

CyberSense

**CyQ 521**

**OPERATORS MANUAL**

Version 9.1

# SUPPORT

support@cyq.com

CyberSense Inc.  
1330 River Road Nicholasville, KY 40356-9649  
www.cyq.com  
800 942 9327  
Copyrights © 1996 -2004. All rights reserved

## **TABLE OF CONTENTS**

INSTALLATION.....-

4-

HYPER TERMINAL .....	-5-
How to Set up Windows Hyper Terminal	
Basic Data Acquisition System	
How to Install Hyper Terminal	
WinWedge to EXCEL Quick Start. ....	-
7-	
COMMANDS .....	-
8-	
Command Summary	
Acquire Commands	
Configure Commands	
Data Output Format Commands	
Utility Commands	
ERROR HANDLING .....	-15-
SERIAL HARDWARE INTERFACE .....	-16-
LEGAL STUFF .....	-17-

# INSTALLATION

Plug the wall transformer into a 115 vac outlet.  
 Plug the barrel connector into the back of the 521.

While viewing the front panel LED's turn on the power switch (red handle, up is on). The blue power light should come on followed by a one-half second flash from each of the four green LED's in order from channels 1 to 8. The yellow Tx LED should flash briefly.

Go to Hyper Terminal setup.

With Hyperterminal running:

Enter "g;" for go; you should see:

0.90161

0.90160

0.90160

.

.

.

.

0.90161

Typing a '?' and pressing the Enter key will cause a summary of the A/D settings to be printed.

# HYPER TERMINAL

(Included with MS Windows. Updates are on Cnet along with many similar programs such as Tera Term)

From windows

- 1). Click on programs
- 2). Click on Accessories
- 3). Select hyper terminal if available. If it does not appear on the list of accessory programs, then go to: How to install Hyper terminal.

## HOW TO SET UP WINDOWS HYPER TERMINAL FOR A COM PORT

- 1) In hyper terminal create a "**new connection**" this can be done by clicking the **Hyperterm.exe** icon or via the menu within HyperTerminal "**File:NewConnection**".
- 2) Type in a name for the connection (for example, cyq504).
- 3) Under "**connect using**" select "**Direct to Com 1**" if your available com port is com 1 otherwise select the appropriate com port. Modems are relentlessly selfish about interrupts. So if a modem is present then avoid the modem port and it's cousin. That is, if the modem is on com 1 then avoid both com 1 and 3. Com 1 and 3 share an interrupt while com 2 and 4 share a different interrupt; in this case avoid 2 and 4.
- 4) Set "**Bits per second**" to 9600.
- 5) Set "**Data Bits**" to 8.
- 6) Set "**Stop Bits**" to 1.
- 7) Set "**Flow control**" to None.
- 8) Click OK - the hyper terminal screen should appear.
- 9). Select **properties** from the menu bar.
- 8) Click on "**settings**", use default: **autodetect** and **back scroll 500 lines**.
- 9) For "**ASCII setup**" use
  - a). Sending - check: "**echo typed characters locally**" box. This lets you see the commands you type in. You may also issue the "ck;" command. This will cause the 504 to echo received characters (keystrokes).

b). Receiving - check: "**wrap long lines**".

10) Under "**File**" menu select "**Save As**" and save the configuration file to a convenient folder.

You can create a shortcut to the configuration file and put it on the desktop, this makes life a bit simpler. The configuration files have a naming convention of \*.ht where star is the name you chose when setting up the new connection. For example, "cyq504.ht".

Connect a serial cable from the DB-9 on the back of the 504 to the serial COM port that you intend to use.

Apply power: the word "CyQ504" will be sent by the 504. That is why the yellow Tx LED blinks on power up.

## **You now have a basic DATA ACQUISITION SYSTEM**

The transfer button on the hyper terminal menu bar will allow you to save received data to a file. You can put the CyQ5XX A/D in continuous acquire mode and the data will go to a file name that you select (default is programs/accessories/capture.txt). You can use scale factor settings to convert the output to your physical units. You can then import this file into a spreadsheet or whatever. A file extension of \*.csv will cause the file to open in **Microsoft Excel**. You can also direct the output to a line printer for hard copy.

*Notes:*

- 1. To change the baud rate DURING a session you must (after going through properties to change the rate) click the 'call' button then 'disconnect' and then 'connect'.*
- 2. The ANSI terminal option will display all ASCII characters including symbols for the unprintable ones.*

## **HOW TO INSTALL HYPER TERMINAL**

- 1). Click on **Control panel**
- 2). Click on **My Computer**
- 3). Click on **Install/Remove Programs**
- 4). Click on **Windows settings**
- 5). Click on **Communications**
- 6). Select **Hyper terminal** and click **apply** or OK at the bottom. You will be prompted for your Windows CDROM.
- 7). Done and out'ta there.

