

# USRobotics®



**T E C H N O L O G Y**

## **Courier™ I-modem™**

### **Command Reference Addendum**

### **External and Internal Version**

*Congratulations! You have just purchased a U.S. Robotics Courier I-modem with x2. x2 is a groundbreaking new technology that allows your I-modem to:*

*Use Server Mode x2 and ISDN to send data to x2 client modems at speeds up to 56 kbps.*

*Use Symmetric Mode x2 to connect at speeds of 56 or 64 kbps.*

*Use ISDN to connect at speeds up to 128 kbps.*

### **Information about x2**

To obtain the latest information about x2, visit the U.S. Robotics Web Site visit <http://www.usr.com/x2>

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## Contacting U.S. Robotics

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We've made every effort to provide you with useful, accurate information. If you have any comments or questions, please let us know.

To do this	Contact
Contact U.S. Robotics Technical Support	800.550.7800
Visit the x2 web site	<a href="http://www.usr.com/x2">http://www.usr.com/x2</a>

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## Enhanced x2 Features

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Your Courier I-modem with x2 has new result codes and the following new features:

To do this	Use this command
Determine if x2 is enabled in your I-modem	ATI7
Disable or enable server and symmetric x2	ATS58
Limit the upper speed limit of an x2 connection	AT&N
Limit the lower speed limit of an x2 connection	AT&U

**Note:** Your Courier I-modem reports the initial established connect speed of 33333 bps or 29333 bps. The I-modem then shifts to higher x2 connection rates after monitoring the line conditions and establishing the maximum x2 connection rate for that line. After waiting several seconds for the higher connection speed to be established, view the **ATI6** screen to determine what speeds the Courier I-modem has shifted up to after the initial connect.

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## Other New I-modem Features

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Your Courier I-modem also has the following new features:

- Data Over Voice
- Host Mode Multilink PPP
- Dynamic Data Bandwidth Allocation

These new features, and how to use them, are explained in this addendum.

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## How to Tell if x2 is Enabled in Your I-modem

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If you aren't sure whether x2 is enabled in your Courier I-modem, use the **ATI7** command to display product configuration information. If x2 is enabled on your Courier I-modem, the following information displays:

```
USRobotics Courier I-modem Configuration Profile...
Copyright, 19xx-96, U.S. Robotics. All rights reserved.
```

```
Product type      US/Canada External
Options           HST,V32bis,Terbo,VFC,V34+,x2
Fax Options       Class 1,Class 2.0
Clock Freq        20.16Mhz
Eprom             256k
Ram               32k
```

```
Supervisor date   01/16/97
DSP date          01/16/97
```

```
Supervisor rev    7.0.0
DSP rev           2.0.0
```

```
Serial Number     {serial number}
```

```
OK
```

**Note:** Dates, serial numbers, and revision numbers may vary. The most important line is the “Options” line, which lists support for x2.

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## How x2 Works

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U.S. Robotics' x2 technology enables analog modems to receive data at up to 56 kbps over the standard analog, public switched telephone network (PSTN). x2 overcomes the limitations imposed on standard, analog modems by exploiting the digital connections that most Internet and online service providers have at their end to connect to the PSTN.

### ***The Shift from Analog to Digital Circuits***

When the first telephone networks were established, they were completely analog. Over time, telephone companies began replacing portions of their analog networks with digital circuits, which provided a higher telephone signal quality at a more economical price.

Today, the PSTN is almost entirely digital. Typically, the only portion of the telephone network that remains analog is the line that connects your home to the telephone company's central office (CO). The rest of the telephone network is digital.

### ***Client and Server Modems***

x2 may not require changes to your wiring and equipment that's already in place. In most cases, all that's required to use x2 is a software upgrade.



