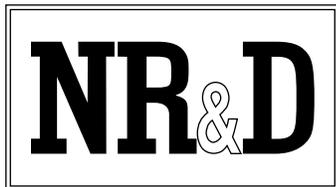


QUCM CCM

Installation and Programming Manual

This Manual describes the QUCM application for interfacing CATERPILLAR CCM devices to a POWERLOGIC system.

Effective: 15 December, 2005



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Introduction

The Niobrara QUCM is a TSX Quantum[®] compatible module that is capable of running multiple applications for performing communication translations between serial protocols. This document covers an application that places CATERPILLAR EMCP II Genset data through a CCM on a Square D POWERLOGIC[®] network as Modbus/TCP compatible devices. This setup allows existing Siemens equipment to be integrated into the POWERLOGIC System Manager Software system via Modbus/TCP Ethernet.

Two applications are required to be loaded into the QUCM: app1.qcm is the CCM serial driver and Modbus/TCP server, app2.qcm is the web server used for configuration and data display. Both of these applications must be running for the system to properly perform.

Port 1 (and optionally Port 2) of the QUCM is to be connected with an RS-232 cable to a Customer Communication Module (CCM). The CCM provides an ASCII serial interface to up to 8 Generators. The QUCM will support up to 16 total generators with a CCM on each of its ports. These devices are accessed via Modbus/TCP by selecting the Destination Index assigned to each slave (1-16).

Port 2 may be configured as a combination PNIM/Modbus RTU master to support a string of PowerLogic and/or Modbus RTU slaves. Up to 32 slaves may be attached to the QUCM. They must be assigned unique drop numbers between 1 and 32. These devices are accessed by Modbus/TCP Destination Indices 101 through 132.

A Modicon two (or more) slot Quantum rack and appropriate Quantum power supply is needed for mounting the QUCM.

The SMS server is connected to the QUCM via Modbus/TCP Ethernet. The QUCM-OE will support up to 6 simultaneous Modbus/TCP clients for access to the CCM data and PowerLogic/Modbus data.

Installation

Module Installation

- 1 Mount the QUCM in an available slot in the register rack. Secure the screw at the bottom of the module.

Software Installation

The application files for the QUCM are included in the CCM.ZIP file. This file must be unzipped using PKUNZIP.EXE. A copy of PKUNZIP is included on the standard NR&D software disk and is also available at www.niobrara.com. The latest version of the CCM.ZIP file is located at

<http://www.niobrara.com/ftp/qucm/cat/cat.zip>

The latest version of this document in pdf format is located at:

<http://www.niobrara.com/ftp/qucm/cat/caterpillar.pdf>

Serial Connections to the QUCM-S

Port 1 to CCM

Port 1 of the QUCM-OE is RS-232 so a simple cable is required to connect to the CCM. Use the Niobrara MM16 cable to connect the QUCM-OE to the CCM (See Figure 2-1).

Configure the CCM for 9600 baud, 8 data bits, 1 stop bit, NO parity. Refer to the CCM Owner's Manual (SEBU6874-03) for complete instructions for configuring the CCM and connecting it to the generators.

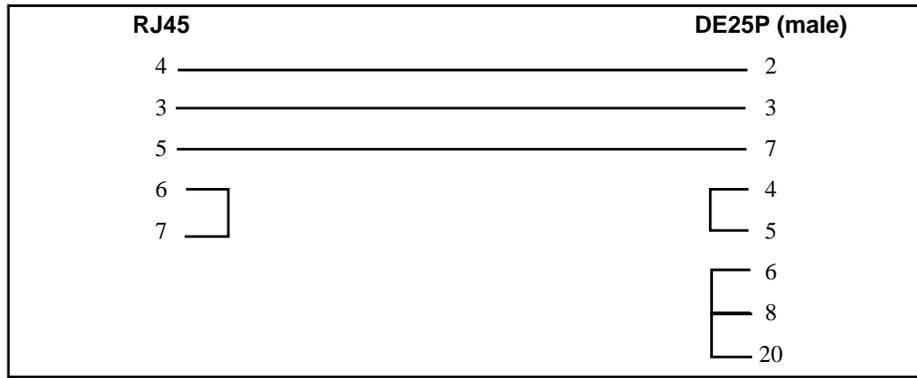


Figure 2-1 QUCM-OE to RS-232 CCM Port (25-pin) (MM16 Cable)

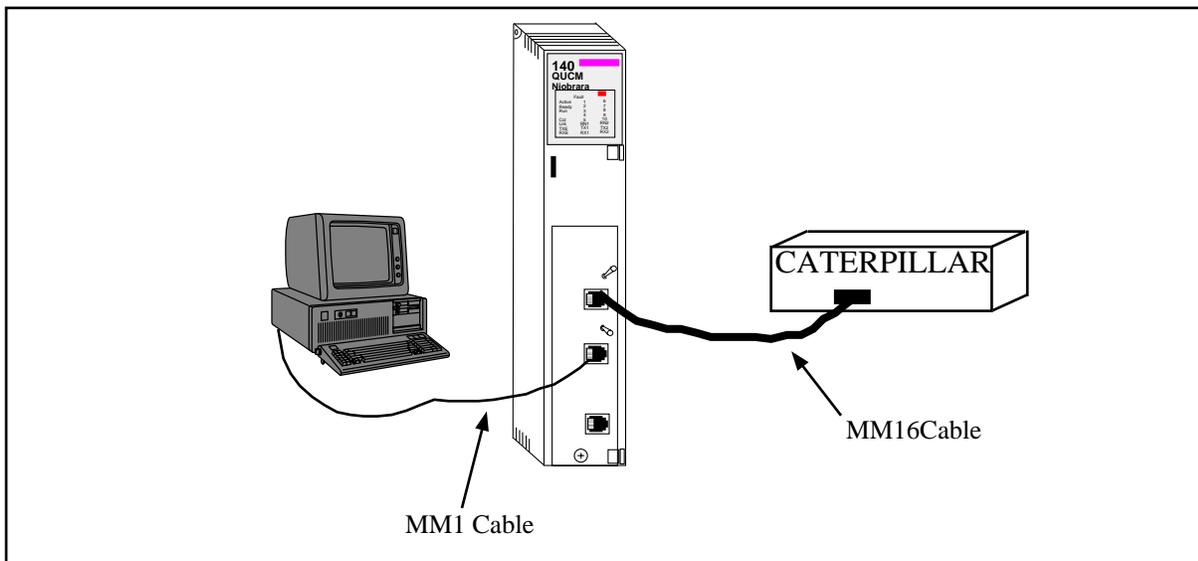


Figure 2-2 QUCM-OE Layout

Port 2 to the Personal Computer

A physical connection must be made from the personal computer to the QUCM in order to download the applications. This link may be a serial connection from a COM port on the personal computer to the RS-232 port on the QUCM-S. The Niobrara MM1 cable may be used for this connection. This cable is shown in Figure 2-3.

