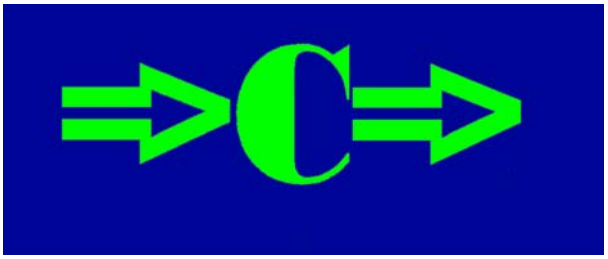
CyberSense



CyQ®703

OPERATORS MANUAL

Version 7.1

SUPPORT
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INSTALLATION

1. Test

A. Plug the wall transformer into a mains (115 USA / 240 EUR) vac outlet. Plug the barrel connector into the back of the 703. 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 eight green LED's in order from channels 1 to 8. The yellow Tx LED should flash briefly. This confirms that power and microcontroller function are good.

HYPER TERMINAL

(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

Most of the settings correspond to the defaults for a PC.

1) In hyper terminal create a "**new connection**" this can be done by clicking the **Hypertrm.exe** icon or via the menu within HyperTerminal "**File:NewConnection**".

2) Type in a name for the connection (for example, cyq).

3) Under "**connect using**" select "**Direct to Com 2**" if your available com port is com 2 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. On some versions of windows this may not work. A “ck;” command to the CyQ module will enable keystroke echo (received characters will be echoed) by the module.

b). Receiving - check: “**append line feeds**” and “**wrap long lines**”. The emits a carriage return (CR), but no line feed. This keeps data from being overwritten on the screen.

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, “cyq.ht”.

1. Connect a serial cable from the DB-9 on the back of the 701 to the serial COM port that you intend to use.

2. Apply power: the word “CyQ703” will be sent by the 703. That is why the yellow Tx LED blinks on power up.

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.

CyQ 703 COMMANDS

Introduction

Logic conventions:

Standard logic is used for the input and output voltages where less than 0.7 volts is treated as 0 (zero) or false and greater than 4.5 volts is true or 1.

A bit has a value of 1 or 0 corresponding to logical true or false states. The true or false states represent a contact condition in the 703, either closed (1 or true) or open (0 or false). In CyQ703 commands where a logical value, L, is needed true may be represented by either T or t ; false may be represented by F, f. The default is TRUE, that is, sending cr; is the same as sending crT;

Commands

Commands may be either upper or lower case characters. All commands **MUST end** with either a semi-colon '**;**' or \r (the ENTER key). The command is buffered, but not processed by the 703 until a ';' or '\r' (ENTER key) is received. The backspace key may be used for corrections.

For brevity we will use the following symbols for values in commands:
L is a logical value where TRUE is ; or T or t or 1, and FALSE is F or f or 0 .
X is a hexadecimal number.
N is an integer number.

Summary of commands

Basic:

wNL; Write L to channel N.
wXX; write to all channels.
rN; read channel N, transmits NL.
r; read all channels, transmits XX (in read on change transmits XX,XX).
s; stop means no reads and no writes for the channels; you will stop it, forget this, and later think that it has died when it will not respond.
g; go.

Configure:

cmr=XX; configure read enable mask; default is FF, all channels are inputs.
cmw=XX; configure write enable mask; DEFAULT is 00, NO channels are OUTPUTS.

crL; configure read on change either on or off.
crh r L; configure read on low-to-high either on or off for all channels.
crl r L; configure read on high-to-low either on or off for all channels.
crlNL; configure read on change high-to-low for channel N either on or off.
crhNL; configure read on change low-to-high for channel N either on or off.

clL; configure local write from lookup table control on or off.
clmr=XX; configure lookup table read AND mask to value XX.
clmw=XX; configure lookup table write enable mask to value XX.
clXX=XX; configure lookup table input entry XX to cause output value XX.

ctNL; timing for channel N output (monostable output mode) on or off;
ctN=N; Set time for output on for channel N (1-8) to N (0-60,000) ms.

Utility:

e; turn error light off
?; status (command summary and current values).
ckL; configure keystroke (received character) echo on or off.
cq@X; configure baud rate to value X (0 to A).
cq?; will cause “cyq(Version)” to be transmitted.
; or \r will cause cr lf to be transmitted.
mss; memory save setup, causes current configuration to be saved.
mls; memory load setup, loads the saved setup configuration.
msd; memory save as default, saves the current configuration as the power up default.
mpd; purges the power up default settings.