## **Client Modems**

x2 client modems can receive data at speeds up to 56 kbps and send data at V.34 speeds. The following products are examples of U.S. Robotics Client Modems:

- Courier™ V.Everything™ with x2
- Sportster® with x2
- Analog Modem Pools or NETServer with x2

## **Server Modems**

The digital x2 modems that client x2 modems connect to are called server x2 modems. Server modems can send data to client x2 modems at speeds up to 56 kbps. A server must have a “digital” interface to the PSTN. This digital interface can be in the form of a “trunk-side” T1, Primary Rate Interface (PRI), or Basic Rate Interface (BRI). The following products are examples of client x2 modems:

- Courier I-modem with x2 (in Server Mode)
- Quad Modem 5.0/5.1 (in Server Mode)
- MP I-modem or NETServer I-modem with x2

## ***Making x2 Work***

To use x2, the client x2 modem must connect to a server x2 modem. If clients attempt to connect to ISPs that do not use x2, the client modem will negotiate the next available modulation. For example, an x2 client modem calling into an ISP that only supports V.34, the modem will only negotiate the highest v.34 connection rate. The maximum V.34 connection speed is 33.6 kbps.

When a client x2 modem connects to a server x2 modem, the path through the telephone network between the modems is subject to the following conditions for an x2 connection to be made.

## **A Digital Connection At One End**

ISPs or online services must have a digital connection to the PSTN. Most major online services have digital connections to the PSTN.

## **Only One Digital-to-Analog Conversion**

There can be only one digital-to-analog conversion in the telephone network between the x2 server modem and the x2 client modem.

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## Controlling x2

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The Courier I-modem allows you to communicate using x2 Server Mode and x2 Symmetric Mode.

### ***x2 Server Mode***

Using x2 Server Mode, you can accept calls from x2 client modems. Using this mode, the x2 client modem that connects to your I-modem can receive data at speeds up to 56 kbps and send data at V.34 speeds.

### ***x2 Symmetric Mode (Host Mode)***

Using x2 Symmetric Mode, your I-modem can connect at speeds of 56 or 64 kbps in both directions over a 3.1 kHz voice call<sup>1</sup> (V2=3). For x2 Symmetric Mode to work, our I-modem must connect to a modem using x2 Symmetric Mode, such as another Courier I-modem.

<b>Note:</b> In some areas, 3.1 kHz voice calls over ISDN are cheaper than data calls.
--

Use the following S58 settings to control x2:

To do this	Use this command
Disable x2	S58.0=1
Force A-law mode	S58.2=1
Disable Symmetric Mode	S58.3=1

<b>Note:</b> A-law is required in all countries but the United States, Canada, Japan, Taiwan, and Hong Kong. If you are using your Courier I-modem in one of these countries, do not force A-law mode.
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## Controlling Link Speeds with &N and &U

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You can use the &N and &U commands to control link speeds. Couriers without x2 can still use the &N and &U commands, but can only control link speeds up to 33.6 kbps.

### ***Limiting Link Speeds***

You can use the &N and &U commands to limit the link speeds of your Courier

I-modem with x2. Use the following table to determine how to use &N and &U commands:

To limit the	Use
Highest possible connect speed	&N
Lowest possible connect speed	&U
Range of possible connect speeds	&N and &U

<b>Note:</b> The default values for &N and &U are 0. If you change these values, you will limit the speeds at which you can connect. U.S. Robotics recommends that you do not alter these values.
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### ***Limiting the Highest Possible Connect Speed***

The &N command allows you to limit the highest possible connect speed. If a remote modem connects to your Courier I-modem with x2 at a speed higher than &N, your Courier I-modem with x2 will not allow it to connect.

To limit the	Use this command
Highest possible connect speed to 33600	&N=16

## ***Limiting the Lowest Possible Connect Speed***

The &U command allows you to limit the lowest possible connect speed. If a remote modem connects to your Courier I-modem with x2 at a speed lower than &U, your Courier I-modem with x2 will not allow it to connect.