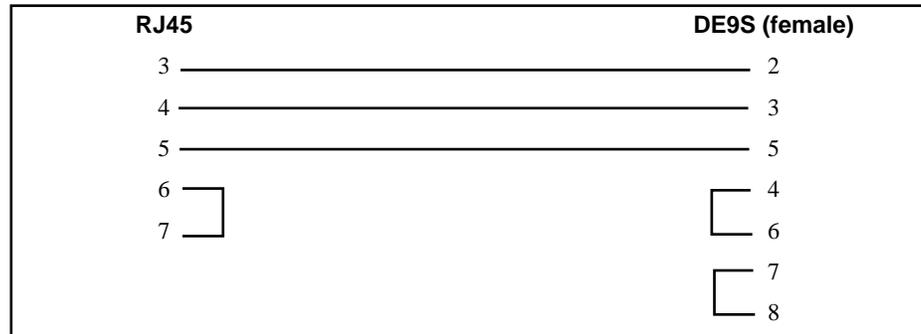


Figure 2-3 QUCM-OE to RS-232 PC DCE Port (9-pin) (MM1 Cable)

Loading the Applications into the QUCM

The QUCM is rapidly evolving so be sure to upgrade the firmware in the module before loading the latest version of APP1.QCC. Most likely the QCOMPILE.EXE has been updated so be sure to use the newest version. Firmware upload is as follows:

- 1 Remove the module from the rack.
- 2 Move the RUN/LOAD switch on the back of the module to LOAD.
- 3 Replace the module in the rack and apply power.
- 4 Only the 3 light should be on. (The Link and RX E-net lights may be on if the E-net port is connected and there is traffic.)
- 5 Connect the PC to QUCM Port 1 with a MM1 cable.
- 6 From the command line enter


```
> fwload qucmtcp.fwl com1:
```

 Be sure to have the colon after the PC's com port name. The download will only take a few minutes and will inform when finished.
- 7 Remove the module from the rack and change the switch back to RUN.
- 8 It is a good idea to press the RESET button after a firmware change.

It is recommended to use the Ethernet capabilities of QLOAD to load APP1.QCC and APP2.QCC into the QUCM. Set up the IP parameters of the module by the following method:

- 1 Move Switch 1 to Halt.
- 2 Connect the PC to QUCM Port 1 with a MM1 cable.
- 3 From the command line enter

```
>zapreg32 com1:9600,e,8,1 255 -b
```

This will start zapreg32 in Modbus RTU mode to slave address 255. Use the arrow and Page Up/Down keys to move to register 46. The IP parameters are shown below for a unit with the IP = 206.223.51.150 subnet Mask = 255.255.255.0, Default Gate = 206.223.51.1, Modbus/TCP port number = 503, Telnet Port number = 24:

Register	Description Example (decimal)
----------	-------------------------------

```

-----
46      IP MSByte 206
47      IP      223
48      IP      51
49      IP LSByte 150
50      SN Mask 255
51      SN Mask 255
52      SN Mask 255
53      SN Mask 0
54      Def. Gate 206
55      Def. Gate 223
56      Def. Gate 51
57      Def. Gate 1
58      TCP Control 7 (leave this at 7)
59      Reserved 0
60      Reserved 0
61      Reserved 0
62      TCP backstep 100 (leave this at 100)
63      Modbus Port 503 (this defaults to 502)
64      Telnet Port 24 (this defaults to 23)
65      Quiet Timer 900 (leave this at 900)
66      Clients -1 (leave this at -1)

```

- 4 After entering the IP parameters, attempt to ping the module to verify the settings.
 > ping 206.223.51.150
- 5 Verify a connection to the internal Modbus/TCP server with zapreg32.
 > zapreg32 206.223.51.150:503 255
 Should connect to the QUCM on port 503 with Destination index 255.
- 6 Load the APP1 file with qload.
 > qload 1 app1 206.223.51.150:503 -a
 Will load the file into application 1's flash and set the program to automatically start on power-up.
- 7 Load the APP2 file with qload.
 > qload 2 app2 206.223.51.150:503 -a
 Will load the file into application 2's flash and set the program to automatically start on power-up.
- 8 Place Switch 1 in RUN. The RN1 light should come on and light 1 will probably blink rapidly.
- 9 Place Switch 2 in RUN. The RN2 light should come on.

Configure the application by connecting a web browser to the IP address of the QUCM-OE

EMCP II Device Register List

The data from the EMCP II device is presented as Modbus Holding Registers (4x). Modbus function codes 03 and 100 for reading. At the present time writes are not supported.

Most data is presented as signed 16-bit integers. Values with two holding registers are 32-bit integers where the first register is bits 0-15 and the second register is bits 16-31.

Power Factor is stored in standard POWERLOGIC format with an implied 3 decimal places and the sign bit signaling the leading/lagging.

Table 2-1 EMCP II Register List (GSC+)

Modbus/TCP Register	Description	Notes	PID	FID Type
1	CCM Device Type	1 = EMCP II (GSC+)		
2	EMCP II Address	x58 through x5F for 1 through 8		
3	Remaining Cooldown Time	0 - 65535 Seconds	\$F4 \$6D	3
4	Voltage A-B	0 - 65503 Volts RMS	\$F4 \$42	3
5	Voltage B-C	0 - 65503 Volts RMS	\$F4 \$43	3
6	Voltage C-A	0 - 65503 Volts RMS	\$F4 \$44	3
7	Voltage A-N	0 - 65503 Volts RMS	\$F4 \$45	3
8	Voltage B-N	0 - 65503 Volts RMS	\$F4 \$46	3
9	Voltage C-N	0 - 65503 Volts RMS	\$F4 \$47	3
10	Average Voltage	0 - 65503 Volts RMS	\$F4 \$C3	3
11	Current A	0 - 65503 Amps RMS	\$F4 \$48	3
12	Current B	0 - 65503 Amps RMS	\$F4 \$49	3
13	Current C	0 - 65503 Amps RMS	\$F4 \$50	3
14	Total Current	0 - 65503 Amps RMS	\$F4 \$C4	3
15	Frequency	Times 10 (0 - 6550.3) Hz	\$F4 \$4B	3
16	% of Rated Power Output	Times 10 (-3273.6% to 3276.7%)	\$F4 \$C7	2
17	Power Factor A	Standard POWERLOGIC Format	\$F4 \$C8	N/A
18	Power Factor B	Standard POWERLOGIC Format	\$F4 \$C9	N/A
19	Power Factor C	Standard POWERLOGIC Format	\$F4 \$CA	N/A
20	Average Power Factor	Standard POWERLOGIC Format	\$F4 \$CB	N/A
21,22	Real Power A	-2147483616 to +2147483647 Watts	\$FC \$11	4
23,24	Real Power B	-2147483616 to +2147483647 Watts	\$FC \$12	4
25,26	Real Power C	-2147483616 to +2147483647 Watts	\$FC \$13	4
27,28	Total Real Power	-2147483616 to +2147483647 Watts	\$FC \$0F	4
29,30	Reactive Power A	-2147483616 to +2147483647 VAR	\$FC \$14	4
31,32	Reactive Power B	-2147483616 to +2147483647 VAR	\$FC \$15	4
33,34	Reactive Power C	-2147483616 to +2147483647 VAR	\$FC \$16	4
35,36	Total Reactive Power	-2147483616 to +2147483647 VAR	\$FC \$17	4
37,38	Apparent Power A	-2147483616 to +2147483647 VA	\$FC \$18	4
39,40	Apparent Power B	-2147483616 to +2147483647 VA	\$FC \$19	4
41,42	Apparent Power C	-2147483616 to +2147483647 VA	\$FC \$1A	4
43,44	Total Apparent Power	-2147483616 to +2147483647 VA	\$FC \$1B	4
45,46	KW-Hours	0 to 4294967263 kW-hrs	\$FC \$1C	5
47,48	kVAR-Hours	0 to 4294967263 kVAR-hrs	\$FC \$1D	5
49	Engine Coolant Temperature	-32726 to 32767 Degrees C	\$00 \$44	2
50	Engine Oil Pressure	0-16383.5 kPa (0.5 kPa per bit)	\$00 \$54	3
51	Engine Hourmeter	0 to 65535 Hours	\$00 \$5E	3
52	Relay Status	See Table 2-2	\$F4 \$4C	N/A
53	Alarm Status	See Table 2-4	\$F4 \$60	N/A
54	Shutdown Status	See Table 2-5	\$F4 \$61	N/A