NOTE: on power up, while the lights are flashing, pressing the Esc key ONCE will cause our original safe configuration to be loaded. Do NOT hold down the Esc key.

$@R (case sensitive) will cause the module to restart (reset).

Basic Commands

Write output command: w

Single channel write commands

"wNL;" Single channel output control examples: The letter w followed by an output channel number between 1 and 4, followed by either true or false. That is wN1; or wN0 where N is a channel number between 1 and 4. wN; defaults to true.

"w1t;" or "w1;" Causes the output for channel 1 to go high (the left first two pins on the lower row of the connector); output 1 LED will light).

"w1f;" or "w10;" Causes the for channel 1 to go low; output 1 LED will go off).

"w2T;" or w2; Causes the relay contacts to close for channel 2 (the first two pins on the lower row of the connector will be shorted; output 2 LED will light).

"w2F;" Causes the relay contacts to open for channel 2 (the first two pins on the lower row of the connector will be open or infinite resistance; output 2 LED will go off).

Byte wide output write examples:

"wXX;" where XX is a hexadecimal number corresponding to the 8 bit output. In hexadecimal format the hexadecimal character (8 bit) is translated to the 4 bit binary representation of the hexadecimal digit. The channels are in bit order: bit 0 corresponds to channel 1, bit 1 corresponds to channel 2 .....

In hex format a string of binary digits (ones and zeros, 0 is off and 1 on), such as 1101, are numbered from 0 for the least significant bit ascending to the left. For 1101: Bit 0 is 1, bit 1 is 0, bit 2 is 1, and bit 4 is 1. In binary the bits are numbered in order of increasing significance. The right most bit is the least significant (bit 0) while the left most (bit 7) is the most significant. This is the same as money; in price $427 the least significant digit is the 7, and the most significant digit is 4. The channels are bit mapped accordingly: channel 1 corresponds to bit 0, channel 2 is bit 1, channel 3 is bit 2, and channel 4 is bit 3.

"w17;" Outputs 1,2,3 and 5 will go high. The binary representation of hexadecimal digit 1 is 0001, and for 7 is 0111.

"w0A;" Hexadecimal digit A is binary 1010, so this is 0000 1010, therefore, outputs 1 and 3 are low, two and four are high.

The following table may be helpful:

HEX	binary	Channel 4 Channel 8	Channel 3 7	Channel 2 6	Channel 1 5
0	0000	low	low	low	low
1	0001	low	low	low	high
2	0010	low	low	high	low
3	0011	low	low	high	high
4	0100	low	high	low	low
5	0101	low	high	low	high
6	0110	low	high	high	low
7	0111	low	high	high	high
8	1000	high	low	low	low
9	1001	high	low	low	high
A	1010	high	low	high	low
B	1011	high	low	high	high
C	1100	high	high	low	low
D	1101	high	high	low	high
E	1110	high	high	high	low
F	1111	high	high	high	high

Read Channel Command: “rN;” or “r;”

Read Examples:

a. Single channel input detection.

“r1;” If Pin 2 on input channel 1 (the leftmost two pins on the upper row of the connector) is low a “10" will be sent. If input 1 is high, then an r1; command causes the string “11” to be transmitted. Channel 1 panel LED on the input (top) row will be ON if input 1 is high.

“r4;” If input channel 4 (the last two pins on the upper row) is low a “40" will be sent. If input 4 (PIN 8) is high (PIN 7), then the either the hex string ”41" is transmitted. Channel 4 LED on the input (top) row will be on if input 4 is high.

The channel value is sent because the serial inputs and outputs are asynchronous The lag between computer command and computer response to an input from the 703 is unknown. Without the channel number it is quite easy to lose track of the relationship between outgoing commands and incoming data.

b. Byte wide read
“r;”

A byte is transmitted with bits 0 through 7 containing the logic state of **input** channels 1 through 8. The resulting byte is an integer number that the computer converts to hexadecimal character format for transmission. Thus, the reception of 0b means that input channels 1 , 2 , and 4 are high while 3, 5, 6, 7, and 8 are low.

Configure commands

These configure commands set up when and how reads are writes are done.

