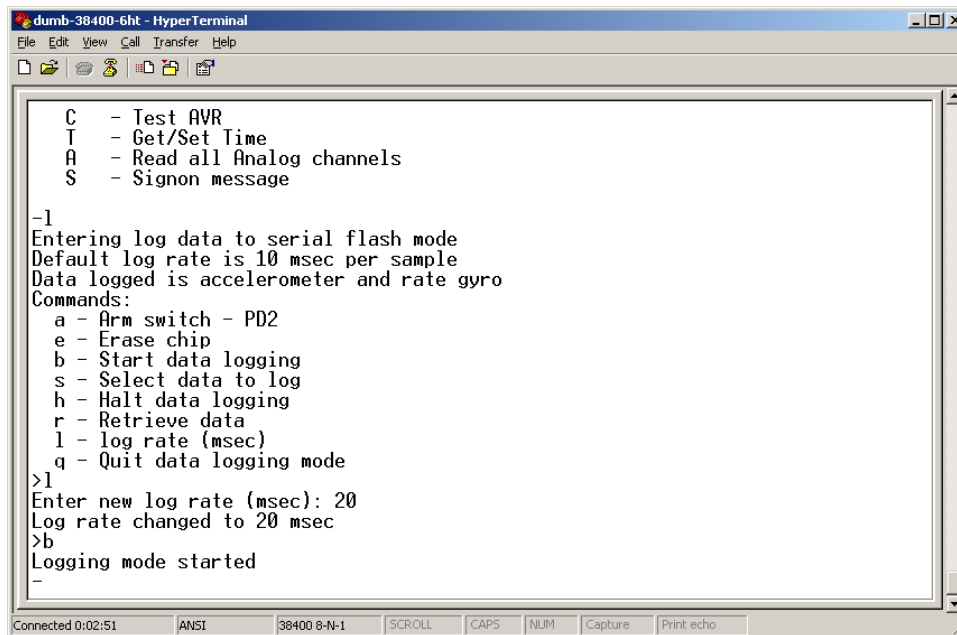
The status bar at the bottom of the window shows 'Connected 0:00:31', 'ANSI', '38400 8-N-1', 'SCROLL', 'CAPS', 'NUM', 'Capture', and 'Print echo'.

Now enter "l" return to enter the Logging Mode setup menu:



```
dumb-38400-6ht - HyperTerminal
File Edit View Call Transfer Help
C - Test AVR
T - Get/Set Time
A - Read all Analog channels
S - Signon message
-1
Entering log data to serial flash mode
Default log rate is 10 msec per sample
Data logged is accelerometer and rate gyro
Commands:
a - Arm switch - PD2
e - Erase chip
b - Start data logging
s - Select data to log
h - Halt data logging
r - Retrieve data
l - log rate (msec)
q - Quit data logging mode
>l
Enter new log rate (msec): 20
Log rate changed to 20 msec
>b
Logging mode started
-
```

You can change the logging rate from the default to another setting by typing the "l" command as shown above. Logging starts either by arming PD2 (if you have a start button with pull up attached to PD2) or by pressing the "s" command as show below. Once logging starts the applications checks that the serial flash is empty and erases it if not prior to starting to log.



```
dumb-38400-6ht - HyperTerminal
File Edit View Call Transfer Help
C - Test AVR
T - Get/Set Time
A - Read all Analog channels
S - Signon message
-1
Entering log data to serial flash mode
Default log rate is 10 msec per sample
Data logged is accelerometer and rate gyro
Commands:
a - Arm switch - PD2
e - Erase chip
b - Start data logging
s - Select data to log
h - Halt data logging
r - Retrieve data
l - log rate (msec)
q - Quit data logging mode
>l
Enter new log rate (msec): 20
Log rate changed to 20 msec
>b
Logging mode started
-
```

Once logging starts the application returns to the top level menu waiting for another command. To stop logging enter the log mode menu again and press "h" to halt logging.