Table 2-2 ECMPII (GSC+) Register List Cont.

Modbus/TCP Register	Discription	Notes	PID	FID Type
55	Genset Battery Voltage	0.0 to 127.5 V (.0.5 Volts DC per bit)	\$F0 \$13	1
56	Genset Engine RPM	0 to 16383.5 RPM (0.5 rpm per bit)	\$00 \$40	2
57	Genset Oil Temperature	-32736 to 32767 Degrees C	\$F5 \$3E	2
58	Genset Right Exhaust Temperature	-32736 to 32767 Degrees C	\$F4 \$40	2
59	Genset Left Exhaust Temperature	-32736 to 32767 Degrees C	\$F4 \$41	2
60	Engine Oil Pressure	PSI (1 psi Units)	Calculated	
61	Engine Coolant Temperature	Degrees F (1 deg. F units)	Calculated	
62	Battery Voltage	VDC (1 Vdc units)	Calculated	
63	Engine RPM	RPM (1 rpm units)	Calculated	
64	Generator Oil Temperature	Degrees F (1 deg. F units)	Calculated	
65	Right Exhaust Temperature	Degrees F (1 deg. F units)	Calculated	
66	Left Exhaust Temperature	Degrees F (1 deg. F units)	Calculated	
67	Average L-L Voltage	Volts AC	Calculated	
68	Total Real Power	KW	Calculated	
69	Total Reactive Power	KVAR	Calculated	
70	Total Apparent Power	KVA	Calculated	
71	Real Power A	KW	Calculated	
72	Real Power B	KW	Calculated	
73	Real Power C	KW	Calculated	
74	Apparent Power A	KVA	Calculated	
75	Apparent Power B	KVA	Calculated	
76	Apparent Power C	KVA	Calculated	
77	Reactive Power A	KVAR	Calculated	
78	Reactive Power B	KVAR	Calculated	
79	Reactive Power C	KVAR	Calculated	
80	CTS Fail Count Statistic			
81	Timeout Count Statistic			
82	Good Read Type 1			
83	Good Read Type 2			
84	Good Read Type 3			
85	Good Read Type 4			
86	Good Read Type 5			
87	Good Write Type 0			
88	Good Write Type 1			
89	Good Write Type 2			
90	Good Write Type 3			
91	Good Write Type 4			
92	Good Write Type 5			
93	Transmit Retry Counter			
94	Pointer to last timeout PID			

Table 2-3 EMCP II Register List (GSC)

Modbus/TCP Register	Description	Notes	PID	FID
1	CCM Device Type	3 = EMCP II (GSC)		
2	EMCP II Address	x58 through x5F for 1 through 8		
3	Remaining Cooldown Time	0 - 65535 Seconds	\$F4 \$6D	3
4	Voltage A-B	0 - 65503 Volts RMS	\$F4 \$64	3
5	Voltage B-C	0 - 65503 Volts RMS	\$F4 \$64	3
6	Voltage C-A	0 - 65503 Volts RMS	\$F4 \$64	3
11	Current A	0 - 65503 Amps RMS	\$F4 \$65	3
12	Current B	0 - 65503 Amps RMS	\$F4 \$65	3
13	Current C	0 - 65503 Amps RMS	\$F4 \$65	3
15	Frequency	Times 10 (0 - 6550.3) Hz	\$F4 \$4B	3
49	Engine Coolant Temperature	-32726 to 32767 Degrees C	\$00 \$44	2
50	Engine Oil Pressure	0-16383.5 kPa (0.5 kPa per bit)	\$00 \$54	3
51	Engine Hourmeter	0 to 65535 Hours	\$00 \$5E	3
52	Relay Status	See Table 2-2	\$F4 \$4C	N/A
53	Alarm Status	See Table 2-4	\$F4 \$60	N/A
54	Shutdown Status	See Table 2-5	\$F4 \$61	N/A
55	Genset Battery Voltage	0.0 to 127.5 V (.05 Volts DC per bit)	\$F0 \$13	1
56	Genset Engine RPM	0 to 16383.5 RPM (0.5 rpm per bit)	\$00 \$40	2
60	Engine Oil Pressure	PSI (1 psi Units)	Calculated	
61	Engine Coolant Temperature	Degrees F (1 deg. F units)	Calculated	
62	Battery Voltage	VDC (1 Vdc units)	Calculated	
63	Engine RPM	RPM (1 rpm units)	Calculated	
80	CTS Fail Count Statistic			
81	Timeout Count Statistic			
82	Good Read Type 1			
83	Good Read Type 2			
84	Good Read Type 3			
85	Good Read Type 4			
86	Good Read Type 5			
87	Good Write Type 0			
88	Good Write Type 1			
89	Good Write Type 2			
90	Good Write Type 3			
91	Good Write Type 4			
92	Good Write Type 5			
93	Transmit Retry Counter			
94	Pointer to last timeout PID			

Relay Status Bit Map

Bits	Discription
15,14	Electronic Governor Relay
13,12	Program Spare Relay
11,10	Run Relay
9,8	Genset Fault Relay
7,6	Starter Motor Relay
5,4	Crank Terminate Relay
3,2	Fuel Control Relay
1,0	Air Shutoff Relay

