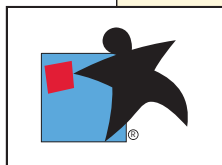# TOSHIBA

USER'S GUIDE
International Modem

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Toshiba International Modem User's Guide

Third edition May 2000

Disclaimer

This manual has been validated and reviewed for accuracy. The instructions and descriptions it contains are accurate for the Toshiba international modem at the time of this manual's production. However, succeeding products and manuals are subject to change without notice. Toshiba assumes no liability for damages incurred directly or indirectly from errors, omissions or discrepancies between the computer and the manual.

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Conformity Statement

The equipment has been approved to [Commission Decision "CTR21"] for pan-European single terminal connection to the Public Switched Telephone Network (PSTN). However, due to differences between the individual PSTNs provided in different countries the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN network termination point.

In the event of problems, you should contact your equipment supplier in the first instance.

Network Compatibility Statement

This product is designed to work with, and is compatible with the following networks. It has been tested to and found to conform with the additional requirements contained in EG 201 121.

Germany	- ATAAB AN005, AN006, AN007, AN009, AN010, and DE03, 04, 05, 08, 09, 12, 14, 17
Greece	- ATAAB AN005, AN006 and GR01, 02, 03, 04
Portugal	- ATAAB AN001, 005, 006, 007, 011 and P03, 04, 08, 10
Spain	- ATAAB AN005, 007, 012, and ES01
Switzerland	- ATAAB AN002
All other countries	- ATAAB AN003, 004

Specific switch settings or software setup are required for each network, please refer to the relevant sections of the user guide for more details.

The hookflash (timed break register recall) function is subject to separate national type approval. It has not been tested for conformity to national type regulations, and no guarantee of successful operation of that specific function on specific national networks can be given.

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Preface

Congratulations on becoming the owner of a Toshiba international modem offering advanced functions for fax and data communication. This manual provides detailed information on features, operation and technical specifications of your international modem.

Manual contents

This manual is composed of six chapters, four appendixes, a glossary and an index.

Chapter 1, *Introduction*, describes the functions and capabilities of the international modem.

Chapter 2, *Using the International Modem*, describes basic operations including connecting the modem and country selection.

Chapter 3, *AT Commands*, explains the meanings of the AT commands that control your international modem.

Chapter 4, *S-registers*, explains the meanings of the registers that contain the settings for many of the international modem functions.

Chapter 5, *MNP and V.42*, explains error correction, flow control and data compression.

Chapter 6, *Test Function*, describes how to conduct the loopback test.

The Appendices provide technical information.

The Glossary defines telecommunications terminology.

The Index quickly directs you to information contained in the manual.

Conventions

This manual uses the following formats to describe, identify, and highlight terms and operating procedures.

Abbreviations

On first appearance, and whenever necessary for clarity, abbreviations are enclosed in parentheses following their definition. For example: Read Only Memory (ROM). Acronyms are also defined in the Glossary.

Keys

The keyboard keys are used in the text to describe many computer operations. A distinctive typeface identifies the key top symbols as they appear on the keyboard. For example, **Enter** identifies the Enter key.

Key operation

Some operations require you to simultaneously use two or more keys. We identify such operations by the key top symbols separated by a plus sign (**+**). For example, **Ctrl + C** means you must hold down **Ctrl** and at the same time press **C**. If three keys are used, hold down the first two and at the same time press the third.

DISKCOPY A: B: Text you are to type in is represented in the type face you see to the left.

Display

ABC Text generated by the computer that appears on its display screen is presented in the type face you see to the left.

Test function

If any errors or malfunctions are encountered, please refer to Chapter 6, *Test Function*. The test function enables you to check whether the cause is in the local station, the remote station or in the communication line.

Messages

Messages are used in this manual to bring important information to your attention. Each type of message is identified as shown below.

Pay attention! A caution informs you that improper use of equipment or failure to follow instructions may cause data loss or damage your equipment.

Please read. A note is a hint or advice that helps you make best use of your equipment.

Chapter 1

Introduction

The Toshiba international modem provides capability for facsimile transmissions and standard computer-to-computer data communications. The international modem has an RJ11 jack for connecting to an analogue telephone line.

This chapter describes features of the international modem.

Features

V.90/K56flex high-speed data communication	The Toshiba international modem uses V.90 and K56flex technology. The modem is capable of downstream speeds of 56Kbps (kilobits per second) when connected to an Internet Service Provider that supports V.90 or K56flex. As with any modem, the actual throughput (speed of data transfer) depends on analogue telephone line conditions, which can vary considerably. Therefore, many users will experience throughput in the range of 28-50Kbps under normal telephone line conditions. Upstream data flows at the V.34 rate. Refer to Appendix D.
Other high-speed data communication	You can use the international modem to transmit and receive data at rates of up to 33,600 bps. It supports the V.34 international standard for asynchronous data transmission on telephone lines and all other existing standards. Refer to the function charts in this chapter.
Fax capability	You can use the international modem to transmit and receive facsimiles at rates of up to 14,400 bps. It supports Class 1 fax transmission. Refer to the function charts in this chapter.
Standard commands	The international modem is compatible with the industry standard Hayes® AT commands and S-register settings.

Error control	This feature assures accurate data transmission even over telephone lines subject to noise interference. The international modem uses Microcom Networking Protocol® 4 (MNP®4) and V.42 error correction.
Data compression	Compression can greatly increase data throughput. The international modem has MNP5 and V.42bis data compression protocols.
Serial port access	The international modem frees your computer's serial port for connection of a serial mouse, serial printer or other serial device.
Ring indicator power on	The computer can be powered automatically when a remote transmission is received. It works only when the computer is in Resume mode. Refer to your computer's documentation for details on Ring indicator power on.
Resume	When the computer is set to Resume mode, the modem settings and connection are automatically resumed when you turn on the power. Refer to your computer's documentation for details on Resume mode.

Function charts

The chart below lists the international modem's functions.

Functions available in all operating systems

Function		Remarks
Data	V.90	From 56000 to 28000 bps (reception only)
	K56flex	From 56000 to 32000 bps (reception only)
	V.34	From 33600 to 2400 bps
	V.32bis	14400, 12,000, 9600, 7200, 4800 bps
	V.32	7200, 4800 bps
	V.22bis	2400, 1200 bps
	V.22	1200 bps
	V.23	1200, 600, 75 bps
	V.21	300 bps
	BELL212A	1200 bps
	BELL103	300 bps
	MNP5	Data compression
	MNP4	Error control
	V.42bis	Data compression
	V.42	Error control
Fax	V.17	14400, 12000, 9600, 7200 bps
	V.29	9600, 7200 bps
	V.27ter	4800,2400 bps
	V.21 ch2	300 bps
	EIA-578	Class 1 command

Chapter 2

Using the International Modem

This chapter describes connection, basic operations and country selection.

Country selection

Telecommunication regulations vary from one country to another, so you will need to make sure the international modem's settings are correct for the country in which it will be used.

In some countries, you cannot change the country code. Also, this utility is not provided in some countries.

Dynamic selection using Toshiba utility

This utility is used with Windows 95/98 and Windows NT/2000.

1. Click **Start**, point to **Programs** and **Toshiba International Modem** and click **Country Selection**.
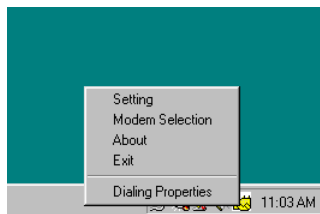2. The **Country Selection** icon will appear in the Windows taskbar.