To limit the	Use this command
Lowest possible connect speed to 48000	&U=24

## ***Setting a Range of Possible Connect Speeds***

By setting &N and &U values, you can limit the range of speeds at which your Courier I-modem with x2 connects. If a remote modem does not connect to your Courier I-modem with x2 at a range between the speeds designated by the &N and &U commands, your Courier I-modem with x2 will not allow it to connect.

**Note:** The link speed associated with the &U argument cannot be greater than the link speed associated with &N argument.

Use the following table to understand the relationship between &U and &N commands:

If &U	And &N	Then your I-modem
Equals zero	Equals zero	Connects at the highest possible speed.
	Is greater than zero	Connects at the &N speed only.
Is greater than zero	Is greater than zero and greater than &U	Connects at the highest possible speed in the range from &U to &N.

# **&N and &U Command Values**

Use the following table for a complete list of &N and &U link speeds and their associated indexes:

Link Speed	Index
Highest	0
300	1
1200	2
2400	3
4800	4
7200	5
9600	6
12000	7
14400	8
16800	9
19200	10

Link Speed	Index
21600	11
24000	12
26400	13
28800	14
31200	15
33600	16
33333	17
37333	18
41333	19
42666	20
44000	21

Link Speed	Index
45333	22
46666	23
48000	24
49333	25
50666	26
52000	27
53333	28
54666	29
56000	30
57333	31
64000	32

**Note:** For x2-mode links, &N and &U are used to constrain the speed of the higher speed direction of the link.

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## Data Over Voice

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Data Over Voice (DOV) is a feature that allows the I-modem to make more cost effective 3.1 kHz analog calls while allowing the I-modem to send digital data at 56 kbps.

DOV is becoming widely used due to the fact that Regional Bell Operating Companies charge less for analog calls than digital calls. DOV allows users to pay a lower fee while taking advantage of the digital transmission.

### ***Protocols Supported by Data Over Voice***

You can use Data Over Voice with V.120 and Multilink PPP calls.

### ***Configuring Data Over Voice***

Use the following \*V2 settings to control Data Over Voice:

To force	Use these commands
V.120 DOV calls	*V2=0 and S69.5=1
Multilink PPP DOV calls	*V2=5 and S69.5=1 and the usual PPP setting
Incoming analog Multilink PPP calls through the data port	*V2=5, S69.5=1 and S67.2=1 and the usual PPP setting

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# Host Mode Multilink PPP

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Your Courier I-modem now supports Host Mode Multilink PPP. Host Mode Multilink PPP allows you to set the I-modem to accept Multilink PPP calls.

## *Determining TurboPPP Settings*

To do this	Use this command
Obtain an overview of TurboPPP settings	ATI16

## *Setting Multilink PPP Host and Originate Mode*

Use the following \*P settings to control Multilink PPP:

To do this	Use this setting	Or these settings
Set all PPP-related default values	*P=0	*V2=5, S68.2=0, S68.6=0, S69.1=0, *D1 =2, *D2=24 *D3=85, *D4=60, *K=1
Set Asynchronous to Synchronous PPP	*P=1	S68.2=1
Set Single Link TurboPPP	*P=2	S68.2=0, S68.3=1
Set Multilink PPP	*P=3	S68.2=0, S68.3=0

**Note:** Before you can use this feature you must enable Host Mode Multilink PPP using \*V2=5.

## Making Calls With Multilink PPP

You can only make a Multilink PPP call using PPP software, such as Windows 95 Dial-Up Networking, FTP Explorer, NetManage Chameleon, or Trumpet Winsock. Terminal programs do not support Multilink PPP.

**Note:** If you are using Windows 95 Dial-Up Networking, uncheck the “Use Country and Area Code” check box if you are using Multilink PPP.

## Making an Outgoing Multilink PPP Call Using PPP Software

When making an outgoing Multilink call, enter the number of the host. If you are given two different phone numbers, you must enter both numbers. The numbers must be separated by an ‘&’ as shown in the figure “Connection With Multilink PPP” below.

If the modem you’re dialing only has one phone number, your I-modem dials the same number for both calls. When only one number is given, you don’t need to enter the number twice in the PPP software.