For Each Group of Relay Status Bits:

00 = Off/de-energized

01 = On/energized

11 = Relay not installed

Table 2-4 Alarm Status Bit Map

Bits	Discription
15,14	Undefined
13,12	Undefined
11,10	Engine Control Alarm
9,8	High Oil Temperature
7,6	Engine Control Switch not in "Auto" or "Manual"
5,4	Low Oil Pressure
3,2	Low Coolant Temperature
1,0	High Coolant Temperature

For Each Group of Alarm Status Bits:

00 = Alarm is OFF

01 = Alarm is ON

10 = Undefined

11 = Not available, or not installed

Table 2-5 Shutdown Status Bit Map

Bits	Discription
15,14	Overspeed
13,12	Overcrank
11,10	Low Oil Pressure
9,8	High Coolant Temperature
7,6	Spare Fault
5,4	Emergency Stop
3,2	Coolant Loss
1,0	Diagnostic Code

For Each Group of Shutdown Status Bits:

00 = Shutdown inactive

01 = Shutdown Active

10 = Undefined

11 = Not available, or not installed

3500B Engine Device Register List

The data from the 3500B Engine device is presented as Modbus Holding Registers (4x). Modbus function codes 03 and 100 for reading. At the present time writes are not supported.

Most data is presented as signed 16-bit integers. Values with two holding registers are 32-bit integers where the first register is bits 0-15 and the second register is bits 16-31.

Table 2-6 3500B Engine Register List

Modbus/TCP Register	Description	Notes	PID	FID Type
1	CCM Device Type	2 =3500B Engine		
2	EMCP II Address	x58 through x5F for 1 through 8		
3	Cooldown Time Remaining	0-65535 seconds	\$F4 \$6D	N/A
4	Engine RPM	0 to 16383.5 rpm (0.5 rpm/bit)	\$00 \$40	2
5	Engine Coolant Temperature	-32736 to 32767 deg. C	\$00 \$44	2
6	Filtered Engine Oil Press. (gauge)	0 to 16383.5 kPa (0.5 kPa/bit)	\$00 \$53	2
7	Atmospheric Pressure	0 to 16383.5 kPa (0.5 kPa/bit)	\$00 \$54	2
8	Boost Pressure (gauge)	0 to 16383.5 kPa (0.5 kPa/bit)	\$00 \$55	2
9	Air Filter Restriction	0 to 16383.5 kPa (0.5 kPa/bit)	\$00 \$58	2
10	Left Turbo Inlet Pressure (abs)	0 to 16383.5 kPa (0.5 kPa/bit)	\$00 \$5C	2
11	Genset Hourmeter	0 to 65535 hours	\$00 \$5E	N/A
12	Right Turbo Inlet Pressure (abs)	0 to 16383.5 kPa (0.5 kPa/bit)	\$00 \$5F	2
13,14	Total Fuel	0 to 268435456 gal (0.125 gal/bit)	\$00 \$C8	N/A
15	System Battery Voltage	0 to 127.5 volts (0.5 volt/bit)	\$F0 \$13	N/A
16	Engine Coolant Level Status	\$00 = OK, \$7F = LOW	\$F0 \$2C	1
17	Engine Control Switch Position	\$00=OFF, \$02=Start, \$03=Stop \$04=Auto	\$F0 \$8F	0
18*	Shutdown Notify Relay Status	\$00=Relay Off, \$01=Relay ON	\$F0 \$9C	1
19	Overspeed Switch	\$00=OFF, \$01-\$07 = ON	\$F0 \$A6	0
20*	Air Shutoff Status	\$00=OFF, \$01-\$07 = ON	\$F0 \$AA	0
21	Remote Emergency Stop	\$00=OFF, \$01-\$07 = ON	\$F0 \$B1	0
22	Engine Fuel Level Status	\$00=OK, \$01=LOW	\$F0 \$B6	1
23	Percent Engine Load	0 to 255% (1% / bit)	\$F1 \$18	N/A
24	Remote Start Initiate	\$00 = Start, \$7F = Stop	\$F2 \$13	N/A
25	Oil Pressure Differential	0 to 32751.5kPa (0.5 kPa/bit)	\$F4 \$0E	3
26	Fuel Pressure Differential	0 to 32751.5kPa (0.5 kPa/bit)	\$F4 \$1C	3
27	Aftercoolant Temp.	-32736 to 32767 deg. C	\$F4 \$20	2
28	Right Exhaust Temp.	-32736 to 32767 deg. C	\$F4 \$40	2
29	Left Exhaust Temp.	-32736 to 32767 deg. C	\$F4 \$41	2
30	Crankcase Air Pressure (gauge)	-3273.6 to 3276.7 kPa (0.1 kPa/bit)	\$F5 \$09	2
31	Filtered Fuel Pressure (gauge)	0 to 32751.5kPa (0.5 kPa/bit)	\$F5 \$0F	1
32	Intake Manifold Air Temp.	-32736 to 32767 deg. C	\$F5 \$11	2
33	Right Air Filter Restriction	0 to 6550.3kPa (0.1kPa/bit)	\$F5 \$1F	3
34	Left Air Filter Restriction	0 to 6550.3kPa (0.1kPa/bit)	\$F5 \$20	3
35	Fuel Consumption Rate	0.00 to 3275.15 liter/hr (0.05liter/hr)	\$F5 \$25	3
36	Engine Oil Temperature	-32736 to 32767 deg. C	\$F5 \$3E	2
37,38	Alarm Status	See Table 2-9	\$FC \$07	N/A
39,40	Shutdown Status	See Table 2-10	\$FC \$08	N/A

Table 2-7 3500B Register List Continued

Modbus/TCP Register	Description	Notes
41	Engine RPM	times 10
42	Engine Coolant Temp	Deg. F
43	Atmospheric Pressure	times 10 psi
44	Filtered Engine Oil Pressure (gauge)	times 10 psi
45	Boost Pressure (gauge)	times 10 psi
46	Air Filter Restriction	times 10 psi
47	Left Turbo Inlet Pressure (abs)	times 10 psi
48	Genset Hourmeter	0 to 65535 hours
49	Right Turbo Inlet Pressure (abs)	times 10 psi
50,51	Total Fuel Used	0 to 268435456 gal (0.125 gal/bit)
52	System Battery Voltage	times 10 Volts
53	Engine Coolant Level Status	\$00 = OK, \$7F = LOW
54	Engine Control Switch Position	\$00=OFF, \$02=Start, \$03=Stop \$04=Auto
55	Shutdown Notify Relay Status	\$00=Relay Off, \$01=Relay ON
56	Overspeed Switch	\$00=OFF, \$01-\$07 = ON
57	Air Shutoff Status	\$00=OFF, \$01-\$07 = ON
58	Remote Emergency Stop	\$00=OFF, \$01-\$07 = ON
59	Engine Fuel Level Status	\$00=OK, \$01=LOW
60	Percent Engine Load	0 to 255% (1% / bit)
61	Remote Start Initiate	\$00 = Start, \$7F = Stop
62	Oil Pressure Differential	times 10 psi
63	Fuel Pressure Differential	times 10 psi
64	Aftercoolant Temp	deg. F
65	Right Exhaust Temp	deg. F
66	Left Exhaust Temp	deg. F
67	Crankcase Air Pressure (Gauge)	times 10 psi
68	Filtered Fuel Pressure (Gauge)	times 10 psi
69	Intake Manifold Air Temp	deg. F
70	Right Air Filter Restriction	times 10 psi
71	Left Air Filter Restriction	times 10 psi
72	Fuel Consumption Rate	times 10 gal/hr
73	Engine Oil Temperature	deg. F
74,75	Alarm Status	See Table 2-9
76,77	Shutdown Status	See Table 2-10