The Country Selection icon

3. Left click on the **Country Selection** icon, the country selection list will appear.

The Country Selection List

4. Select the country in which the TOSHIBA **International** V.90 Modem will be used.

5. Right click on the **Country Selection** icon, the following menu will appear.

The Properties Menu

Setting

You can change the following settings.

Show Flags for country selection

Enable this option to show national flags in the Country Selection list instead of the country names.

AutoRun Mode

Enable this option to automatically execute the Country Selection Utility when the OS boots up and set the modem to the selected country.

Open the Dialling Properties dialog box after selecting country

Enable this option to automatically open the Windows Dialling Properties dialog box to make dialling settings.

Modem Selection

Use this dialog box to select the COM port of your modem. This dialog will be displayed automatically when the TOSHIBA international modem cannot be found.

Dialling Properties

When you select this option, the Dialling Properties window will appear.

Country list

You can select from among the following 16 countries. The list may vary depending on the type of modem.

1.	Austria	9.	Italy
2.	Belgium	10.	Netherlands
3.	Denmark	11.	Norway
4.	Finland	12.	Portugal
5.	France	13.	Spain
6.	Germany	14.	Sweden
7.	Greece	15.	Switzerland
8.	Ireland	16.	UK

Country selection in Windows

To make a country selection using Windows 95/98 and Windows NT/2000, follow the steps below.

1. Open the control panel and double click the **Modems** icon.

2. Click the Dialling Properties button to display the following window:
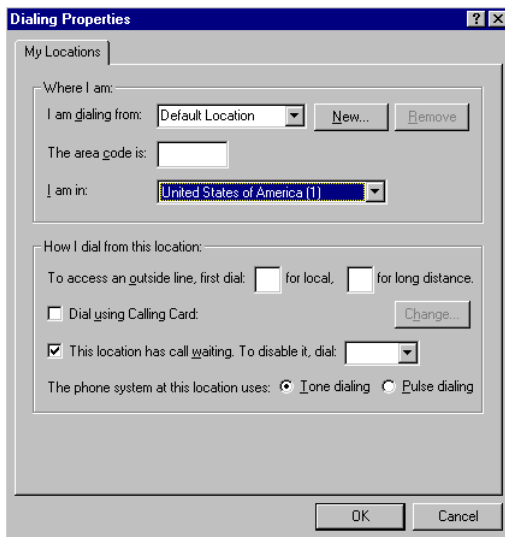
The Dialling Properties window

3. Select the country you want and close the window.

This setting will be effective after cold boot.

Country selection with AT commands

DOS is not supported by the Country Selection utility. If you use a DOS-based communications software, you will have to use an AT command to enter the country settings.

Country code input

Start your communications software and set terminal mode. Then follow the steps below.

1. Type **AT%TE=1** and press **Enter**.
2. Type **ATS133= ***, where the asterisk represents one of the hexadecimal values below and press **Enter**.

   The values (hexadecimal) for each country are:

Australia	1	Sweden	C
Belgium	2	Switzerland	D
Denmark	3	UK	E
Finland	4	Austria	F
France	5	Japan	10
Germany	6	Portugal	18
Netherlands	7	USA	19
Italy	8	Ireland	1A
New Zealand	9	Canada	1C
Norway	A	Greece	21
Spain	B		

3. Type **AT&F** and press **Enter**.
4. Type **AT&W** and press **Enter**.
5. Type **AT%TE=0** and press **Enter**.

After setting up the country code input the ATZ command to reset the software.

Connection procedures

This section describes how to connect and disconnect the international modem to a telephone jack.

⚠️ *In case of a lightning storm, unplug the modem cable from the telephone jack.*

Do not connect the modem to a digital telephone line. A digital line will damage the modem.

Connecting the international modem

A standard modular cable is supplied with the international modem. Follow the steps below to connect the international modem to a telephone jack.

1. Turn the connector so that the small connecting lever faces down.
2. Squeeze the lever and plug the connector into the computer's RJ11 jack.
3. Plug the other end of the cable into an RJ11 wall jack.
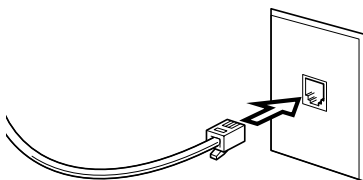
Connecting the international modem

ℹ️ *When you connect the RJ11 jack, insert the jack until you hear a click.*

Disconnecting the international modem

When you need to disconnect the international modem's modular cable for transporting the computer or other reason, follow the steps below.

1. Pinch the connecting lever on the connector in the telephone wall jack and pull out the connector.
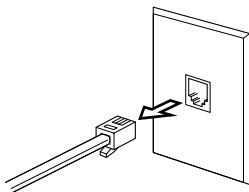
Disconnecting the cable from the wall jack

2. Disconnect the modular cable from the computer.

Basic operation

After you connect the modular cable to your international modem and a telephone jack, you are ready to run your communication software. Refer to your software documentation for instructions on operating your international modem.

As examples, this section describes how to execute basic modem operations by typing AT commands directly into the communication software program. You must be in terminal mode to enter the AT commands. Refer to your software documentation or on-line help.

Connecting to a telephone line

The AT commands for connecting to a telephone line depend on whether you are using a direct line or an extension line such as in an office building.

Direct access line

To place a call using tone dialling, enter:

ATDT*****

Press **Enter**.

The asterisks * indicate the number you are calling.

To place a call using pulse dialling, enter:

ATDP*****

Press **Enter**.

The asterisks * indicate the number you are calling.

Extension line

If you are calling from an extension line, such as in an office building, and need to dial zero or another number to gain external access, follow the steps below.

To place a call using tone dialling, enter:

ATDT 0, *****

Press **Enter**.

The zero or other number is for line access; the comma (,) is for a pause (about 4 seconds with the default setting) to give time for a connection. The asterisks * indicate the number you are calling.

To place a call using pulse dialling, enter:

ATDP 0, *******

Press **Enter**.

The zero or other number is for line access; the comma is for a pause (about 4 seconds with the default setting) to give time for a connection. The asterisks * indicate the number you are calling.

You can enter as many commas as you need. The following example will result in a 12-second pause:

ATDT 0, , , *******

Press **Enter**.

If you are using a PBX connection that does not wait for a dial tone, add the X0, X1 or X3 to the AT command line. For example:

ATX3DP 0*, ********

Press **Enter***.*

Actual usage will vary according to the host system so please check with the system manager.

Receiving a call

To set the number of rings before the international modem automatically answers the phone set the S0 register as follows:

ATS0=*

Press **Enter**.

The asterisk * indicates the number of rings.

Refer to Chapter 4, *S-Registers* for details.

Terminating a call

The methods for terminating a call depend on the status of the communication.

■ If the international modem is dialling or has not yet gone on-line, you can terminate a call simply by pressing **Enter**.

■ If the terminal is on-line, enter the escape code (**+++**), then enter:

   ATH0

   Press **Enter**.

■ If the remote party's carrier is terminated, the call will be automatically cut off.

■ If the power to the computer is cut off, the call is terminated.

Setting the data flow control

Data flow control is used to start and stop data transmission according to the status of the data buffer (full or empty). The following describes how to set the data flow control method: CTS/RTS (hardware control) or XON/XOFF (software). Refer also to Chapter 5, *MNP and V.42*.

