



Customer Service Support System

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QL 3002 Manual

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QL 3002 Chapter 1 - Introduction

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Introduction

The QL 3002 features two remote communications processor-based products which function as diskless workstations on a Novell network. The QL 3002 must be installed in either a NetWare file server or an external bridge or router. NetWare versions 2.15C, 2.2, and 3.11 are currently supported.

Although the QL 3002 can function in a variety of application environments, it is typically used to host remote sessions. A modem is connected to the standard serial COM port on each QL 3002 processor. Two simultaneous remote users can then dial into the network via the QL 3002. [Figure 1-1](#)

Hardware Overview

The QL 3002 contains two computers on a single AT-style plug-in board. The standard QL 3002 is equipped with two 80386SX processors. The QL 3002CX uses the higher performance Cyrix Cx486SLC processors. Both models of the QL 3002 are ISA-bus compatible.

The QL 3002 and the QL 3002CX provide most of the functionality of standard AT-class computers. Each processor includes VGA support, two serial ports, one parallel port, and up to 16MB of RAM. The standard QL 3002 is compatible with the 80387SX math coprocessor, and the QL 3002CX is compatible with the Cyrix Cx87SLC. [Figure 1-2](#)

Since the QL 3002 products are installed as remote communication host processors, the ability to directly connect a monitor and keyboard to the processors is not usually required. However, to provide for times when the network administrator wishes to connect a monitor and keyboard to a QL 3002 workstation, Cubix supplies an adapter for this purpose (refer to Chapter 3). In addition, the QLVision software utility allows the screen and keyboard I/O to be redirected to another workstation on the LAN (refer to the *QL 3000 Series Guide to Operations*).

The QL 3002 boards function as diskless workstations. All of the files necessary to boot and run a QL 3002 workstation reside on a NetWare file server. Therefore, there is no disk controller interface on the boards.

Both the standard QL 3002 and the QL 3002CX have been uniquely engineered and designed for remote communication integration on a Novell NetWare network. Cost effectiveness has been achieved through the elimination of standard AT-class computer hardware which is not required in a remote communication environment, while AT compatibility has been maintained. Expanded support for the Cyrix Cx486SLC provides additional performance at a low cost for processor-intensive applications.

Optional Features

In addition to the optional math co-processor support, both the standard QL 3002 and the QL 3002CX are compatible with the Cubix Line Busy Module. The purpose of the Line Busy Module is to make the telephone line appear busy when the QL processor or modem is not ready to answer an incoming telephone call.

For further information on the Line Busy Module, contact the Cubix Sales department.

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QL 3002

Chapter 2 - Configuration & Installation

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Configuration & Installation

This chapter explains how to configure and install a QL 3002 board. Unless otherwise specified, "QL 3002" refers to both the standard QL 3002 and the QL 3002CX. The "QL 3000 Series" includes the QL 3001 and QL 3002 products. The configurable options are:

- * Memory
- * Board Node Numbers (Default 2 and 3)
- * I/O Address (Default 220 Hex)
- * Reset on loss of DCD or DSR

The boards also require an interrupt on the file server or bridge in which they are installed, and also a 16K shared memory window. Both the interrupt and the memory window are shared by all QL 3000 Series boards installed in the server or bridge. These options are software configurable, and are described in the *QL 3000 Series Guide to Operations*. [Figure 2-1](#).

Memory

The QL 3002 is equipped with a minimum of 4 MB of RAM per processor. The QL 3002 RAM resides in standard PS/2 type 72pin SIMMs. One SIMM may be installed per processor. Available configurations are:

Table 2 - 1
SIMM Configurations

SIMM TYPE	AVAILABILITY	MEMORY
1M x 36	Multiple sources	4 Megabytes
2M x 36	Cubix Corporation	8 Megabytes
4M x 36	Multiple sources	16 Megabytes

[Figure 2-2](#), QL 3002 SIMM Locations.

Board Node Number

Each node on a Novell network must be identified by a unique address. This address consists of two parts: a network number and a node number. When the Cubix server driver is installed, it must be assigned a unique network number. Each QL 3000 Series node to be supported by the server driver must be assigned a unique node number. The node number is selected by a DIP switch (SW2) on the QL 3002 board. Valid node numbers range from 2 to 249. It is recommended that the QL 3002 node numbers be assigned consecutively beginning with node number 2 as this will maximize network performance.