Table 2-8 3500B Register List (Continued)

Modbus/TCP Register	Description	Notes	PID	FID
80	CTS Fail Count Statistic			
81	Timeout Count Statistic			
82	Good Read Type 1			
83	Good Read Type 2			
84	Good Read Type 3			
85	Good Read Type 4			
86	Good Read Type 5			
87	Good Write Type 0			
88	Good Write Type 1			
89	Good Write Type 2			
90	Good Write Type 3			
91	Good Write Type 4			
92	Good Write Type 5			
93	Transmit Retry Counter			
94	Pointer to last timeout PID			
101,102	Total Fuel	(0.1 gal per bit)	\$00 \$C8	

Table 2-9 3500B Alarm Status

Bits	Description
24-31	Not Used
23	High Transmission oil temp.
22	Low Transmission oil temp.
16-21	Not Used
15	Oil Filter Plugged
14	Fuel Filter Plugged
13	High crankcase pressure
12	High Aftercooler coolant temp.
8-11	Not Used
7	Low System Voltage
6	Low Engine Oil Pressure
5	High Engine Coolant Temp.
4	Low Engine Coolant Temp.
3	Engine Overspeed
2	Air Filter Plugged
1	Not Used
0	High exhaust Temperature

Table 2-10 3500B Shutdown Status

Bits	Discription
14-31	Not Used
13	High crankcase pressure
12	High Aftercooler coolant temp
7-11	Not Used
6	Low engine oil pressure
5	High engine coolant temp.
4	Not Used
3	Engine Overspeed
0-2	Not Used

Fault Identifiers (FID)

The Fault Identifiers are sorted into six types from signed byte, unsigned byte, signed word, unsigned word, signed long, and unsigned long.

Table 2-11 Fault Identifiers

FID	Signed Byte (Type 0)	Unsigned Byte (Type 1)	Signed Word (Type 2)	Unsigned Word (Type 3)	Signed Long (Type 4)	Unsigned Long (Type 5)	Fault Description
0-1	\$80 - \$81	\$E0 - \$E1	\$8000 - \$8001	\$FFE0 - \$FFE1	\$80000000 - \$80000001	\$FFFFFFE0 - \$FFFFFFE1	Not Used
2	\$82	\$E2	\$8002	\$FFE2	\$80000002	\$FFFFFFE2	Data erratic, intermittent, or incorrect
3	\$83	\$E3	\$8003	\$FFE3	\$80000003	\$FFFFFFE3	Shorted high or open circuit
4	\$84	\$E4	\$8004	\$FFE4	\$80000004	\$FFFFFFE4	Shorted low
5	\$85	\$E5	\$8005	\$FFE5	\$80000005	\$FFFFFFE5	Open Circuit or current below normal
6	\$86	\$E6	\$8006	\$FFE6	\$80000006	\$FFFFFFE6	Current above normal or grounded circuit
7	\$87	\$E7	\$8007	\$FFE7	\$80000007	\$FFFFFFE7	Not used
8	\$88	\$E8	\$8008	\$FFE8	\$80000008	\$FFFFFFE8	Abnormal frequency, pulse width, or period
9	\$89	\$E9	\$8009	\$FFE9	\$80000009	\$FFFFFFE9	Abnormal update
10	\$8A	\$EA	\$800A	\$FEEA	\$8000000A	\$FFFFFFEA	Not used
11	\$8B	\$EB	\$800B	\$FEEB	\$8000000B	\$FFFFFFEB	Failure mode not identified
12	\$8C	\$EC	\$800C	\$FEFC	\$8000000C	\$FFFFFFEC	Bad device or component
13-15	\$8D - \$8F	\$ED - \$EF	\$800D - \$800F	\$FFED - \$FFEF	\$8000000D - \$8000000F	\$FFFFFFED - \$FFFFFFEF	Not used
16	\$90	\$F0	\$8010	\$FFF0	\$80000010	\$FFFFFFF0	Parameter not available
17	\$91	\$F1	\$8011	\$FFF1	\$80000011	\$FFFFFFF1	Module not responding
18	\$92	\$F2	\$8012	\$FFF2	\$80000012	\$FFFFFFF2	Sensor supply fault
19-31	\$93 - \$9F	\$F3 - \$FF	\$8013 - \$801F	\$FFF3 - \$FFFF	\$80000013 - \$8000001F	\$FFFFFFF3 - \$FFFFFFF7	Not used

Main Page

The Main page displays a summary of the configured Caterpillar devices. The table will display the Modbus/TCP Destination Index, QUCM Port, Device Type, Genset slave address, and Device Status. If a device is not responding to queries from the QUCM then the Status table entry will have a gray background and display the text "Offline". If the device is responding to queries then the cell will display "Online". The Online message is a hypertext link that will display the "Actual" data for that device.

Figure 3-1 shows an example page with Port 1 set for CCM Slave mode with two ECMP II Generators online.

At the bottom of the Main page are links to Niobrara's WWW site, Statistics on this QUCM, and a page for configuring this QUCM.