# WinWedge to Excel Quick Startup

## Goal: Two clicks to data into Excel

1. Install WinWedge
2. Place our CyQ floppy disk in a drive
3. Plug in wall transformer and turn the AD power on.

### EXCEL Operation Summary

1. Start Excel
2. Start WinWedge, and click  
File, Open "floppy:CYQ.SW3" where floppy is either A or B.
3. Click Activate  
Click Test  
You may need to Click on the Excel window to shift it into focus for keystrokes.

### How to get to the two click goal:

Clicking on any file with an SW3 extension (that is anyname.SW3) will start Winwedge with that configuration file). Therefore, you can drag an SW3 file to the screen for a shortcut. Then it is just click Excel, click the SW3 shortcut and you are up and running (don't forget to turn the power on).

So create a directory, copy CYQ.SW3 into the directory, create a shortcut to CYQ.SW3 and drag it onto the main window.

Done! Click Excel, then click the shortcut to CYQ.SW3.

### Windows Newbie Details:

1. Click on start - then programs - then Explorer.
2. Click on C: - then Files (left side of explorer menu bar) - click on New, and then Folder. Rename the folder from NEW FOLDER to CYQ (click on, right button, choose rename, and then change the name).
3. Copy CYQ.SW3 from the floppy to this directory using either drag or copy and paste.
4. Click on CYQ.SW3, right button click, choose create shortcut.
5. Click and Drag the shortcut to the main window.

# CyQ 521 COMMANDS

There are three kinds of commands. *Configure* commands are used to change parameters such as interval between conversions or number of points to average. *Acquire* commands cause or enable conversions to occur. *Utility* commands include memory, baud rate, and other housekeeping chores .

Typing ?; or ?<ENTER> will print out the current status.

All commands **MUST** end with either a semi-colon ';' or the ENTER key. The command is buffered, but not processed by the A/D until a ';' or '\r' is received. The backspace key may be used for corrections on screen.

Where possible the command format allows a value to be assigned with an '=' sign following the command code or for the feature to be turned on or off with a logical t, f (for true, false) character instead of the '=' sign. This allows setup values to be defined and preserved for future use. It allows the feature to be reactivated with a minimum of hassle. For example: "cmr = 60;" will set the rate to 60 samples per second, but it will not affect the current mode.

In the following N is an integer number; L is a logical true or false, and X is a hexadecimal number. A logical, L, may be T, t, 1 or ';' for true, or F, f, 0 for false.

## SUMMARY OF COMMANDS

a;        acquire  
s;        stop.  
g;        go

### *Configure*

cmr:        acquire mode rate  
cmp;        polled  
cmr=N;     Sampling rate in rate mode

### Mode

### Output

cofv;     Voltage format  
cofx;     Hexadecimal format  
cofb;     Binary format  
cop = N;   Set output prefix, 0 is none.  
con = N;   Set postfix: 0 = none, 1 is cr, 2 is lf, 3 is both cr lf.  
coiL;     Send index counter

### *Utility:*

e;        turn error light off.  
ck;       keystroke (Rx char) echo.  
cq;       Returns model number.  
cq@N;    Changes baud rate. N=3 is 9600, N=8 is 57600 ... see text  
?;        Transmit command summary and current settings.  
mss;     Memory save setup.  
mls;     Memory load saved setup.  
msd;     Memory save current setup as default.  
mpd;     Memory Purge default.  
\$@R      Restart. (case sensitive)

## ACQUIRE COMMANDS

1. Acquire: "a;". This assigns the channel numbers to be converted in either rate, timed or poll mode. In polled mode this will cause a poll to occur. In rate mode this command will allow conversions to begin. Modes are assigned in configure using "cmr;" or "cmp;" commands for rate or poll.

2. Stop: "s;" Stops conversions from occurring. If in rate mode or poll mode the acquire, 'a;' command will be ignored. CAUTION: Stop MUST be exited with a GO ("g;") command for the poll (or rate or timed) acquires to work. You will forget this, and frantically pound the keyboard, wondering why nothing is happening.

**3. Go: "g;" Allows poll and continuous commands to resume. If stop occurred while a continuous conversion was in effect then the continuous mode is resumed. The DEFAULT mode on power up is stop.**

# CONFIGURE COMMANDS:

Current configuration: “?” causes modes, rate, and other settings to be printed. This is helpful during the development phase to make sure that the command you thought you entered was the command you entered. It also serves as a Help file for the command mnemonics.

## Basic acquire mode commands

“cmr;” Configure acquire mode as rate. Sampling rate conversion..

“cmp;” configure acquire mode as polled. An a; command will cause channels NN... to be converted, and the results transmitted.