**Note:** When you attempt to dial another I-modem, you must enter the Data number first and the Voice number second.

## Making an Incoming Multilink PPP Call to Your I-modem

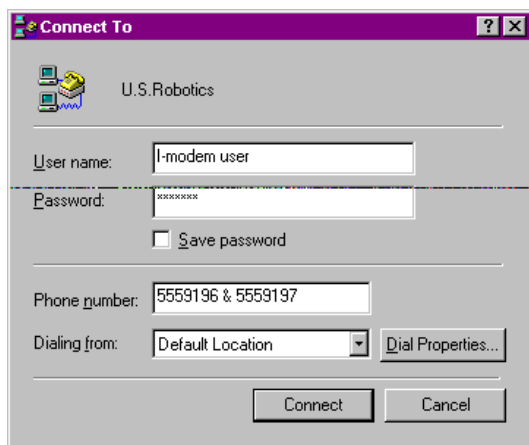
When someone attempts to call your I-modem using Multilink PPP, they must enter the Data number first and the Voice number second.

See the following figures for an example of phone numbers with and without Multilink PPP using Windows 95. These rules apply when using terminal programs with other operating systems.



Regular Connection Without Multilink PPP





Connection With Multilink PPP

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## Dynamic Data Bandwidth Allocation

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Dynamic Bandwidth Allocation is a cost savings feature that helps you save money by only using the second B-channel when it is need for data transfers, and then dropping the second B-channel when it is not needed. Dynamic Bandwidth Allocation works with TurboPPP to add or drop the second B-channel automatically. Dynamic Bandwidth Allocation determines the need for the second B-channel by measuring the amount of data sent or received during a set period of time. These threshold and timer values are set in TurboPPP.

**Important:** Dynamic Bandwidth Allocation is set on by default. To turn off Dynamic Bandwidth Allocation, use **\*D0=1**.

### ***Controlling Dynamic Bandwidth Allocation in MLPPP***

Use the following \*D0 settings to control Dynamic Bandwidth Allocation:

To do this	Use this setting	Or this setting
Enable Dynamic Bandwidth Allocation in MLPPP (default).	*D0=0	S68.6=0
Disable Dynamic Bandwidth Allocation in MLPPP	*D0=1	S68.6=1

### ***Controlling Bandwidth Sample Time***

Use the following settings to control the period of time your I-modem samples the throughput in order to determine if the second link needs to be brought up or down:

To set the period of time your I-modem samples throughput to determine	Use this setting	Example
If a second link should be brought up	*D1=n, where n equals 1-255 five second units	*D1=2 (ten seconds)
If a second link should be brought down	*D2=n, where n equals 1 -255 five second units	*D2=10 (50 seconds)

## ***Setting When the I-modem Brings Up the Second Link***

Use the following \*D3 setting to determine when the I-modem should bring up a second link:

To do this	Use this setting	Example
Determine when the second link should be brought up, based on the level of utilization of the existing link	*D3=n, where n equals 50 -100%	*D3=60 (60%)

## ***Setting When the I-modem Brings Down the Second Link***

Use the following \*D4 setting to determine when the I-modem should bring down a second link:

To do this	Use this setting	Example
Determine when the second link should be brought down, based on the level of utilization of the existing link	*D4=n, where n equals 50-100%	*D4=60 (60%)

## ***Enabling the Tone When the I-modem Brings up the Second Link***

Use the following \*T settings to enable the tone when the I-modem brings up a second link:

To do this	Use this setting	Or this setting
Enable tone when second link is brought up	*T=0	S69.1=1
Disable tone when second link is brought up	*T=1	S69.1=0

# Using Compression in TurboPPP mode

Courier I-modem supports the following three types of compression in TurboPPP mode.

## Pass-through Compression

Pass-through compression allows the terminal applications running on each PC on both ends of the connection to perform compression. Using this form of compression, the Courier I-modem does not perform compression.