The QL 3002 board uses a seven position DIP switch to select its node numbers. Since the QL 3002 contains two nodes, these seven switches determine the seven high order bits of the address for each node. The low order bit for the Port A node is assumed to be 0, while it is assumed to be 1 for the Port B node. A switch is OFF when its handle is away from the board.

[Figure 2-3](#) shows SW2 set to node numbers 2 and 3. Table 22 shows switch settings for all node numbers.

Table 2 - 2
Node Number Switch Settings for Users

#	Switch SW2	#	Switch SW2	#	Switch SW2
002	7 off	052	2,4,7 off	082	1,7
004	6	054	2,4,6	084	1,6
006	6,7	056	2,4,6,7	086	1,6,7
008	5	058	2,4,5	088	1,5
00A	5,7	05A	2,4,5,7	08A	1,5,7
00C	5,6	05C	2,4,5,6	08C	1,5,6
00E	5,6,7	05E	2,4,5,6,7	08E	1,5,6,7
010	4	060	2,3	090	1,4
012	4,7	062	2,3,7	092	1,4,7
014	4,6	064	2,3,6	094	1,4,6
016	4,6,7	066	2,3,6,7	096	1,4,6,7
018	4,5	068	2,3,5	098	1,4,5
01A	4,5,7	06A	2,3,5,7	09A	1,4,5,7
01C	4,5,6	06C	2,3,5,6	09C	1,4,5,6
01E	4,5,6,7	06E	2,3,5,6,7	09E	
020	3	070	2,3,4	0A0	1,3
022	3,7	072	2,3,4,7	0A2	1,3,7
024	3,6	074	2,3,4,6	0A4	1,3,6
026	3,6,7	076	2,3,4,6,7	0A6	1,3,6,7
028	3,5	078	2,3,4,5	0A8	1,3,5
02A	3,5,7	07A	2,3,4,5,7	0AA	1,3,5,7
02C	3,5,6	07C	2,3,4,5,6	0AC	1,3,5,6
02E	3,5,6,7	07E	2,3,4,5,6,7	0AE	

030 3,4 	080 1	0B0 1,3,4

032 3,4,7 	062 2,3,7	0B2 1,3,4,7
034 3,4,6 	064 2,3,6	0B4 1,3,4,6
036 3,4,6,7 1,3,4,6,7	066 2,3,6,7	0B6
038 3,4,5 	068 2,3,5	0B8 1,3,4,5

03A 3,4,5,7 1,3,4,5,7	06A 2,3,5,7	0BA
03C 3,4,5,6 1,3,4,5,6	06C 2,3,5,6	0BC
03E 3,4,5,6,7 1,3,4,5,6,7	06E 2,3,5,6,7	0BE
040 2 	070 2,3,4	0C0 1,2

042 2,7 	072 2,3,4,7	0C2 1,2,7
044 2,6 	074 2,3,4,6	0C4 1,2,6
046 2,6,7 	076 2,3,4,6,7	0C6 1,2,6,7
048 2,5 	078 2,3,4,5	0C8 1,2,5

04A 2,5,7 	07A 2,3,4,5,7	0CA 1,2,5,7
04C 2,5,6 	07C 2,3,4,5,6	0CC 1,2,5,6
04E 2,5,6,7 1,2,5,6,7	07E 2,3,4,5,6,7	0CE
050 2,4 	080 1	0D0 1,2,4

I/O Address

Each QL 3002 board houses a seven position DIP switch (SW1). Positions 1 and 2 select the base I/O address used by the server driver to communicate with the QL 3000 processors. The QL interface requires eight consecutive I/O ports beginning with the base I/O address.

The I/O addresses selected must not be assigned to any non QL 3000 Series devices installed in the file server or bridge hosting the QL 3000 Series boards. However, all of the QL 3000 Series boards installed in this host should have the same base I/O address. [Figure 2-4](#), I/O Addresses Set on Switch Block SW1.

Reset on Loss of DCD or DSR

The QL 3002 is typically connected via a COM port to a modem performing remote communications over a telephone line. The COM port monitors the state of the Data Carrier Detect (DCD) or Data Set Ready (DSR) signals coming from the modem. The QL processors can be configured to perform an automatic hardware reset if DCD or DSR is dropped.

One practical usage of this feature is to force the QL processor to reset between remote sessions. This ensures users that they are connecting to a newly initialized system. It also verifies that users are properly disconnected from the network when their session terminates (i.e., a user will not remain logged into NetWare after "hanging up" the phone).