CTS/RTS control

This control method is hardware dependent. To control data flow, the modem and computer transmit Clear To Send/Request To Send signals to each other. To set CTS/RTS control, enter the following AT command:

AT\N3\Q3\V1

Any other MNP related settings should use factory default values.

XON/XOFF control

This control method is managed by software. The start/stop signals, that is transfer on/transfer off, are included in the data stream. To set XON/XOFF control, enter the following AT command:

AT\N3\Q1\V1

Any other MNP related settings should use factory default values.

With this setting, binary data cannot be transmitted using X-MODEM.

Please use any settings recommended by the communications software. Please refer to your communications software manual.

In some cases, even when your modem and the remote modem are in MNP mode, an MNP connection cannot be achieved. Failure to achieve an MNP connection can be caused by line interference. In this case, hang up and retry the connection. Also when an MNP connection is achieved, a circuit problem can cause errors that stop data flow. This condition should not be considered a malfunction. If the remote modem is not in MNP mode, \N2, \N3, \N4 and \N5 can result in errors. In this case, change the setting to \N0 or \N1.

Facsimiles

For fax communication, use G3. Example:

AT\N3\Q1\V1

Fax communication uses EIA-578 Class 1 commands and requires fax software. Communication is controlled by the fax software.

Use only software compatible with EIA-578 Class 1. Do not use EIA-592 Class 2 compatible software.

Chapter 3

AT Commands

In most cases, you will not need to type AT commands manually. However, there might be some occasions when you will need to do so.

This chapter describes AT commands for data mode. Fax commands are taken care of by application software.

The format for entering AT commands is:

ATXn

where **X** is the AT command, and **n** is the specific value for that command. After you type in the command press **Enter**.

Any command issued is acknowledged with a response in either text or numeric values known as result codes.

All commands and command-values accepted by the modem are described in this section; any entry other than those listed results in an error.

+++ *Escape sequence*

The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, you can communicate directly to your modem using AT commands. Once you finish, you can return to data mode using the ATO command.

A pause, the length of which is set by Escape Guard Time (S12), must be completed after an escape sequence is entered, This pause prevents the modem from interpreting the escape sequence as data.

The value of the escape sequence character may be changed using register S2.

A/ *Repeat last command*

This command repeats the last command string entered. Do not precede this command with an AT prefix or conclude it by pressing **Enter**.

A *Answer command*

This command instructs the modem to go off-hook and answer an incoming call.

Refer to table 3-1 for country-specific codes.

Bn   Communication standard setting

This command determines the communication standard CCITT or Bell.

B0   Selects CCITT V.22 mode when the modem is at 1200 bps.

B1   Selects Bell 212A when the modem is at 1200 bps (default).

B15   Selects V.21 when the modem is at 300 bps.

B16   Selects Bell 103J when the modem is at 300 bps (default).

Result Codes:

OK   n=0,1,15,16

ERROR Otherwise

Dn   Dial

This command instructs the modem to dial a telephone number. Enter n (the telephone number and any modifiers) after the ATD command.

Any digit or symbol (0-9, *, #, A, B, C, D) may be dialled as touch-tone digits. Characters such as spaces, hyphens, and parentheses do not count. They are ignored by the modem, but you may want to include them to make the number and modifiers easier to read.

The following may be used as phone number modifiers:

P   Pulse dialling.

T   Touch-tone dialling (default).

,   Pause during dialling. Pause for time specified in Register S8 before processing the next character in the dial string.

W   Wait for dial tone. Modem waits for a second dial tone before processing the dial string.

@   Wait for quiet answer. Wait for five seconds of silence after dialling the number. If silence is not detected, the modem sends a NO ANSWER result code back to the caller.

!   Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook.

;   Return to command mode. Causes the modem to return to command mode after dialling a number, without disconnecting the call.

S=n   Dial a telephone number previously stored using the &Zn=X command (See &Zn=X command for more information). The range is 0-3.

Refer to table 3-1 for country-specific codes.

En   *Echo command*

This command controls whether or not the characters entered from your computer keyboard are displayed on your monitor (echoed) while the modem is in command mode.

E0   Disables echo to the computer.

E1   Enables echo to the computer (default).

Result Codes:

OK   n=0,1

ERROR   Otherwise

Hn   *Hook control*

This command instructs the modem to go on-hook to disconnect a call, or off-hook to make the phone line busy.

H0   Modem goes on-hook (default).

H1   Modem goes off-hook.

Result Codes:

OK   n=0,1

ERROR   Otherwise

In   *Request ID information*

This command displays product information about the modem.

I0   Returns device information.

I1   Calculates ROM checksum and displays it on the DTE.

I2   Performs a ROM check and calculates and verifies the checksum displaying **OK** or **ERROR**.

I3   Same as **I0**.

I4   Returns firmware version for data pump.

I9   Returns country code.

Result Codes:

OK   n=0,1,2,3,4,9

ERROR   Otherwise

Ln   *Monitor speaker volume*

This command sets speaker volume to low, medium, or high.

L0   Low volume.

L1   Low volume. (Same as **L0**)

L2   Medium volume (default).

L3   High volume.

Result Codes:

OK   n=0,1,2,3

ERROR   Otherwise

Mn *Monitor speaker mode*

This command turns the speaker on or off.

M0 The speaker is off.

M1 The speaker is on until the modem detects the carrier signal (default).

M2 The speaker is always on when modem is off-hook.

Result Codes:

OK n=0,1,2

ERROR Otherwise

Nn *Modulation handshake*

This command controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different.

N0 When originating or answering, this is for handshake only at the communication standard specified by S37 and the ATB command.

N1 When originating or answering, begin the handshake at the communication standard specified by S37 and the ATB command (default).

During handshake, a lower transmission speed may be selected.

Result Codes:

OK n=0,1

ERROR Otherwise

On *Return on-line to data mode*

O0 Instructs the modem to exit on-line command mode and return to data mode (see AT escape sequence, +++).

O1 This command issues a retrain before returning to on-line data mode.

O3 This command issues a rate renegotiation before returning to on-line data mode.

Result Codes:

OK n=0,1,3

ERROR Otherwise

P   Select pulse dialling

This command configures the modem for pulse (non touch-tone) dialling. Dialled digits are pulsed until a T command or dial modifier is received. Tone dial is the default setting.

Refer to table 3 -1 for country-specific codes.

Qn   Result code control

Result codes are informational messages sent from the modem and displayed on your monitor. Basic result codes are **OK**, **CONNECT**, **RING**, **NO CARRIER**, and **ERROR**. The ATQ command allows the user to turn result codes on or off.

Q0   Enables modem to send result codes to the computer (default).

Q1   Disables modem from sending result codes to the computer.

Result Codes:

OK   n=0,1

ERROR   Otherwise

T   Select tone dialling

This command instructs the modem to send DTMF tones while dialling. Dialled digits are tone dialled until a P command or dial modifier is received. This is the default setting.

Vn   DCE response format

This command controls whether result codes (including call progress and negotiation progress messages) are displayed as words or their numeric equivalents.

V0   Displays result codes as digits.

V1   Displays result codes as text (default).

Result Codes:

OK   n=0,1

ERROR   Otherwise

Xn   Result code selection, call progress monitoring

This command sets detection options for dial tones and busy signals, which is its primary function. It also, however, enables or disables extended result codes.

Refer to table 3-1 for country-specific codes.