This allows for maximum compression by eliminating the serial port bottleneck.

## Auto Mode Compression

Auto Mode Compression allows the I-modem to negotiate compression if your application cannot negotiate compression.

## Turbo Mode Compression

Turbo Mode Compression allows the I-modem to negotiate compression with the remote host and disable compression between the I-modem and your application.

## Setting Modes of Compression

Use the following \*K settings to use compression in TurboPPP mode:

Use this mode of compression	Use this setting
Pass-through Mode	*K0
Auto Mode (Default)	*K1
Turbo Mode	*K2

U.S. Robotics recommends that you enable the compression in your application software and keep compression set to **\*K1** (default).

**Note:** Under Auto Mode Compression (&K1), the I-modem allows your application to negotiate compression. If you have enabled compression in your application and the application successfully negotiates compression, then the I-modem switches to Transparent Mode compression and allows your application to do data compression.

U.S. Robotics supports a 230 kbps DTE rate to enhance throughput using Multilink PPP.

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## Period Dial Modifier

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The period (‘.’) dial modifier is used to send DTMF tones after the telephone number is dialed. The period dial modifier can be used with the comma (’,’) dial modifier to insert delay between the numbers as appropriate for the application. A typical application for the period dial modifier is use with PBX systems.

Example: **ATDT18479335200.980234**

In this example, 18479335200 will be dialed using ISDN signaling, then 980234 will be dialed using in band DTMF signaling.

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## PCSDL vs. XMODEM

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In certain situations, such as running under a multitasking OS such as Microsoft Windows 95, you may experience difficulty performing a software download using PCSDL. As a result, U.S. Robotics recommends using PCSDL under *DOS only* or performing software download using the XMODEM file transfer protocol as described in the *Courier I-modem Command Reference* section 17-2.

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## 230 kbps DTE Rate Under Windows®

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If you are using a Windows® 95 terminal program, you will be unable to set your transmission speed to 230 kbps.

### ***230 kbps in Internal I-modems***

The I-modem operates at 230 kbps when appropriate regardless of the transmission speed setting.

**Note:** The actual data rate for internal I-modems does not appear correctly in Windows.

### ***230 kbps in External I-modems***

To take advantage of the 230 kbps data rate, you may need to purchase a high speed (230 kbps) serial card.

**Note:** Depending on the serial card you purchase, the actual data rate may not appear correctly in Windows. Consult the serial card documentation if this problem occurs.

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## **Saving Money With Analog Calls**

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By default, the I-modem anticipates the rare occasion that telephone company equipment incorrectly allows a digital connection when you call a modem or fax machine. In these situations, although the I-modem proceeds with the call as a standard analog (fax or modem) call, the telephone company bills the call as digital.

### ***Digital and Analog Billing Structures***

Often the billing structure for digital (“data”) calls is different than for analog (“3.1 kHz audio”) calls. In some areas, telephone companies charge a flat rate for analog local calls and bill digital calls by usage at a metered rate. Although all long-distance calls are typically metered, long-distance digital calls tend to be slightly more expensive than long-distance analog calls.

To do this	Use this setting
Prevent the I-modem from behaving like a fax/modem over digital connections	S68.0=1

When you use this setting, and the I-modem detects an analog device over a digital connection, it ends the call. If you check the call status information by sending I6 , the I-modem reports:

Disconnect Reason is Analog Destination Over a Digital Network Connection.
--

### ***Forcing Analog Calls***

If your calls to analog devices fail and you can’t figure out why, you can always :

To do this	Use this setting
Force analog calls (and be billed at analog rates)	*V2=3

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## Troubleshooting x2

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If x2 client modems cannot connect at x2 speeds to x2 server I-modems, use the chart below to determine problems at the server end and how to fix them:

Step	This may be the problem	Do this
<b>1</b>	x2 may not be enabled on your Courier. I-modem	See the section “How to Tell if x2 is Enabled” (Use the ATI7 command)
<b>2</b>	There may be a problem with the phone line or the other modem.	Refer the x2 client modem to x2 documentation.
<b>3</b>	There is another issue.	Do the following: <ul style="list-style-type: none"><li>• Visit the U.S. Robotics x2 Web Site at <a href="http://www.usr.com/x2">http://www.usr.com/x2</a></li><li>• Contact U.S. Robotics Technical Support at 800.550.7800</li></ul>

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## New x2 Result Codes

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Use the following table for a list of all result codes, including new x2 result codes:

<b>Numeric</b>	<b>Alphanumeric</b>
180	CONNECT 33333
181	CONNECT 33333/ARQ
182	CONNECT 33333/x2
183	CONNECT 33333/ARQ/x2
184	CONNECT 37333
185	CONNECT 37333/ARQ
186	CONNECT 37333/x2
187	CONNECT 37333/ARQ/x2
188	CONNECT 41333
189	CONNECT 41333/ARQ
190	CONNECT 41333/x2
191	CONNECT 41333/ARQ/x2
192	CONNECT 42666
193	CONNECT 42666/ARQ
194	CONNECT 42666/x2
195	CONNECT 42666/ARQ/x2
196	CONNECT 44000
197	CONNECT 44000/ARQ
198	CONNECT 44000/x2
199	CONNECT 44000/ARQ/x2
200	CONNECT 45333
201	CONNECT 45333/ARQ
202	CONNECT 45333/x2
203	CONNECT 45333/ARQ/x2
204	CONNECT 46666
205	CONNECT 46666/ARQ



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## New x2 Result Codes (Continued)

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<b>Numeric</b>	<b>Alphanumeric</b>
206	CONNECT 46666/x2
207	CONNECT 46666/ARQ/x2
208	CONNECT 48000
209	CONNECT 48000/ARQ
210	CONNECT 48000/x2
211	CONNECT 48000/ARQ/x2
212	CONNECT 49333
213	CONNECT 49333/ARQ
214	CONNECT 49333/x2
215	CONNECT 49333/ARQ/x2
216	CONNECT 50666
217	CONNECT 50666/ARQ
218	CONNECT 50666/x2
219	CONNECT 50666/ARQ/x2
220	CONNECT 52000
221	CONNECT 52000/ARQ
222	CONNECT 52000/x2
223	CONNECT 52000/ARQ/x2
224	CONNECT 53333
225	CONNECT 53333/ARQ
226	CONNECT 53333/x2
227	CONNECT 53333/ARQ/x2
228	CONNECT 54666
229	CONNECT 54666/ARQ
230	CONNECT 54666/x2
231	CONNECT 54666/ARQ/x2
232	CONNECT 56000

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## New x2 Result Codes (Continued)

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<b>Numeric</b>	<b>Alphanumeric</b>
233	CONNECT 56000/ARQ
234	CONNECT 56000/x2
235	CONNECT 56000/ARQ/x2
236	CONNECT 57333
237	CONNECT 57333/ARQ
238	CONNECT 57333/x2
239	CONNECT 57333/ARQ/x2
240	CONNECT 64000
241	CONNECT 64000/ARQ
242	CONNECT 64000/x2
243	CONNECT 64000/ARQ/x2

There is a complete list of result codes in your Courier I-modem  
*Command Reference*

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## FCC Information

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### ***BRI U Model: FCC Part 68 Compliance Statement***

This equipment complies with Part 68 of the FCC rules concerning:

FCC Registration Number: CJE USA-30998-DD-N

Facility Interface Code: 02IS5

Service Order Code: 6.0Y

USOC Jack: RJ49C

REN: Not applicable

### ***BRI S/T Model: FCC Part 68 Compliance Statement***

This equipment complies with Part 68 of the FCC rules concerning:

FCC Registration Number: CJE USA-30999-DD-N

Facility Interface Code: 02IS5

Service Order Code: 6.0F

USOC Jack: Not applicable

REN: Not applicable

This PDF file is based on part number 1.024.990