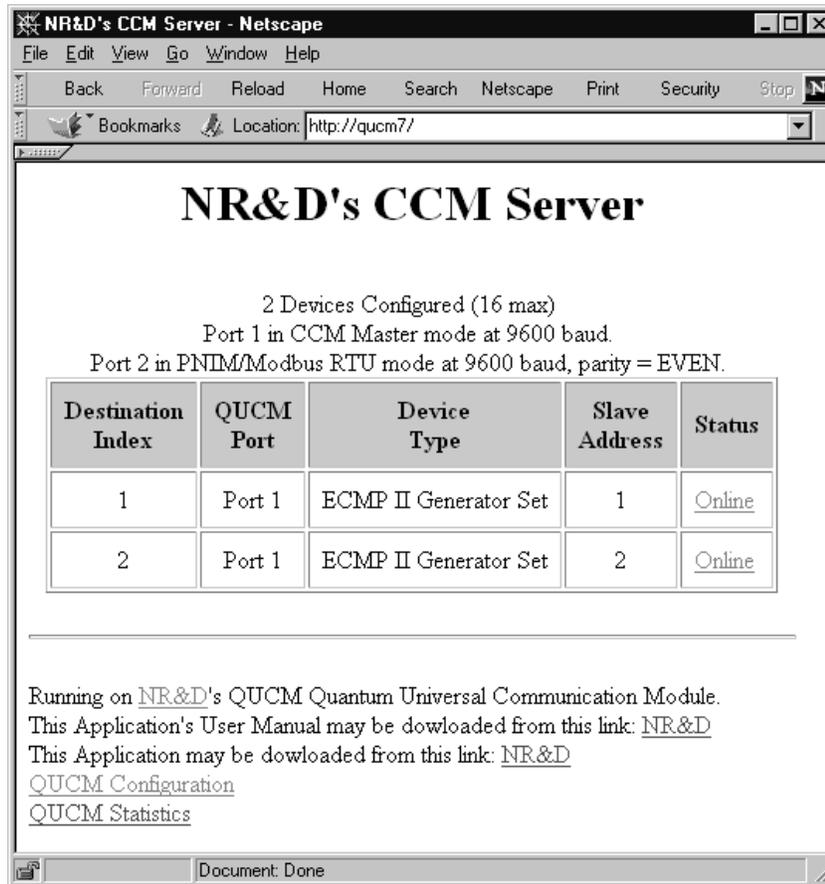


Figure 3-1 Main Web Page

Actual Data Page

Following one of the "Online" links will display a table of the metered data for the particular CCM device. Figure 3-2 shows a table for a ECMP II Genset.

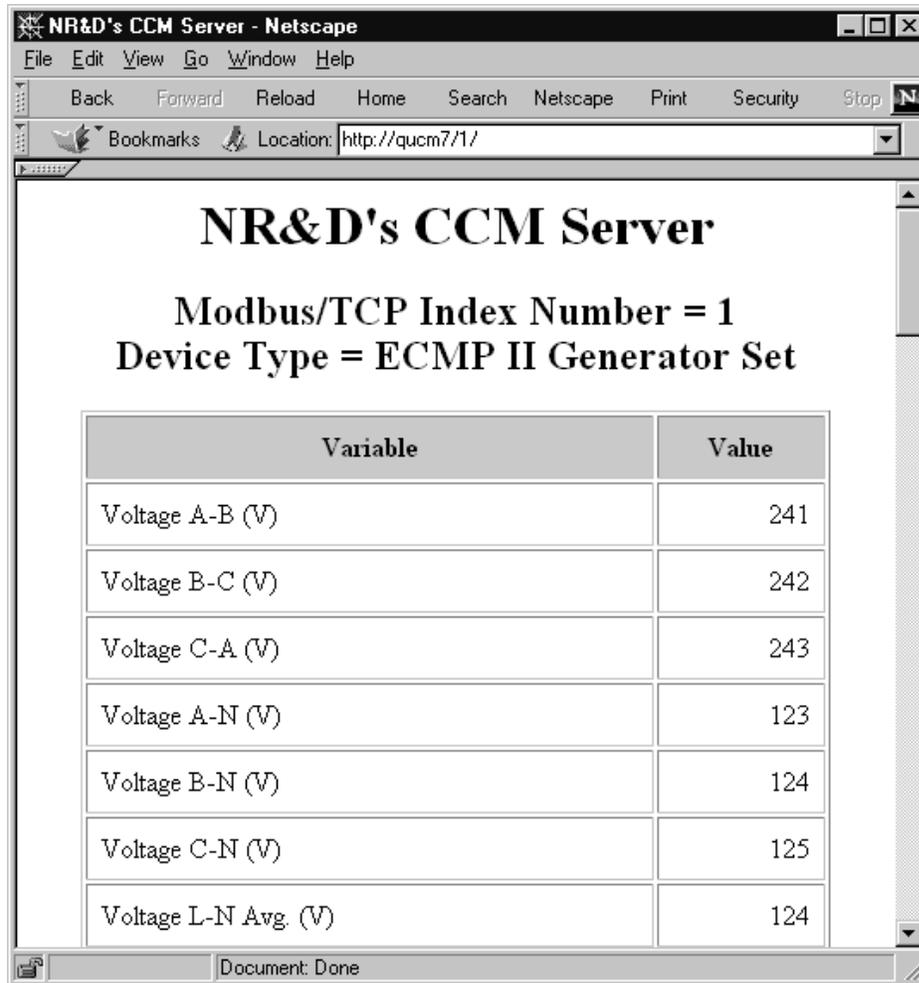


Figure 3-2 Web Server Actual Data Page

Configure QUCM

At the bottom of the Main page is a link to configure the QUCM. The password may need to be entered before access to this page is granted. The default password is "master" and is case sensitive. Light 9 will come on while the password timer is active.

A link is provided for altering the password. The current password must be verified before the new password is edited. The new password must be entered twice for verification. If it has been longer than three minutes since a password protected setting has been altered then the user will be prompted to enter the password.

NOTE: This password protection is not very secure and is only intended to prevent accidental modification to the QUCM configuration. The user should implement other more stringent protection such as firewalls and isolated networks to ensure the safety of the metered system.

NOTE: Once a password has been accepted by the QUCM, any connection is allowed to modify settings until the timer expires; not just the user who entered the password.

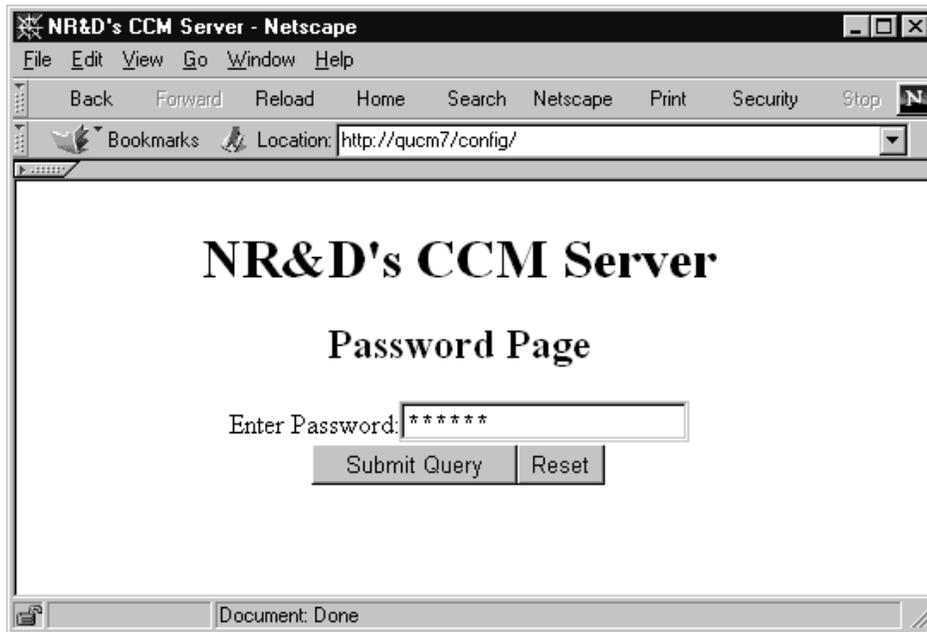


Figure 3-3 Enter Password Page

Each CCM device configured is shown with a link to edit the device parameters or remove the device. Links below are given to add a new device, alter the serial port configuration, change the password, and save the configuration to FLASH.