Masks

The purpose of the read and write masks is to define the input and output channels for serial input commands. These are enable masks where 1 is enabled and 0 is disabled in an 8 bit number with bits 0 through 7 corresponding the channels 1 through 8.

“cmr=XX;” Sets the read enable mask to XX. Prevents outputs from being read and left in a tristate condition because they have been converted to inputs buy the read operation. Default is FF, all channels are inputs.

“cmw=XX;” Sets the write enable mask to XX. Prevents inputs from being written to in a byte wide write; thereby preventing damage to whatever is connected to the input. Default is 00, no channels are outputs. This is the safest power up condition since we have no way of knowing what channels you intend to use for inputs and outputs.

Debounce

“cdN;” Configure debounce value. N is an integer number from 0 to 250. It is the time in tenth of a millisecond that the input is allowed to settle after a change is detected. When all inputs are stable the inputs are read and transmitted.

Read on Change

“crL;” If L is either ‘;’ or true (T or t) then read on change is activated. A change on an input will cause an all channel read per the configuration described below. The initial change will be detected; after a delay equal to the debounce time the contacts will be read again. If the change is still present, then the read will be transmitted. If L is false (F, f, 0) then read on change will be deactivated.

“cr(state)NL; where state is either ‘l’ for low or ‘h’ for high. The channel number is ‘N’, and L is ;,T, t ,1 for true(on) or F, f, 0 for false(off). Activates read on change for channel N on high to low, and low to high edges. Default is all channels and both changes.

crl1t; Read when channel 1 goes low, goes from high to low.
crl1f; Disable read when channel one goes low.
crh2t; Enable read when channel two goes high, goes from low to high.
crl1; Enable read when channel goes one high, goes from high to low.

To completely disable read on change for channel 1 enter:
‘crl1f;’ and ‘crh1f;’ to turn off both edges.
To Enable all channels for read on high to low enter:
crl r ; or crl r L; where L is t orT.
To Disable all channels for read on low to high enter:
‘crh r f;’ or ‘crh r F;'

When read on change is enabled, a read will result in 4 hexadecimal characters; the first two digits will be a map of the channel(s) that changed (followed by a comma ‘,’), and the second two digits will be the current (new) values of the 8 channels.

Local Lookup Table Write Control

"clL;" Enable local write control. The outputs are determined from the inputs by a look up table stored in memory. The look up table is programmable, and is saved by the memory save command. In this mode the 703 will control the outputs without the need for serial communication with a computer; it becomes a stand alone device. Handy way to create SPDT, DPDT, SP4T switches and other logic such as 6 input or's.
"cl;" or "clt;" : enables local lookup table control.
"clf;" : disables local LUT control.

Set Read and Write Masks for look up table write control

"clmrXX;" sets the read mask (a logical AND mask, this is not an enable mask) to hexadecimal XX (default is 0xFF, 1111 1111, use all as inputs). For example:

"clmr0E;" corresponds to 0000 1111 and channels 5,6,7,8 inputs are forced to zero when looking up the input in the lookup table.
"clmrF7;" corresponds to 1111 0111 and channel 4 input is forced to zero.
This command reduces the number of entries needed in the look up table. More importantly, it allows for an arbitrary distribution of inputs and outputs among the 8 channels. It also allows inputs to be used for other purposes than lookup table control.

"clmwXX;" sets the write enable mask. A zero bit value blocks an individual output from being written to. Allows channels to be used for inputs or other purposes. For example:
"clmwF7;" will block channel 4 (1111 0111) from being written to from the look up table.

Load Write Lookup Table

"clXX=XX;" write table, loads lookup table location left XX with right XX. The first hexadecimal character pair XX is the input state. The second XX pair is the output state that is produced. For example:

"cl09=F0" will cause the upper four channels to go high and the lower four to go low when channels 3 and 4 high and channels 1,2 and 5,6,7,8 are low.
In binary 0000 1100 -> 1111 0000.

Timing (Monostable output)

"ctNL;" timing for channel N output on or off; Activates monostable operation for output channel N. The output will remain True for a programmable time interval and then return to false.

"ctN=N;" Set time for output on (True) for channel N (1-4) to N (0-60,000) ms.

Utility Commands

Utility commands perform general functions unrelated to reading and writing the input channels.