Depending upon the system configuration, either DCD or DSR will indicate that the telephone signal connection is established and that the modem is ready. Most configurations support DCD. However, if a multiplexer is installed between the QL 3002 COM port and the modem, it may be necessary to monitor DSR instead. Refer to the multiplexer manufacturer's documentation for this information. The QL 3002 contains a seven position DIP switch (SW1) that configures this feature.

Switch Number	Description	Switch set ON	Switch set OFF
3	Selects COM port for both processors.	COM1	COM2
4	Selects signal to be monitored for both processors.	DCD	DSR
5	Enable/Disable reset on processor B.	Enable	Disable
6	Enable/Disable reset on processor A.	Enable	Disable

* **Position 7 should always be in the ON position. It is used by manufacturing test only.**

Table 2 - 4
Switch Block SW1 Switch Configurations

Description	Switch Number	3	4
Reset Disabled Processor A OFF OFF		5	6
Reset Disabled Processor B		--	--
Reset on COM1 Loss of DCD Processor A ON OFF		ON	ON
Reset Disabled Processor B			
Reset on COM2 Loss of DCD Processor A ON OFF		OFF	ON
Reset Disabled Processor B			
Reset on COM1 Loss of DSR Processor A ON OFF		ON	OFF
Reset Disabled Processor B			
Reset on COM2 Loss of DSR Processor A ON OFF		OFF	OFF
Reset Disabled Processor B			
Reset Disabled Processor A OFF ON		ON	ON
Reset on COM1 Loss of DCD Processor B			
Reset Disabled Processor A OFF ON		OFF	ON
Reset on COM2 Loss of DCD Processor B			
Reset Disabled Processor A OFF ON		ON	OFF
Reset on COM1 Loss of DSR Processor B			
Reset Disabled Processor A OFF ON		OFF	OFF
Reset on COM2 Loss of DSR Processor B			
Reset on COM1 Loss of DCD Processor A ON ON		ON	ON
Reset on COM1 Loss of DCD Processor B			
Reset on COM2 Loss of DCD Processor A ON ON		OFF	ON
Reset on COM2 Loss of DCD Processor B			
Reset on COM1 Loss of DSR Processor A ON ON		ON	OFF

Reset on COM1 Loss of DSR Processor B

Reset on COM2 Loss of DSR Processor A OFF OFF
ON ON

Reset on COM2 Loss of DSR Processor B

Install Board

The QL 3002 boards must be installed in the file server or an external bridge or router. If the file server or bridge/router already contains QL 3000 Series boards, and the QL software does not need to be updated, simply follow the instructions below to install the new boards. For **all** other cases, a complete software installation should be performed. Refer to the ***QL 3000 Series Guide to Operations***.

* Before installing the QL 3002 boards, configure the memory, node numbers, I/O address, and reset on loss of DCD or DSR options as previously described in this chapter.

To install the boards:

- * Ensure all boards in the server or bridge are idle.
 - * Perform an orderly shutdown of the server or bridge.
 - * Power down the server or bridge.
 - * Remove the access cover to the bus slots.
 - * Seat the QL 3002 board into a 16bit slot in the
computer and secure with a screw.
 Repeat for each QL 3002 board to be
 installed.
 - * Replace the computer's cover.
 - * Apply power to the server or bridge.
 - * Boot the file server or external bridge. Be sure
that the system loads all of the selected
 LAN drivers, and connects properly
 to the server.
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QL 3002 Chapter 3 - Hardware Reference

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Serial Port Connectors

The QL 3002 boards provide two standard PC/ATtype COM ports. These ports use Mini DIN 9 female connectors. The following cables may be acquired from Cubix:

[Figure 3-1](#), Mini DIN 9 to Male DB-9.

[Figure 3-2](#), Mini DIN 9 to Male DB-25

Optional Parallel Port

A parallel port may optionally be added to function as LPT1 of the QL 3002. One parallel port may be installed per processor. Each port requires a Cubix LPT1 printed circuit board (PCB) adapter and bracket, a panel opening where the DB-25 connector can be installed, and a 20conductor ribbon cable.

Installation

WARNING: Perform a proper shutdown and disconnect power from the system before beginning this procedure.

1. Install the Cubix LPT1 adapter in a panel opening in the system. Typically, an opening provided for an empty board space is dedicated to the LPT1 connector. In this case, install the bracket next to the QL 3002 board requiring the LPT1 port and tighten the screw firmly.