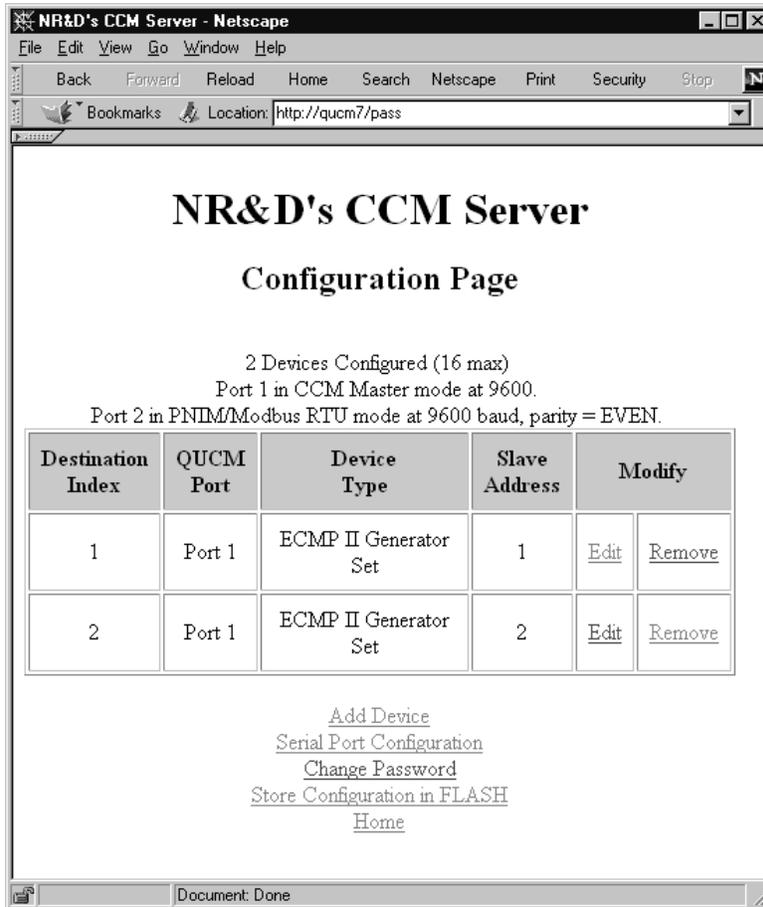


Figure 3-4 Configuration Page

Add Device

The Add Device link is used to add a new CCM device to the list. A screen like Figure is displayed. There is a pull-down menu item for the Modbus/TCP Destination Index. This menu will only display unused values.

There is a pull down field for the QUCM port number. Port 2 must be in CCM Master mode or the devices configured for Port 2 will not actually be polled.

There is a pull down field for the Device Type.

There is a text field for the CCM Slave Address. Addresses must be unique for a given QUCM port. Only slaves 1 through 8 are supported on each port.

There is a check box for "In Service". Clearing this check box keeps the device in the QUCM's configuration but prohibits the QUCM from actually polling it. This may be desirable if a particular device is to be powered off for extended periods of time because the QUCM will not waste bandwidth trying to poll a device that is not present.

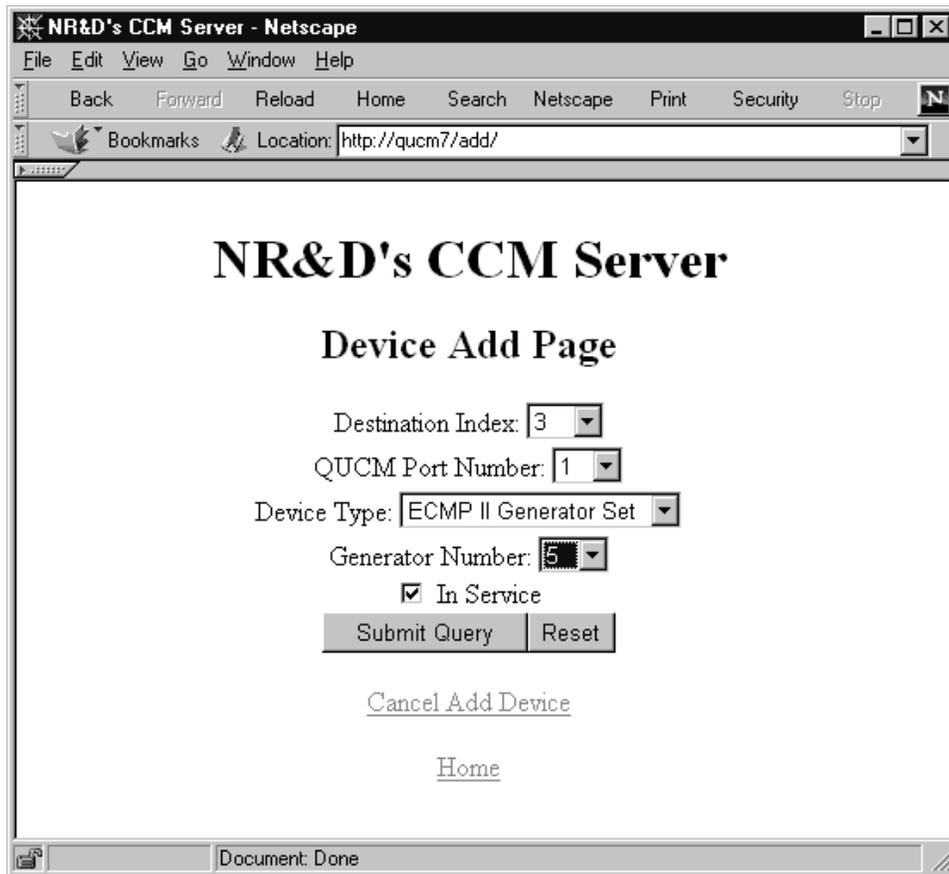


Figure 3-5 Add Device Page

Serial Port Configuration

The Serial Port Configuration page allows the altering of the baud rates of QUCM port 1 and 2, the Protocol of Port 2, and the Parity of Port 2.