Command	Extended result code	Dial tone detect	Busy signal detect
X0	Disable	Disable	Disable
X1	Enable	Disable	Disable
X2	Enable	Enable	Disable
X3	Enable	Disable	Enable
X4 (default)	Enable	Enable	Enable
X5	Enable	Enable	Enable
X6	Enable	Enable	Enable
X7	Disable	Enable	Enable

Extended result codes

Disabled: Displays only the basic result codes **OK**, **CONNECT**, **RING**, **NO CARRIER**, and **ERROR**.

Enabled: Displays basic result codes, along with the connect message and the modem's data rate, and an indication of the modem's error correction and data compression operation.

Dial tone detect

Disabled: The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialling is specified in register S6.

Enabled: The modem dials only upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.

Busy tone detect

Disabled: The modem ignores any busy tones it receives.

Enabled: The modem monitors for busy tones.

Result Codes:

OK   n=0,1,2,3,4,5,6,7

ERROR   Otherwise

Zn   *Recall stored profile*

The modem performs a soft reset and restores (recalls) the configuration profile according to the parameter supplied. If no parameter is specified, zero is assumed. Either Z0 or Z1 restores the profile.

Result Codes:

OK   n=0,1

ERROR   Otherwise

&Cn   *Data Carrier Detect (DCD) control*

Data Carrier Detect is a signal from the modem to the computer indicating that a carrier signal is being received from a remote modem. DCD normally turns off when the modem no longer detects the carrier signal.

&C0   The state of the carrier from the remote modem is ignored. DCD circuit is always on.

&C1   DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected (default).

Result Codes:

OK   n=0,1

ERROR   Otherwise

&Dn   *DTR control*

This command interprets how the modem responds to the state of the DTR signal and changes to the DTR signal.

&D0   Ignore. The modem ignores the true status of DTR and treats it as always on. This should only be used if your communication software does not provide DTR to the modem

&D1   If the DTR signal is not detected while in on-line data mode, the modem enters command mode, issues an **OK** result code, and remains connected.

&D2   If the DTR signal is not detected while in on-line data mode, the modem disconnects (default).

&D3   Reset on the on-to-off DTR transition.

Result Codes:

OK   n=0,1,2,3

ERROR   Otherwise

&F   Load factory settings

This command loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values.

&F   Recall factory setting as active configuration.

&Gn   V.22bis guard tone control

This command determines which guard tone, if any, to transmit while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not used in North America and is for international use only.

&G0   Guard tone disabled (default).

&G1   Sets guard tone to 550 Hz.

&G2   Sets guard tone to 1800 Hz.

Result Codes:

OK   n=0,1,2

ERROR   Otherwise

&Kn   Local flow control selection

&K0   Disable flow control.

&K3   Enable CTS/RTS flow control (default).

&K4   Enable XON/XOFF flow control.

Result Codes:

OK   n=0,3,4

ERROR   Otherwise

&Pn   Select Pulse Dial Make/Break Ratio (WW)

&P0   Selects 39% - 61% make/break ratio at 10 pulses per second.

&P1   Selects 33% - 67% make/break ratio at 10 pulses per second.

&P2   Selects 39% - 61% make/break ratio at 20 pulses per second.

Result Codes:

OK   n=0 to 2

ERROR   Otherwise

&Tn   Self-test commands

These tests can help to isolate problems if you experience periodic data loss or random errors.

&T0   Abort. Stops any test in progress.

&T1   Local analogue loop. This test verifies modem operation, as well as the connection between the modem and computer. Any data entered at the local DTE is modulated, then demodulated, and returned to the local DTE. To work properly, the modem must be off-line.

Result Codes:

OK   n=0

CONNECT n=1

ERROR   Otherwise

&V   View active configuration and stored profile

This command is used to display the active profiles on your computer's monitor.

&V   View active file

For example:

Option	Selection	AT Command
Comm Standard	Bell	B
Command Char Echo	Enable	E
Speaker Volume	Medium	L
Speaker Control	OnUntilCarr	M
Result Codes	Enable	Q
Dialler Type	Tone	T/P
Result Code Form	Text	V
Extend Result Code	Enable	X
Dial Tone Detect	Enable	X
Busy Tone Detect	Enable	X
LSD Action	Standard RS-232C	&C
DTR Action	Ignore	&D

Press any key to continue; **Esc** to quit.

Option	Selection	AT Command
V.22b Guard Tone	Disable	&G
Flow Control	Hardware	&K
Error Control Mode	V.42, MNP, Buffer	\N
Data Compression	Enable	%C
Auto Answer Ring#	0	S0
AT Escape Char	43	S2
Carriage Rtn Char	13	S3
Linefeed Char	10	S4
Backspace Char	8	S5
Blind Dial Pause	2 sec.	S6
No Answer Time-out	50 sec.	S7
"," Pause Time	4 sec.	S8

Press any key to continue; **Esc** to quit.

Option	Selection	AT Command
No Carrier Disc	2000 msec.	S10
DTMF Dial Speed	95 msec.	S11
Escape Guard Time	1000 msec.	S12
Data Calling Tone	Disabled	S35
Line Rate	33600	S37
DSVD mode	Disabled	-SSE

Press any key to continue: **Esc** to quit.

Stored phone numbers

&Z0=
&Z1=
&Z2=
&Z3=
OK

&W   Store current configuration

Saves the current (active) configuration (profile), including S-Registers.

The current configuration comprises a list of storable parameters illustrated in the **&V** command. These settings are restored to the active configuration upon receiving a **Zn** command or at power up. Refer to the **&V** command.

&W   Stores the current configuration.

&Zn=x   *Store telephone number*

This command is used to store up to four dialling strings in the modem's non-volatile memory for later dialling. The format for the command is **&Zn**="stored number" where n is the location 0-3 to which the number should be written. The dial string may contain up to 40 characters. The ATDS=n command dials using the string stored in location n.

Result codes:

OK   n=0, 1, 2, 3

ERROR   Otherwise

\Nn   *Error control mode selection*

This command determines the type of error control used by the modem when sending or receiving data.

\N0   Buffer mode. No error control.

\N1   Same as **\N0**.

\N2   MNP or disconnect mode. The modem attempts to connect using MNP2-4 error control procedures. If this fails, the modem disconnects.

         This is also known as MNP reliable mode.

\N3   V.42, MNP, or buffer (default).

         The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/MNP auto reliable mode.

\N4   V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.

\N5   V.42. MNP or Buffer (same as **\N3**).

\N7   V.42. MNP or Buffer (same as **\N3**).

Result Codes:

OK   n=0,1,2,3,4,5,7

ERROR   Otherwise

\Qn   *Local flow control selection*

\Q0   Disable flow control.

\Q1   XON/XOFF software flow control.

\Q3   CTS/RTS to DTE (default).

Result Codes:

OK   n=0,1,3

ERROR   Otherwise

\Vn   Protocol result code

\V0   Disable protocol result code appended to DCE speed.

\V1   Enable protocol result code appended to DCE speed (default).

Result Codes:

OK   n=0,1

ERROR   Otherwise

-V90=*   V.90 Dial Line Rate

-V90 sets the maximum V.90 downstream rate that the modem attempts to connect. The asterisk represents one of the line rates listed below.