Alternatively, if the LPT1 connector is being installed into a Cubix auxiliary junction panel, the bracket provided with the LPT1 adapter should be removed. Unscrew the connector from the bracket and install the adapter into the desired panel opening.

2. Connect one end of the 20-conductor ribbon cable to the LPT1 header on the QL 3002 board. The pin-one side of the ribbon cable is marked with a colored stripe. Pin one on the QL 3002 is on the left side of the header when the edge connector is down (refer to [Figure 3-3](#)). Align the pin-one side of the ribbon cable with pin one on the header.
3. Connect the other end of the ribbon cable to the LPT1 adapter. Pin one on the adapter is labeled with a triangular arrowhead. Align the pin-one side of the ribbon cable with pin one on the adaptor.
4. Plug the peripheral device's cable into the DB25 connector.

[Figure 3-3](#), LPT1 Adapters Connected to QL 3002

Parallel Port Connector

LPT1 (DB-25)

Pin #	Definition	Pin #	Definition
1	Strobe	14	Auto Feed
2	Data 0	15	Error
3	Data 1	16	Initialize Printer
4	Data 2	17	Select Input
5	Data 3	18	Ground
6	Data 4	19	Ground
7	Data 5	20	Ground
8	Data 6	21	Ground
9	Data 7	22	Ground
10	Acknowledge	23	Ground
11	Busy	24	Ground
12	Paper Empty		
13	Select		

Optional Monitor and Keyboard

Each processor on the QL 3002 will optionally support a VGA monitor and PS\2 keyboard. This requires a Cubix printed circuit board (PCB) adapter and bracket, and a single panel opening where the DB-15 High Density and Mini-DIN 6 connectors can be installed. Both the monitor and the keyboard interfaces are provided on the same PCB adapter; however, a separate adapter is required for each processor. A 14-pin flat ribbon cable is required to connect the monitor and keyboard adapter to the QL 3002.

INSTALLATION

Warning: *Perform a proper shutdown and disconnect power from the system before beginning this procedure.*

1. Install the Cubix PCB adapter in a panel opening on the system. Typically, an opening provided for an empty board space is dedicated to the monitor and keyboard connectors. In this case, install the bracket next to the QL 3002 board requiring the monitor/keyboard ports, and tighten the screw firmly.

Alternately, if the monitor and keyboard connectors are being installed into a Cubix auxiliary junction panel, the bracket provided with the monitor/keyboard adapter should be removed. Remove the bracket from the connectors and install the adapter into the desired opening.

2. Connect one end of the 14pin ribbon cable to the video/keyboard mux header for the appropriate processor on the QL 3002 board (refer to [Figure 3-4](#)). The pin-one side of the ribbon cable is marked with a colored

(blue or red) stripe. Pin one on the QL 3002 is on the left side of the header when the edge connector is down. Align the pin-one side of the ribbon cable with pin one on the header.

3. Connect the opposite end of the 14-pin cable to the header on the Cubix adapter board. Pin one on the adapter is indicated in [Figure 3-4](#). Align the pin-one side of the ribbon cable with pin one of the 14-pin header on the adapter board.

4. If a monitor is to be used, plug the monitor's cable into the DB-15 HD connector.

5. If a keyboard is to be used, plug the keyboard connector into the Mini-DIN 6.

[Figure 3-4](#), Video/Keyboard Adapter Connected to QL 3002

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Specifications

Communications Processor - Standard QL 3002

Processor	
80386SX	
Speed	25
MHz	
Number per board	2
Co-processor (factory-installed, optional)	80387SX

Communications Processor - QL 3002CX

Processor	
Cx486SLC	
Speed	25
MHz	
Number per board	2
Co-processor (factory-installed, optional)	Cyrix
Cx87SLC	
Internal cache size	1
KByte	
Hardware integer multiplier unit	
Internal	

Communications Memory Support

Total per processor	Either 4, 8
or 16 MBytes	
Conventional memory area	640 KBytes [00000-9FFFF]
High memory area	380 KBytes
[A0000-FFFFFF]	
Extended memory area	1-16 MBytes
[100000-FFFFFF]	
Access Time (RAM speed)	70
nanoseconds	
System & video BIOS ROM shadowing	Enabled
LIM 4.0 support	Yes

Communications Video Support

Video controller location	On-board
Highest mode supported	VGA
Resolution (maximum)	640x480
Colors supported (maximum)	256
VGA modes supported	
11	640x480, 2-color
12	640x480, 16-color
13	320x200, 256-color