Status

"?;" Provides (sends to terminal) a summary of commands with current values.

Scroll

";" or Enter causes a cr lf to be transmitted (echoed). Allows the cursor to be bumped down to a blank line in hyperterminal.

Echo

"ck;" Activates echo received character.

Memory

"mss;" : Save setup. The present status is written to nonvolatile memory. This includes configure commands and baud rate. Useful for testing before saving as default. Allows multiple configuration settings to be switched on the fly with one command.

"mls; Loads the saved setup.

"msd;" Save default. Saves the current configuration as the power up default.

"mpd;" Purges the saved power up default. The module will boot as originally shipped.

Error LED

Reset Command: "**e;**" turns off the error LED.

Baud rate

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

The values are: 0=1200, 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.

RESTART

"$@R" will cause the module to do a power up reset. This command is CASE Sensitive, $@r will not work.

VERSION

You found me' command: "cq?;" Causes "cyqVERSION" to be transmitted. Used by our software to find and identify our stuff on serial ports.

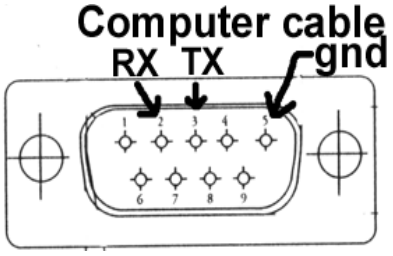
SERIAL HARDWARE INTERFACE

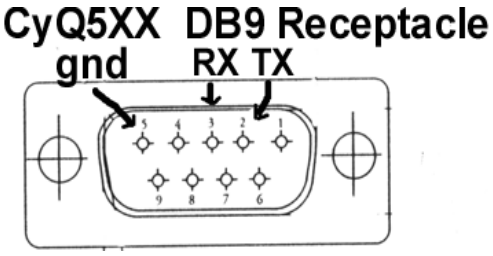
RS232C

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 Host.....CyQXXX Module

TX PI 3.....Pin 3 RX
RX Pin 2.....Pin 2 TX
GND Pin 5.....Pin 5 GND



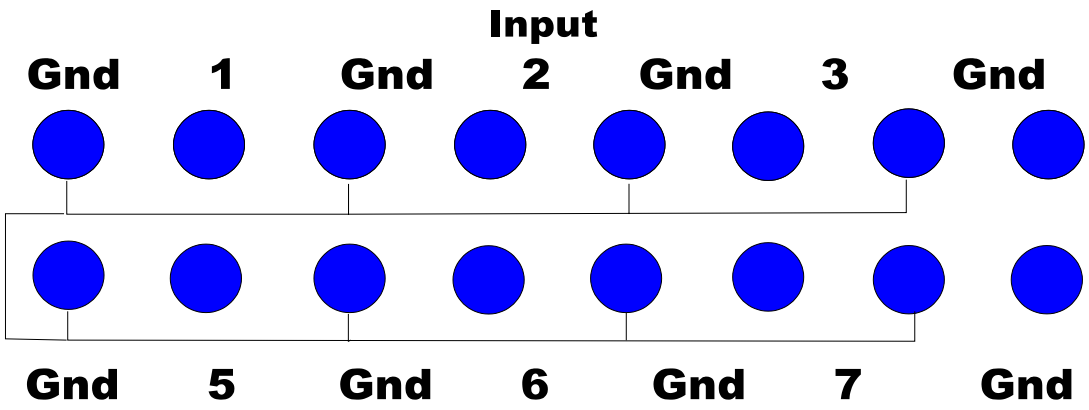


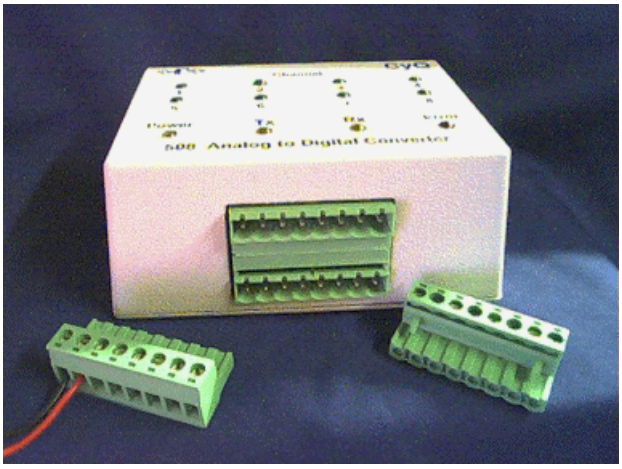
The interface is implemented with a MAX232A integrated circuit from Maxim Inc. It has been tested to 115.2 kb on a 6 foot cable. (9600 baud at 24 feet)

There is no hardware (washer/nut) inside the case for the jackscrews on the DB9 receptacle. If the post comes loose, then simply remove, and reinstall it. Do not over tighten.