0	V.90 disabled
1	V.90 enabled: automatic speed selection - maximum modem speed (default)
2	28000 bps
3	29333 bps
4	30666 bps
5	32000 bps
6	33333 bps
7	34666 bps
8	36000 bps
9	37333 bps
10	38666 bps
11	40000 bps
12	41333 bps
13	42666 bps
14	44000 bps
15	45333 bps
16	46666 bps
17	48000 bps
18	49333 bps
19	50666 bps
20	52000 bps
21	53333 bps

%B   View numbers in blacklist

This command displays the phone numbers for which connections have failed. If you are using the modem in a country that does not require blacklisting, an error code results when you execute this command.

Refer to table 3-1 for country-specific codes.

%Cn   Data compression control

This command determines the operation of V.42bis and MNP class 5 data compression. On-line changes do not take effect until a disconnect occurs first.

%C0   V.42bis/MNP 5 disabled. No data compression.

%C1   V.42bis/MNP 5 enabled. Data compression enabled (default).

Result Codes:

OK   n=0,1

ERROR   Otherwise

Table 3-1 AT commands that vary according to country regulations

	ATA	ATDP/ATP/&P (10PPS)	AT%B	ATS0
Australia	Normal	Enable	Disable	0 to 255
Austria	If S1 is not 0, then active	Enable	Enable	0 and 2 to 6
Belgium	Normal	Enable	Enable	0 and 2 to 6
Denmark	Normal	Disable	Disable	0 and 2 to 6
Finland	Normal	Enable	Disable	0 and 2 to 6
France	If S1 is not 0, then active	Enable	Enable	0 and 2 to 6
Germany	If S1 is not 0, then active	Enable	Enable	0 and 2 to 6
Italy	If S1 is not 0, then active	Enable	Enable	0 and 2 to 6
Netherlands	Normal	Enable	Enable	0 and 2 to 6
New Zealand	Normal	Enable	Disable	0 to 255
Norway	Normal	Enable	Enable	0 and 2 to 6
Portugal	Normal	Enable	Disable	0 and 2 to 6
Spain	Normal	Enable	Enable	0 to 255
Sweden	Normal	Disable	Disable	0 to 255
Switzerland	Normal	Enable	Disable	0 and 2 to 6
U.K.	Normal	Enable	Disable	0 to 255

Table 3-1 AT commands that vary according to country regulations continued

	ATS11	AT&P (20PPS)	ATS 6	ATS 8	ATS91	ATX
Australia	Fixed (85)	Disable	12	4	10	Normal
Austria	Fixed (85)	Disable	4	4	10	Normal
Belgium	Fixed (85)	Disable	12	4	10	Always dial tone detect
Denmark	Fixed (85)	Disable	4	4	10	Always dial tone detect
Finland	Fixed (85)	Disable	4	4	10	Always dial tone detect
France	Fixed (85)	Disable	12	4	10	Normal
Germany	Fixed (85)	Disable	4	4	10	Normal
Italy	Fixed (85)	Disable	4	4	10	Normal
Netherlands	Fixed (85)	Disable	4	4	10	Always dial tone detect
New Zealand	Fixed (85)	Disable	4	4	10	Normal
Norway	Fixed (85)	Disable	4	4	10	Normal
Portugal	Fixed (150)	Disable	4	4	10	Always dial tone detect
Spain	Fixed (150)	Disable	4	4	10	Normal
Sweden	Fixed (85)	Disable	4	4	10	Normal
Switzerland	Fixed (85)	Disable	4	4	10	Normal
U.K.	Fixed (85)	Disable	4	4	10	Normal

Chapter 4

S-registers

S-registers contain the settings that determine how a number of functions of the international modem operate. For example, how many times to let the telephone ring before the modem answers and how long to wait before it hangs up if a connection fails. You can also customise certain AT commands such as the escape sequence and command line termination.

The contents of the registers are changed automatically when you modify corresponding settings in your communication software. If you choose, however, you can display and edit the contents of the registers manually when the modem is in command mode. If the value is out of the acceptable range, then an error is generated.

This chapter describes the settings for each S-register.

S-register values

The format for displaying the value of an S-register is:

ATSn?

where **n** is the register number. After you type in the register press **Enter**.

The format for modifying the value of an S-register is:

ATSn=r

where **n** is the register number, and **r** is the new register value. After you type in the register and its new value press **Enter**.

S0   Auto answer ring number

This register determines the number of rings the modem will count before automatically answering a call. Enter 0 (zero) if you do not want the modem to automatically answer at all. When disabled, the modem can only answer with an ATA command.

Range: (0-255) or (0 or 2 to 6) depending on the country

Default: 0

Units: rings

S1   Ring counter

This register is read only. The value of S1 is incremented with each ring. If no ring occurs over a six-second interval, this register is cleared.

Range: 0-225
Default: 0
Units: rings

S2   AT escape character (user defined)

This register determines the ASCII values used for an escape sequence. The default is the + character. The escape sequence allows the modem to exit data mode and enter command mode when on-line. Values greater than 127 disable the escape sequence.

Range: 0-255
Default: 43
Units: ASCII

S3   Command line termination character (user defined)

This register determines the ASCII values as the carriage return character. This character is used to end command lines and result codes.

Range: 0-127, ASCII decimal
Default: 13 (carriage return)
Units: ASCII

S4   Response formatting character (user defined)

This register determines the ASCII value used as the line feed character. The modem uses a line feed character in command mode when it responds to the computer.

Range: 0-127, ASCII decimal
Default: 10 (line feed)
Units: ASCII

S5 *Command line editing character (user defined)*

This register sets the character recognised as a backspace and pertains to asynchronous only. The modem will not recognise the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the backspace character, an ASCII space character, and a second backspace character. This means a total of three characters are transmitted each time the modem processes the backspace character.

Range: 0-127, ASCII decimal

Default: 8 (backspace)

Units: ASCII

S6 *Wait before dialling*

This register sets the length of time, in seconds, that the modem must wait (pause) after going off-hook before dialling the first digit of the telephone number. The modem always pauses for a minimum of two seconds, even if the value of S6 is less that two seconds. The wait for dial tone call progress feature (W dial modifier in the dial string) will override the value in register S6. This operation, however, may be affected by some ATX options according to country restrictions. In some countries, S6 will set dial tone detect time.

Range: 2-65

Default: 4 or 12

Units: seconds

S7 *Connection completion time-out*

This register sets the time, in seconds, that the modem must wait before hanging up because carrier is not detected. The timer is started when the modem finishes dialling (originate), or goes off-hook (answer). In originate mode, the timer is reset upon detection of an answer tone if allowed by county restriction. The timer also specifies the wait for silence time for the @ dial modifier in seconds. S7 is not associated with the W dial modifier.

Range: 1-255

Default: 50

Units: seconds

S8   Comma pause time

This register sets the time, in seconds, that the modem must pause when it encounters a comma (,) in the dial command string. In some countries, S8 will set both wait before dialling and comma pause time.

Range: 0-65
Default: 4
Units: seconds

S10   Automatic disconnect delay

This register sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for temporary carrier loss without causing the local modem to disconnect.

The actual interval the modem waits before disconnection is the value in register S10.

Range: 1-254
Default: 20
Units: .1 seconds

S11   DTMF dialling speed

This register determines the dialling speed which is prefixed for each country.

Range: 50-150
Default: 85 or 150
Units: .001 seconds

S12   Escape guard time

This register sets the value (in 20 ms increments) for the required pause after the escape sequence (default 1 s).

Range: 0-255
Default: 50
Units: .02 seconds

S37   Dial line rate

This register sets the maximum dial line rate.

In K56FLEX and V.90 mode, S37 sets the maximum upstream rate.