Rate in rate mode: “cmr=N;” where N ranges from 2 to 1000 samples per second. DEFAULT=10 samples per second. This command sets overall conversions per second.

## DATA OUTPUT FORMAT

All output begins with the special character all bits set, hexadecimal 0xFF, binary 1111 1111 (all 8 bits set to 1).

‘v’ volts output: “<0xFF>###.....” values are printed in volts with 0.00001 volt (10 uv) resolution. This is produced by a 32 bit IEEE floating point divide, and is at the accuracy limit for the mathematic. The numbers followed by a CR LF at the end, where CR is carriage return and LF is linefeed. In other words: no start separator followed by a floating point number, and ending with a carriage return and line feed. This is the standard spreadsheet format for Linux or windows (the CSV format). Makes nuts and bolts sense, especially if you are using the AD to actually measure a voltage instead of, say, a pressure related to voltage only as an intermediate scale factor.

‘x’ causes the output format to be in hexadecimal notation: <Prefix>number, 6 hexadecimal digits<CR LF>. In other words: start separator followed by a hexadecimal number, and ending with a carriage return line feed. Included for the comfort of programmers.

‘b’ binary output: “<0xFF>####.....” each channel value is represented by two ascii characters; many unprintable. The digits are concatenated without delimiters. There is no CR or LF at the end. This is a fixed length format. This allows much higher conversion speeds. Each character transmitted requires 10 bits. In voltage mode one channel requires at least 6 digits plus a final CR,LF; that’s 80 bits. In binary

mode only 3 digits plus a start character are used or 40 bits. Almost three times as fast. However, it is completely unreadable nonsense on a screen. For a computer a fixed length format with a start byte is quite easy to decode to an integer using either basic or c languages (wait for the start byte, shift left 8 next byte, add next byte, etc).

**“coiL; “** will cause the first number to be an index number. This number will increment by 1 for each transmission. 000 001 002 003,....255 and roll over to 000. This feature is helpful in reassuring you that there is no missing data due to the communication link.

Turning it off reduces the bandwidth requirement which is in the direction of goodness, that is, if it works correctly with the index then it is even more likely to work without it.

**“cop=N”** Sets the output prefix (the sync character that precedes data packet transmission) to ascii value N. For voltage, scaled, and integer the default is 0, no prefix. The prefix in binary format is 0xFF (255, all bits set )and cannot be changed. Examples: 07 will change the prefix to ASCII BEL, the computer will issue a beep; 42 will result in an \* asterisk preceding data; 61 will result in an = equals sign prefix. Put simply N = decimal position in the ASCII format table.

**“con=N”** Sets the output postfix for the current format (the carriage return, cr, and line feed, lf, characters that follow transmission). N=1 is carriage return, N=2 is line feed, N=3 is both cr and lf, N=0 is neither cr or lf. For voltage the default is cr lf.

# Utility commands

1. Baud rate: "cq@X;" where X ranges from 0 to A. Sets the transmit and receive baud rates for the A/D serial output. The DEFAULT rate at power up is 9600. There is always 1 start bit, 8 data bits, and 1 stop bit; there is no parity. The computer baud rate MUST be changed to match after this command is executed (in hyper terminal you must click properties, and then configure. Baud rate will not change until you click disconnect and then connect on the toolbar).

The values are: 1=2400, 2=4800, 3=9600, 4=14,400, 5=19,200, 6=28,800, 7=38,400, 8=57,600, 9=115,200, A=230,400.

2. Error reset: "e;" turns off the error LED.

3. Memory:

a. Save setup: "mss;"

Memory write setup .... stores the current setup including modes, channels, and configuration.

b. Read and load setup: "mls;", Memory load setup. Loads a saved setup if one is present.

c. "msd;" Memory save default. Stores the current setup (baud, mode, configuration)

as the power up default. Replaces (over writes) a previously stored default.

You

may wish to first test using the write and read saved setup commands,

However, should you accidentally save a setup that renders the AD inaccessible (high data rate, etc.) or a year has passed and you forgot the baud rate ... there is an out. The device *always* powers up at 9600 baud; it checks for and, if present, loads the stored default after the led's stop flashing (about 2 sec). During the time the led's are flashing pressing the escape (ESC) key will cause the module to skip the load stored default. It will come up with the original safe defaults shown in this manual.

d. "mpd;" Purge stored default:

Restores the power up defaults of the module to those shown in this manual.

e. "mld;" loads default settings.

4. "\$@R" will cause a power on restart (case sensitive - capital R).

5. **Echo received characters: "ck;" Keystroke echo. Incoming characters are transmitted back to the serial source sending the characters. "ck0;" stops echo.**

# ERROR Handling

If an error occurs then a line feed will be followed by one or more r 's followed by an error message. The error light will come on, and can only be turned off with an 'e;' command.