INPUTS/OUTPUTS

SIGNAL





Inputs and outputs are HCMOS 5 Volt Specs.

POWER

A 7.5 to 12 vdc unregulated wall transformer with 300 ma or more current capability will work. This is a 2.1 mm barrel connector. Center positive. The red handle power switch is directly above. Up is on and down is off. This power input is diode protected against reverse polarity. It is varistor protected above 18 volts. Further protection is provided by a 500 ma self resettable fuse in series with varistor.

Error Codes

1. Receive buffer overrun. Too many instructions were sent too fast. Generally seen when a computer is issuing instructions. Insert a wait or delay instruction in your program.

2. Transmit buffer overrun. Too many messages being sent from the module. May be caused by switch changes occurring too rapidly when in read on change mode. Increase the baud rate.

3. Command buffer overflow. The command exceeds 10 characters in length. May be due to a stuck key on the keyboard or failing to use ';' or cr to end commands.

4. Read command buffer overflow. Commands may arrive while another is waiting on debounce to complete. These are buffered. Too many reads were received during debounce or debounce time is set too long.

Actions by CyQXXX due to overflows: An error message is sent. The buffer is flushed and all pointers are set to zero.

10. Unrecognized top level command. The first letter of the command is invalid.
11. Expecting a channel number.
12. Write command length is wrong.
13. A logical value is expected T,F or t,f or ;
14. Expecting an 'r' or 'w' in look up table write command.
15. Debounce number is too big.
16. Configure command is unrecognizable.
17. In read on change a or t,f was expected.
18. Configure - format hasn't heard of this format.
19. A hexadecimal character was expected.
20. Baud rate code is invalid.

31. Memory write command, what to write is wrong.
32. Attempt to load a saved setup when no setup has been saved.
33. Memory command is unknown; what to do, the second character.

703 SPECIFICATIONS

- Outputs: HCMOS 10 ma.
- Input: HCMOS.
- Serial communications RS232, connector: standard DB9 female. TX, RX, Gnd.
- Contact Interface connector: Phoenix Contact MDSTB2,5/G1-5.08 (1762431); Two removable wire connect plugs. Phoenix Contact MSTB2.5/8-ST-5.08
- Pins on contact interface connector UL/CSA rated Nominal 300 v/10 amp, surge 4 kv.
- **Power supply:** 7.5 to 12 vdc unregulated wall transformer, 300 ma, 2.1 mm barrel connector. **Dropout is 7 volts.**
- **Power input:** reverse polarity diode protected, 500 ma self resetting fuse, surge protected above 18 vdc to 600 amps.
- **Power supply current : 120 ma MAX**
- **Size**: width 4 in.(10 cm), depth 3 in.(7.6 cm), height 2.0 in. (5 cm).
- **Weight**: 7.7 oz (218 g)**.**
- **Material**: ABS plastic case, textured gray, 4.49 X 3.25 inches (11.2X8.3 cm).

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, subjected to abnormal environments (examples: submergence in water or harsh chemicals, ovens, etc) or conditions (vaporized, parts, circuit board, etc due to application of mains to a signal input, etc). This warranty is void if the case is opened for any reason without contacting us. Specifically - if you attempt repairs then, at our discretion, you abandon this warranty and all benefits of this warranty. We will gladly assist with trouble shooting your setup by phone or email.

Fragile sensors such as force, low pressure, and 30 gauge thermocouples are excluded from this warranty, and are sold without warranty. You must test immediately upon receipt. We test immediately prior to shipping. You will know it is a fragile sensor because it will be packed with a picture of a broken wine glass and a trash can.

Purchase price refund including shipping (exception on shipping: international orders) for 90 days (30 days international) or repair and replacement for a period of 5 years (3 year international) 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!

Trademarks

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