S37 = 0 (default)	maximum modem speed
S37 = 1	reserved
S37 = 2	1200/75 bps
S37 = 3	300 bps
S37 = 4	reserved
S37 = 5	1200 bps
S37 = 6	2400 bps
S37 = 7	4800 bps
S37 = 8	7200 bps
S37 = 9	9600 bps
S37 = 10	12000 bps
S37 = 11	14400 bps
S37 = 12	16800 bps
S37 = 13	19200 bps
S37 = 14	21600 bps
S37 = 15	24000 bps
S37 = 16	26400 bps
S37 = 17	28800 bps
S37 = 18	31200 bps
S37 = 19	33600 bps

S38 K56FLEX dial line rate

S38 sets the maximum K56FLEX downstream rate that the modem attempts to connect.

S38 = 0	K56FLEX disabled
S38 = 1 (default)	maximum modem speed
S38 = 2	32000 bps
S38 = 3	34000 bps
S38 = 4	36000 bps
S38 = 5	38000 bps
S38 = 6	40000 bps
S38 = 7	42000 bps
S38 = 8	44000 bps
S38 = 9	46000 bps
S38 = 10	48000 bps
S38 = 11	50000 bps
S38 = 12	52000 bps
S38 = 13	54000 bps
S38 = 14	56000 bps

AT command set result codes

The following table shows the result codes.

The result code summary

Result Code	Numeric	Description
OK	0	Command executed
CONNECT	1	Modem connected to line
RING	2	A ring signal has been detected
NO CARRIER	3	Modem lost carrier signal, or does not detect carrier signal, or does not detect answer tone
ERROR	4	Invalid command
CONNECT 1200 EC*1	5	Connection at 1200 bps
NO DIAL TONE	6	No dial tone detected
BUSY	7	Busy signal detected
NO ANSWER	8	No quiet answer
CONNECT 2400 EC*1	10	Connection at 2400 bps
CONNECT 4800 EC*1	11	Connection at 4800 bps
CONNECT 9600 EC*1	12	Connection at 9600 bps
CONNECT 14400 EC*1	13	Connection at 14400 bps
CONNECT 12000 EC*1	25	Connection at 12000 bps
CONNECT 16800 EC*1	86	Connection at 16800 bps
CONNECT 300 EC*1	40	Connection at 300 bps
CONNECT 21600 EC*1	55	Connection at 21600 bps
CONNECT 24000 EC*1	56	Connection at 24000 bps
CONNECT 26400 EC*1	57	Connection at 26400 bps
CONNECT 28800 EC*1	58	Connection at 28800 bps
CONNECT 31200 EC*1	59	Connection at 31200 bps
CONNECT 33600 EC*1	60	Connection at 33600 bps
DELAYED*2	88	Delay is in effect for the dialled number
BLACKLISTED*2	89	Dialled number is blacklisted
BLACKLIST FULL*2	90	Blacklist is full

*1: *EC only appears when the Extended Result Codes configuration option is enabled. EC is replaced by one of the following symbols, depending upon the error control method used:*

- *V.42bis - V.42 error control and V.42bis data compression.*
- *V.42 - V.42 error control only.*
- *MNP 5 - MNP class 4 error control and MNP class 5 data compression.*
- *MNP 4 - MNP class 4 error control only.*
- *NoEC - No error control protocol.*

*2: *In some countries, these result codes may not appear.*

Country select command and S-register

In some countries, these commands and S-register are not supported.

S133   Country select

This register sets the country code.

Country	Code (hexadecimal)
Australia	1
Belgium	2
Denmark	3
Finland	4
France	5
Germany	6
The Netherlands	7
Italy	8
New Zealand	9
Norway	A
Spain	B
Sweden	C
Switzerland	D
United Kingdom	E
Austria	F
Japan	10
Portugal	18
USA	19
Ireland	1A
Canada	1C
Greece	21

%TE   Country dependent access control

Enables access to the country select register S133, which is normally disabled. To enable this register, execute the special AT command **AT%TE=1**.

Execute the special command.

To disable the register, execute the command **AT%TE=0**.

Chapter 5

MNP and V.42

The international modem has built-in protocols MNP Class 4 and V.42 for error correction and MNP class 5 and V.42bis for data compression. These protocols are also used for data compression and data flow control.

Error-correction overview

Telephone line noise, or electrical interference, can cause errors in data communication. Noise is especially a problem at high-speeds, of say 14,400 bps or greater.

The MNP and V.42 protocols were developed to ensure reliable data communications despite the high probability of error generation from line noise.

MNP error correction

MNP (Microm Networking Protocol) was developed by Microm Networking Protocol. MNP class 4 enables data correction of full-duplex communications and also provides asynchronous/synchronous conversion and data packet size negotiation to increase throughput.

The protocol of both modems must be the same, therefore if the remote modem supports only class 3 or below, the protocol for the remote modem will be used. If the remote modem does not use MNP, the communication will be made at the speed of the remote modem.

V.42 error correction

The V.42 (ITU-T-Rec V.42) protocol is recommended by the ITU (International Telecommunications Union). V.42 specifies two kinds of protocols, LAP-M (Link Access Procedure for Modem) and MNP classes 2, 3, and 4. This protocol first tries to establish a link to the remote modem with LAP-M. If it is unsuccessful, it tries to connect with MNP. Although this modem uses class 4 correction, it can connect in class 5 to remote modems that support class 5.

Operation modes

The operation mode depends on whether an error-protection protocol is being used.

Normal mode

Errors are not corrected, even if communication speed is different between a personal computer and modem, or between modems, the buffers in the modem and the flow control function permit communication without changing communication speed.

Reliable mode

This mode used with MNP or V.42 protocols to ensure error free communication.

Commands (\Nn)

The following N modulation handshake commands are used to set the communication mode:

|	
\N0, \N1	Remote modem unable to use MNP or V.42
\N2	Remote modem uses MNP
\N3	Uncertain if remote modem can use MNP or V.42
\N4	Remote modem uses V.42
\N5, \N7	Same as **\N3**

For details refer to Chapter 3, *AT Commands*.

Flow control

In both normal mode and reliable mode, the buffers in the modem and its flow control function permit communication even if speed is different between a personal computer and modem (serial port) or between modems (modem port).

If there is a speed difference between serial port and modem port, the buffers in the modem will become full periodically. Therefore, communication speed is controlled so that data transmission or reception is temporarily halted before the data exceeds buffer capacity, and that transmission is resumed when the receiving buffers have room. This is the flow control function.

The modem card has two kinds of flow control:

■ Serial port flow control
■ Modem port flow control (only in reliable mode)
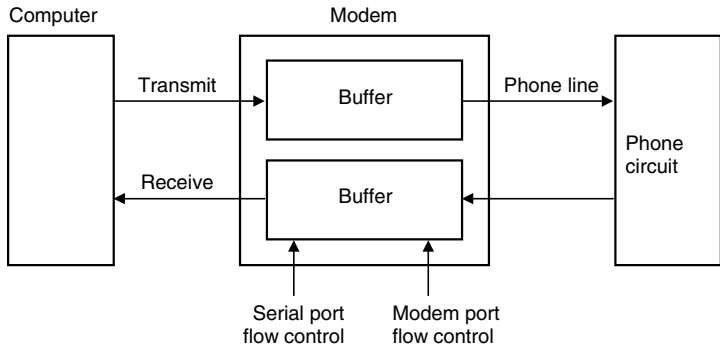
Flow control

Serial port flow control

Serial port data flow is controlled by the modem in its communication with a personal computer.