**cmd** Command buffer overflow. More than 16 characters were received before a command could be processed. Either a ';' was dropped, or there was noise, or a key is stuck on the keyboard.

**Rx** Receive buffer overflow. Too many commands were sent to fast. Usually happens when commands are being sent by a computer program. Place some wait(1 or more ms) statements in the code.

**Tx** Transmit buffer overflow. Everything was not transmitted before the next data was ready to be loaded for transmission. The buffer will go into a wait loop for about 1 ms to give the uart buffer time to clear; if this fails then this error will be set. Baud rate needs to be increased or the sampling rate decreased.

**Speed** Acquire rate is too high or baud rate is too low .

Other errors will result in the following:

The command will be printed up to the offending character, an underline '\_' will be printed, this will be followed by a letter where:

'?' means the last character was invalid

'L' a logical was expected: t,f,0,1.

'=' an equal sign was expected. (In some instances both an L and = error will occur.)

'N' a number was expected, or the number is out of range, e.g., a bad channel number.

'X' a hexadecimal number is out of range or the character is not a hexadecimal number.

For example:

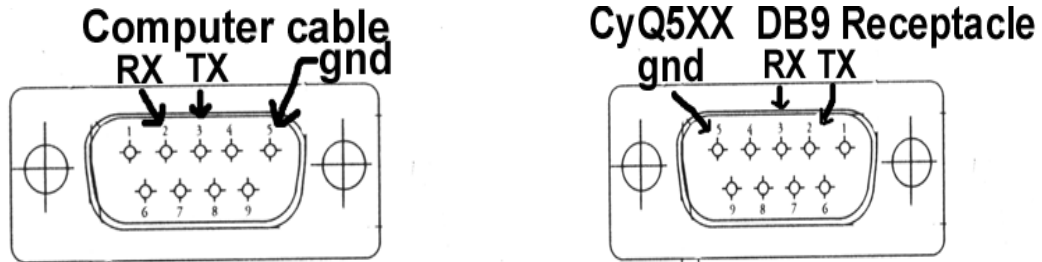
```
type cz;  
***cz_?
```

is the error message because 'z' is not a valid configure command character.

# SERIAL HARDWARE INTERFACE RS232C

This is a standard serial cable for DB9 interconnection. It is NOT a null modem cable. The crossover from transmit to receive is done at the receptacle on the A/D. The required condition is that transmit from the computer connects with receive at the peripheral (A/D) while transmit from the A/D connects to receive at the computer.

CyQ.....	CyQ5XX A/D
TX PI 3.....	Pin 3 RX
RX Pin 2.....	Pin 2 TX
GND Pin 5.....	Pin 5 GND



The interface is implemented with a MAX232A integrated circuit from Maxim Inc. It has been tested to 115.2 kb. The jackscrew standoffs are threaded into a captive nut; there is no hardware to come off inside the case. If the standoffs come loose, then simply remove and reinsert them. Do not over tighten or you will break them; then you really go a mess.

Note: The DB9 and DB25 connector pinouts are completely different. Specifically - pins 2 and 3 are switched for Tx and Rx.

# LEGAL STUFF

## *Limited Warranty*

CyberSense warrants to the original purchaser or end-user complete satisfaction for 90 days - money back or exchange; we pay shipping within USA. This product is warranted to be free from defects in material or workmanship for a period of five years. During this period the product will be replaced or repaired without charge for either parts or labor.

This warranty is voided if the product is modified, misused, or subjected to abnormal environments. This warranty is void if repairs are attempted or the case is opened for any reason without our permission. We will gladly assist with troubleshooting your setup by phone or email.

Fragile sensors such as force, pressure, temperature are excluded from this warranty, and are sold without warranty. You must test immediately upon receipt. We test immediately prior to shipping. If you use a sensor, then you broke it.

Purchase price refund including shipping (exception on shipping: international orders) for 90 days or repair and replacement for a period of 5 years (terms may vary internationally) are the **ONLY REMEDY** of the purchaser. This warranty is in lieu of all other warranties either express or implied; specifically, any warranties of implied merchantability or fitness for a particular use or purpose. CyberSense shall in no way be liable for indirect or consequential damages of ANY kind or nature.

Some jurisdictions do not allow exclusion or limitation of consequential or incidental damages, or how long implied warranties last; therefore, the above limitations may not apply to you. This warranty gives you specific legal rights. In some states you may have other rights.

Use in life support systems: **NO!** Not approved by any agency for diagnostic usage.

## *Trademarks*

CyQ is a trademark of CyberSense, Inc.; CyberSense, Inc. is a trade name. Any other trademarks, trade names, service marks, or service names owned or registered by any other company and used in this manual are the property of their respective companies.