Communications Ports

Serial

Assignment (per processor)	COM1, COM2
UART type	16C552
Buffering	16 byte
Maximum transmission rate	115.2 Kbps
Connector type	Mini-DIN 9,
female (2)	
Location	Rear
bracket	

Parallel

Assignment (per processor)	LPT1
Connector type	Header to
DB-25, female	
Location	Top of
board	

Other Input/Output (per processor)

Mouse	Header to
PS\2-style mini-DIN 6	
Video	Header to DB-15
HD	
Keyboard	Header to
PS\2-style Mini-DIN 6	

Network Characteristics

Network interface	Built-in, ISA
bus-based	
Burst rate	2 MBytes/second
or 16 Mbps	

Standards Support and Third Party Applications

Novell NetWare 2.x and 3.x	Yes
Co-exist with Ethernet,	
ARCnet & IBM Token Ring	Yes
DOS 3.x, 5.x and DR-DOS 6.x	Yes
Microsoft Windows 3.x	Yes
Dial-out interrupts 14 and 6B	Yes

Utilities

QLVision

Across LAN processor monitoring	Yes
Across LAN processor control	Yes
Across LAN processor reset	Yes
Activity audit logs	Yes
Connection time and date	Yes
Connection duration	Yes
User identification	Yes
Screen, and hard copy output	
Yes	
Communications packet analysis	
Yes	
Processor lock-up monitoring	
Yes	
Automatic response to lockup	
Reset	
Interval of checking for lockup	
1-15 minutes	
Processor address viewing	
Yes	

Remote video type sensing
Yes

Communications Processor Characteristics

Initialization method
Diskless
Diagnostic LEDs Rear
bracket
Configurable automatic reset Upon
loss of DSR/DCD

Power

Standard QL 3002
Rating (with co-processor) 19.9
watts
Rating (without co-processor) 18.9
watts
Requirements
+5 VDC (with co-processor) 3.6
amps maximum
+5 VDC (without co-processor) 3.4
amps maximum
+12 VDC .0.08
amps maximum
-12 VDC 0.08
amps maximum
QL 3002CX
Rating (with co-processor) 20.4
watts
Rating (without co-processor) 19.4
watts
Requirements
+5 VDC (with co-processor) 3.7
amps maximum
+5 VDC (without co-processor) 3.5
amps maximum
+12 VDC 0.08
amps maximum
-12 VDC 0.08
amps maximum

Environmental

Operating temperature 0 - 400 C
Relative humidity 10 - 95%
noncondensing
FCC Compliance Class A

Optional Equipment

Line Busy Module Yes

Warranty

Parts and labor return-to-manufacturer 1 year



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QL 3002 Appendix B - Memory and I/O Map

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Memory Map

00000 - 9FFFF	System DRAM Memory
A0000 - BFFFF	VGA Video Memory
C0000 - C7FFF	VGA Video BIOS Copied to Shadow RAM
C8000 - CBFFF	Diskless Download Code
CC000 - EDFFF	Not used, can be used for EMS
EE000 - EFFFF	8K Dual-Port-RAM
F0000 - F7FFF	Not used, can be used for EMS
F8000 - FFFFF	Quadtel System BIOS Copied to Shadow RAM
100000 - FFFFFFFF	Extended DRAM, up to 16 MB

On Board I/O Map

000 - 00F	DMA 1
020 - 021	PIC 1
040 - 043	Timer
060,064	8742 Keyboard Controller
061	Port B
070 - 071	CMOS RAM & NMI Mask Register
080	Manufacturing Hex Display
081 - 08F	DMA Page Registers
0A0 - 0A1	PIC 2
0C0 - 0DF	DMA 2
2F8 - 2FF	COM 2
300 - 302	QL 3002 Command/Status
378 - 37F	LPT 1
3B0 - 3DF	VGA
3F8 - 3FF	COM 1
46E8,102	VGA Configuration Ports

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Interrupt Channels

NMI	Parity/VGA
0	Timer
1	Keyboard
2	Cascaded Input for PIC 2
3	COM 2
4	COM 1
5	Broadcast Interrupt from Fileserver
6	Transmit Interrupt from Fileserver
7	LPT 1
8	Real Time Clock
9	VGA
10	Receive Interrupt from Fileserver
11	Not Used
12	Not Used
13	Numeric Co-Processor Interrupt
14	Not Used
15	Not Used

No DMA channels are used by the QL 3002.