If serial port speed is higher than modem port speed, this control function sends a transmission halt request to the personal computer before the buffers in the modem are about to become full. When the buffers have room to receive data again, the transmission halt request is cancelled and data transmission from the personal computer is resumed.

The international modem provides three kinds of serial port flow control: one determined by software and two determined by hardware.

XON/XOFF flow control (software)

Flow control is performed by sending XON and XOFF control codes in the data stream. The XOFF code makes a transmission halt request, or the XON code makes a transmission restart request.

Since these two codes, XON and XOFF, are used as flow control characters, binary data that has these two codes cannot be transmitted or received.

CTS/RTS two-way flow control (hardware)

Flow control is performed by turning on and off the control lines CTS and RTS (request to send) between the modem and personal computer. A transmission halt or restart request is made from the modem to the personal computer using the CTS signal.

A transmission halt or restart request is made from the personal computer to the modem using the RTS signal.

Commands (\Qn, &Kn)

Select flow control between the modem and personal computer (serial port) as follows:

When CTS/RTS flow control is supported by communication software

\Q3, &K3   Communication in reliable mode or normal mode

When XON/OFF flow control only is supported by communication software

\Q1, &K4   Communication in reliable mode or normal mode

For details refer to Chapter 3, *AT Commands*.

Modem port flow control

Modem port flow control refers to flow control between the modems of the local station and remote station.

If data transmission from the modem under serial port flow control is interrupted because the computer cannot catch up with it, modem port flow control is applied to the remote modem so that transmitted data will not exceed buffer capacity. This flow control functions in normal mode only.

Data compression

Protocols MNP class 5 and V.42bis are included in the modem to compress data received from the computer. The receiving modem decompresses the received data and sends it to its own computer. This data compression function increases actual transmission speed up to twofold in communications using MNP5 or up to three- or fourfold in communications using V.42bis. The compression ratio varies depending on the data. Actual speed will not always be raised close to the maximum compression ratio.

Commands (%Cn)

Select whether or not to compress data in communications by MNP class 5 or V.42bis as follows:

%C1   Enables data compression

For details refer to Chapter 3, *AT Commands*.

Chapter 6

Test Function

Normally, data communications are executed by connecting your computer and modem to those of a remote station with a communication line. If any errors or malfunctions are encountered, it is necessary to check whether the cause is in the local station, the remote station or in the communication line.

Test description

This international modem has a test function (for local/analogue/loopback tests), which identifies the cause of a malfunction. The test can be used to check errors in data communications or to check operation following modem connection.

In conducting a test, use the **&T** command to select test mode and control.

For details on the **&T** command refer to Chapter 3, *AT Commands*.

A general description of each test and its procedures is given below.

In this test, data is transmitted from the computer, is looped back (analogue/loopback) within the modem from the transmitter to the receiver, then is sent back to the computer. This test enables the user to check whether the computer and modem operate in normal condition and whether they are properly connected.
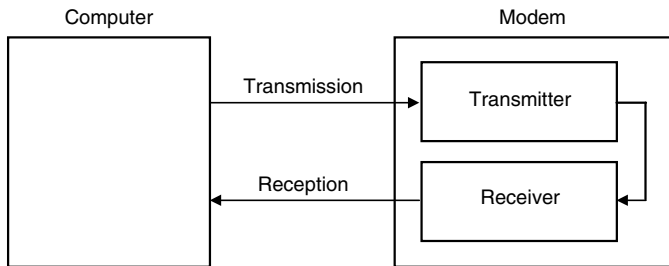
Local/analogue/loopback test

Testing procedure

To conduct the loopback test, follow the steps below.

1. Set the Toshiba Modem Port speed to 33,600 bps or less.

2. Enter as follows to set the modem to normal mode:

AT&F\N0

Select OK to verify the answer code.

3. Enter as follows to select the local/analogue/loopback test:

AT&T1

You are now in the on-line state.

4. Enter characters from the keyboard as desired.

The entered characters should be displayed on the screen.

5. Enter the escape code as follows to return to the command state from the on-line state.

+++

Select OK to verify the answer code.

6. Enter as follows to terminate the test:

AT&T0

Select OK to verify the answer code.

Appendix A

ASCII Character Codes

Appendix A shows the American Standard Code for Information Interchange (ASCII) on the following pages. The characters in the `CHAR` column appear on your display when you type the corresponding ASCII code. The characters that are printed, however, depend on the software you are using. For most software, the printed output for decimal codes 32 to 128 will match your screen display.

Dec code	Hex code	IBM char	Sort seq	Ctrl char
000	00		000	NUL
001	01	☺	1	SOH
002	02	☻	2	STX
003	03	♥	3	ETX
004	04	♦	4	EOT
005	05	♣	5	ENQ
006	06	♠	6	ACK
007	07	•	7	BEL
008	08	◘	8	BS
009	09	○	9	HT
010	0A	◙	10	LF
011	0B	♂	11	VT
012	0C	♀	12	FF
013	0D	♪	13	CR
014	0E	♫	14	SO
015	0F	☼	15	SI
016	10	►	16	DLE
017	11	◄	17	DC1
018	12	↕	18	DC2
019	13	‼	19	DC3
020	14	¶	20	DC4
021	15	§	21	NAK
022	16	▬	22	SYN
023	17	↨	23	ETB
024	18	↑	24	CAN
025	19	↓	25	EM
026	1A	→	26	SUB
027	1B	←	27	ESC
028	1C	∟	28	FS
029	1D	↔	29	GS
030	1E	▲	30	RS
031	1F	▼	31	US

Dec code	Hex code	IBM char	Sort seq	Dec code	Hex code	IBM char	Sort seq
032	20	space	32	064	40	@	64
033	21	!	33	065	41	A	65
034	22	"	34	066	42	B	66
035	23	#	35	067	43	C	67
036	24	$	36	068	44	D	68
037	25	%	37	069	45	E	69
038	26	&	38	070	46	F	70
039	27	'	39	071	47	G	71
040	28	(	40	072	48	H	72
041	29	)	41	073	49	I	73
042	2A	*	42	074	4A	J	74
043	2B	+	43	075	4B	K	75
044	2C	,	44	076	4C	L	76
045	2D		45	077	4D	M	77
046	2E	.	46	078	4E	N	78
047	2F	/	47	079	4F	O	79
048	30	0	48	080	50	P	80
049	31	1	49	081	51	Q	81
050	32	2	50	082	52	R	82
051	33	3	51	083	53	S	83
052	34	4	52	084	54	T	84
053	35	5	53	085	55	U	85
054	36	6	54	086	56	V	86
055	37	7	55	087	57	W	87
056	38	8	56	088	58	X	88
057	39	9	57	089	59	Y	89
058	3A	:	58	090	5A	Z	90
059	3B	;	59	091	5B	[	91
060	3C	<	60	092	5C	\	92
061	3D	=	61	093	5D	]	93
062	3E	>	62	094	5E	^	94
063	3F	?	63	095	5F	_	95