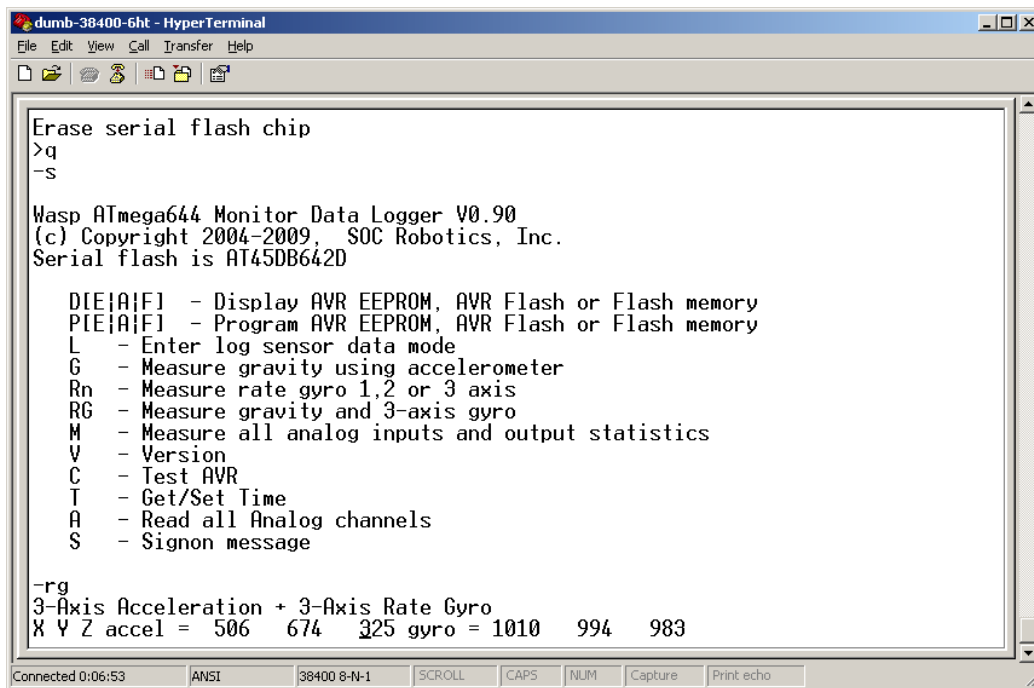
```
dumb-38400-6ht - HyperTerminal
File Edit View Call Transfer Help
r - Retrieve data
l - log rate (msec)
q - Quit data logging mode
>l
Enter new log rate (msec): 20
Log rate changed to 20 msec
>b
Logging mode started
-l
Entering log data to serial flash mode
Default log rate is 20 msec per sample
Data logged is accelerometer and rate gyro
Commands:
a - Arm switch - PD2
e - Erase chip
b - Start data logging
s - Select data to log
h - Halt data logging
r - Retrieve data
l - log rate (msec)
q - Quit data logging mode
>h
Logging mode halted
>
```

Logged data can now be output by selecting Retrieve Data using the “r” command. Note that logged data is streamed to the console. If you wish to store this data on the PC use the Hyperterminal Transfer menu to assign the retrieved data to a file on the PC.

```
dumb-38400-6ht - HyperTerminal
File Edit View Call Transfer Help
1323 0:0:2:52.728 511 679 344 974 903 897
1324 0:0:2:52.748 508 688 335 961 903 899
1325 0:0:2:52.768 512 684 344 963 903 899
1326 0:0:2:52.788 508 679 344 963 903 899
1327 0:0:2:52.808 511 679 335 974 903 897
1328 0:0:2:52.828 508 679 348 963 903 897
1329 0:0:2:52.848 504 688 344 963 903 897
1330 0:0:2:52.868 496 679 344 974 903 899
1331 0:0:2:52.888 504 679 344 974 903 899
1332 0:0:2:52.908 512 671 335 963 903 897
1333 0:0:2:52.928 512 671 327 961 903 897
1334 0:0:2:52.948 508 679 327 972 903 897
1335 0:0:2:52.968 504 679 344 974 903 899
1336 0:0:2:52.988 504 679 335 961 903 899
1337 0:0:2:53.008 504 671 344 963 903 897
1338 0:0:2:53.028 512 679 335 963 903 897
1339 0:0:2:53.048 508 671 352 974 903 897
1340 0:0:2:53.068 508 688 335 963 903 899
1341 0:0:2:53.088 504 688 344 963 903 899
1342 0:0:2:53.108 504 675 348 974 903 897
1343 0:0:2:53.128 508 679 344 963 903 897
1344 0:0:2:53.148 504 679 335 963 903 899
Finished processing pages
>
```

Retrieved data records are time stamped with the day, hour, minute, seconds and mseconds. The Wasp has a crystal controlled real time clock so the stored data is accurately time stamped. Analog data representing acceleration and rate gyro are stored as 10 bit binary data.

You can also display accelerometer and rate gyro information in real time by entering the “g”, “rn” or “rg” commands as shown in the example below.



```
Erase serial flash chip
>q
-s

Wasp ATmega644 Monitor Data Logger V0.90
(c) Copyright 2004-2009, SOC Robotics, Inc.
Serial flash is AT45DB642D

D[E|A|F] - Display AVR EEPROM, AVR Flash or Flash memory
P[E|A|F] - Program AVR EEPROM, AVR Flash or Flash memory
L - Enter log sensor data mode
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Rn - Measure rate gyro 1,2 or 3 axis
RG - Measure gravity and 3-axis gyro
M - Measure all analog inputs and output statistics
V - Version
C - Test AVR
T - Get/Set Time
A - Read all Analog channels
S - Signon message

-rg
3-Axis Acceleration + 3-Axis Rate Gyro
X Y Z accel = 506 674 325 gyro = 1010 994 983
```

Complete source code for this application is provided so it is possible to modify the application to suit your own particular needs.

A desktop application is also available to allow you to configure what is logged by the Wasp using a desktop application called the Data Acquisition Device (DAD). Logged data can be stored on the Wasp for later retrieval or returned in real time and graphically displayed. DAD is designed to work with the Wasp, WaspARM and SAM48.