Port 1 is fixed as an CCM Master. Its parity is fixed at NONE. Its baud rate may be set to 1200, 2400, 4800, 9600, or 19200. 9600 is recommended.

Port 2 may be set to CCM Slave or PNIM/RTU Master. As an CCM Slave its parity is fixed at NONE and its baud rates may be set to 1200, 2400, 4800, 9600, or 19200. As a PNIM/RTU Master, its parity may be set to EVEN or NONE and its baud rate may be set to 1200, 2400, 4800, 9600, or 19200

When Port 2 is in PNIM/RTU, it accepts Modbus/TCP queries to Destination Indices 101 through 132 and passes the messages out to either PNIM or Modbus RTU slaves 1 through 32. The QUCM will automatically determine the proper protocol for the each of the possible 32 slaves.

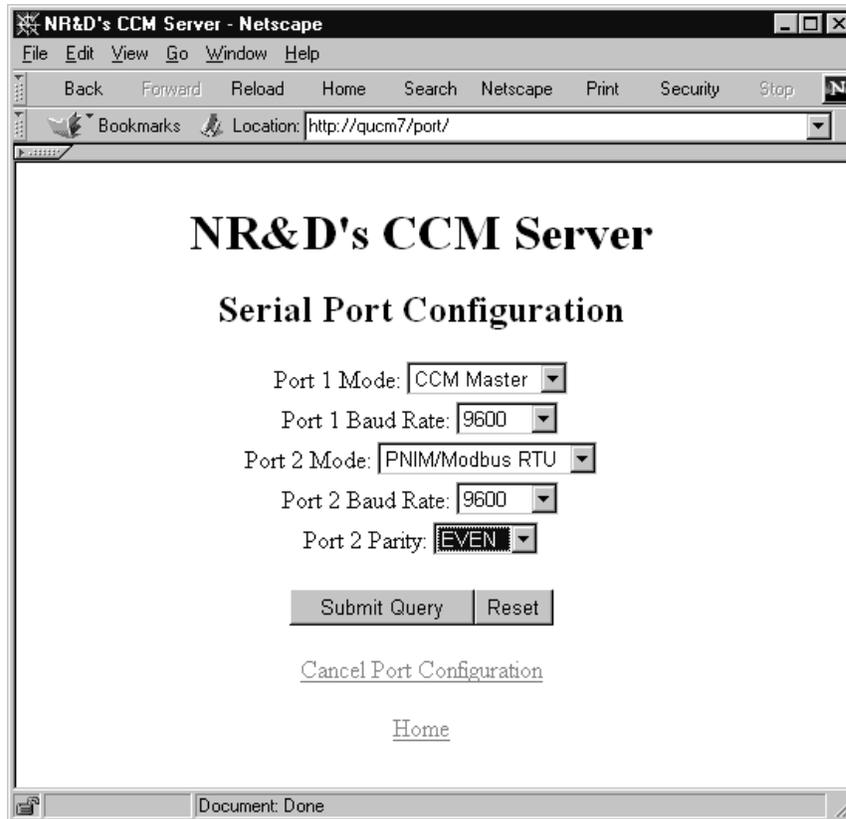


Figure 3-6 Serial Port Page

Save Settings to FLASH

After completion of the configuration, be sure to save the settings to flash. Otherwise the modifications will be lost on the next power cycle of the QUCM. Once the settings are saved to flash, the QUCM's configuration, including its IP settings, will be safe indefinitely.

Statistics Page

At the bottom of the Main page is a link to some statistical information about this QUCM. (See Figure 3-7)

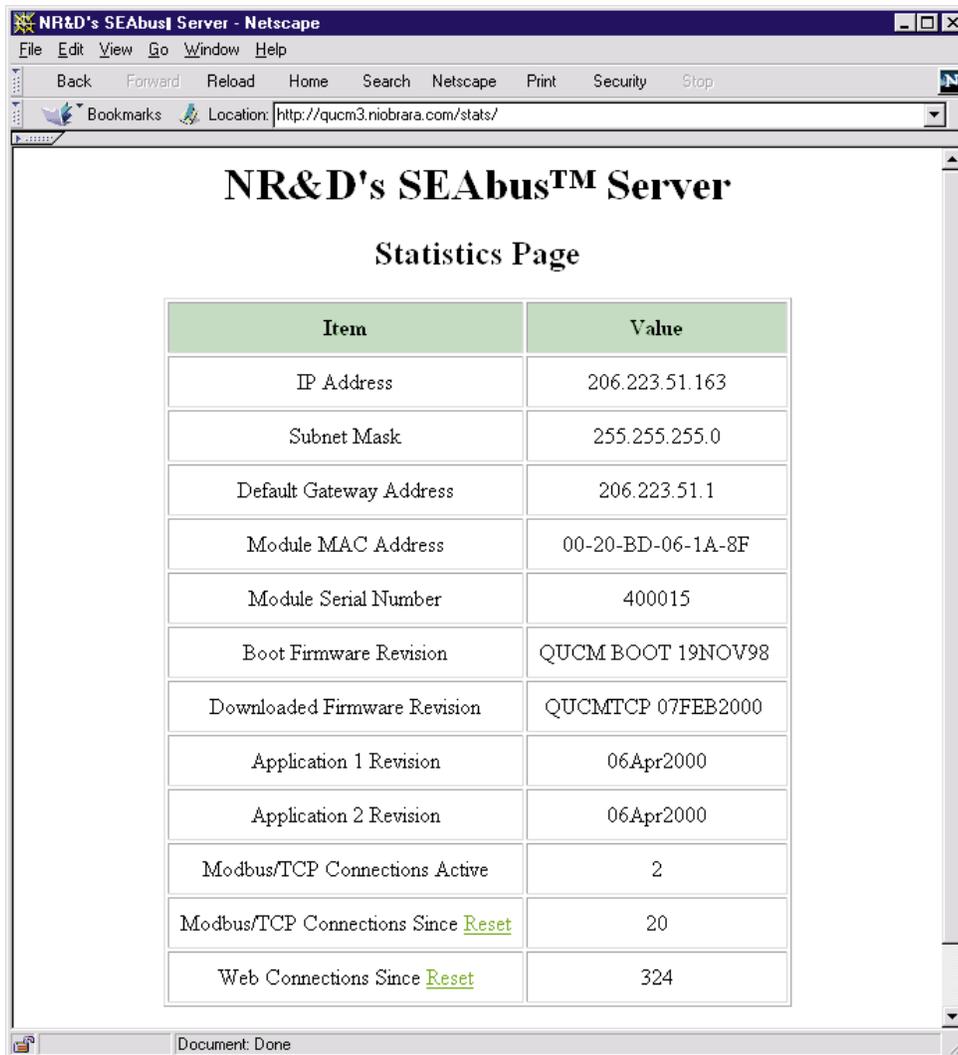


Figure 3-7 Statistics Web Page