Dec code	Hex code	IBM char	Sort seq	Dec code	Hex code	IBM char	Sort seq
096	60	'	96	128	80	Ç	67
097	61	a	97	129	81	ü	85
098	62	b	98	130	82	é	69
099	63	c	99	131	83	â	65
100	64	d	100	132	84	ä	65
101	65	e	101	133	85	à	65
102	66	f	102	134	86	å	65
103	67	g	103	135	87	ç	67
104	68	h	104	136	88	ê	69
105	69	i	105	137	89	ë	69
106	6A	j	106	138	8A	è	69
107	6B	k	107	139	8B	ï	73
108	6C	l	108	140	8C	î	73
109	6D	m	109	141	8D	ì	73
110	6E	n	110	142	8E	Ä	65
111	6F	o	111	143	8F	Å	65
112	70	p	112	144	90	É	69
113	71	q	113	145	91	æ	65
114	72	r	114	146	92	Æ	65
115	73	s	115	147	93	ô	79
116	74	t	116	148	94	ö	79
117	75	u	117	149	95	ò	79
118	76	v	118	150	96	û	85
119	77	w	119	151	97	ù	85
120	78	x	120	152	98	ÿ	89
121	79	y	121	153	99	Ö	79
122	7A	z	122	154	9A	Ü	85
123	7B	{	123	155	9B	¢	36
124	7C	¦	124	156	9C	£	36
125	7D	}	125	157	9D	¥	36
126	7E	~	126	158	9E	Pt	36
127	7F	⌂	127	159	9F	ƒ	36

Dec code	Hex code	IBM char	Sort seq
160	A0	á	65
161	A1	í	73
162	A2	ó	79
163	A3	ú	85
164	A4	ñ	78
165	A5	Ñ	78
166	A6	ā	166
167	A7	ō	167
168	A8	¿	63
169	A9	⌐	169
170	AA	¬	170
171	AB	½	171
172	AC	¼	172
173	AD	¡	33
174	AE	«	34
175	AF	»	34
176	B0	░	
177	B1	▒	
178	B2	▓	
179	B3	│	
180	B4	┤	
181	B5	╡	
182	B6	╢	
183	B7	╖	
184	B8	╕	
185	B9	╣	
186	BA	║	
187	BB	╗	
188	BC	╝	
189	BD	╜	
190	BE	╛	
191	BF	┐	

Dec code	Hex code	IBM char	Sort seq
192	C0	└	
193	C1	┴	
194	C2	┬	
195	C3	├	
196	C4	─	
197	C5	┼	
198	C6	╞	
199	C7	╟	
200	C8	╚	
201	C9	╔	
202	CA	╩	
203	CB	╦	
204	CC	╠	
205	CD	═	
206	CE	╬	
207	CF	╧	
208	D0	╨	
209	D1	╤	
210	D2	╥	
211	D3	╙	
212	D4	╘	
213	D5	╒	
214	D6	╓	
215	D7	╫	
216	D8	╪	
217	D9	┘	
218	DA	┌	
219	DB	█	
220	DC	▄	
221	DD	▌	
222	DE	▐	
223	DF	▀	

Dec code	Hex code	IBM char	Sort seq
224	E0	α	
225	E1	ß	83
226	E2	Γ	
227	E3	Π	
228	E4	Σ	
229	E5	σ	
230	E6	μ	
231	E7	Υ	
232	E8	Φ	
233	E9	Θ	
234	EA	Ω	
235	EB	δ	
236	EC	φ	
237	ED	ϕ	
238	EE	E	
239	EF	Λ	
240	F0	Ξ	
241	F1	±	
242	F2	≥	
243	F3	≤	
244	F4	⌠	
245	F5	⌡	
246	F6	÷	
247	F7	≈	
248	F8	°	
249	F9	∙	
250	FA	∙	
251	FB	√	
252	FC	η²	
253	FD		
254	FE	■	
255	FF		

Appendix B

Specifications

This appendix summarises the Toshiba international modem's technical specifications.

Network control unit (NCU)

Type of NCU	AA
Type of line	Telephone line (analogue only)
Type of dialling	Pulse Tone
Control command	AT commands EIA-578 commands
Monitor function	Computer's speaker

Communication specifications

Communication system	Data: Full duplex Fax: Half duplex

Communication protocol	Data
	   ITU-T-Rec V.21/V.22/V.22bis/V.32
	   (Former CCITT) /V.32bis/V.34/V.90
	   Bell 103/212A
	   Other K56 flex
	
	Fax
	   ITU-T-Rec V.17/V.29/V.27ter
	   (Former CCITT) /V.21 ch2

Communication speed	Data transmission and reception
	   300/1200/2400/4800/7200/9600/12000/
	   14400/16800/19200/21600/24000/26400/
	   28800/31200/33600 bps
	
	Data reception only with K56flex
	   32000/34000/36000/38000/40000/42000/
	   44000/46000/48000/50000/52000/54000/
	   56000 bps
	
	Data reception only with V.90
	   28000/29333/30666/32000/33333/34666/360
	   00/37333/38666/40000/41333/42666/44000/4
	   5333/46666/48000/49333/50666/52000/5333
	   3/54666/56000 bps
	
	Fax
	   2400/4800/7200/9600/12000/14400 bps

Transmitting level	-10 dBm
Receiving level	-10 to -40 dBm
Input/output impedance	600 ohms ±30%
Error correcting	MNP class 4 and ITU-T V.42
Data compression	MNP class 5 and ITU-T V.42bis
Power supply	+3.3V, +5 V (supplied by computer)

Appendix C

Communication Conditions

Communication parameters

Select communication parameters from the table below.

Start (bps)	Data length (bit)	Parity (bit)	Stop (bit)
1	8	None	1 or more
1	7	0	1 or more
1	7	1	1 or more
1	7	Odd	1 or more
1	7	Even	1 or more
1	7	None	2

Telephone line types

This international modem can be connected to an analogue RJ11 telephone line.

Do not connect the modem to a digital telephone line. A digital line will damage the modem.

Dial modes

There are two types of dial mode, pulse dial and tone dial. Generally pulse dial lines are associated with rotary phones, but there may be cases where a push button phone is connected to a pulse dial line, so it is not possible to identify the type of line by simply looking at the phone. If you are not sure what type of line you are using, you can check an ordinary direct line by the following AT command, where n is the outside number.

ATDTn Enter

If you connect to the dialled number, the line is tone dial type. If you do not get a connection, it is pulse dial type.

The command **ATDP** will connect a pulse line.

Appendix D

V.90/K56flex

The Toshiba international modem is capable of high-speed data transmission. It supports V.90 and K56flex technology.

V.90/K56flex rates can be achieved only when connected to a V.90/K56flex-capable host modem. The Toshiba International modem will select automatically V.34 if the remote modem lacks V.90/K56flex capability or if a combination of network and/or phone line conditions prevent V.90/K56flex connection.

V.90 mode

Function	Transmission speed
Data V.90	From 56K (maximum) to 28Kbps (minimum) Reception only

K56flex mode

Function	Transmission speed
Data K56flex	From 56K (maximum) to 32Kbps (minimum) Reception only

Result codes for a 56K connection

No.	Result code	Description
70	CONNECT 32000 EC*	Connection at 32000 bits/s (K56flex mode) or V.90
71	CONNECT 34000 EC*	Connection at 34000 bits/s (K56flex mode)
72	CONNECT 36000 EC*	Connection at 36000 bits/s (K56flex mode) or V.90
73	CONNECT 38000 EC*	Connection at 38000 bits/s (K56flex mode)
74	CONNECT 40000 EC*	Connection at 40000 bits/s (K56flex mode) or V.90
75	CONNECT 42000 EC*	Connection at 42000 bits/s (K56flex mode)
76	CONNECT 44000 EC*	Connection at 44000 bits/s (K56flex mode) or V.90
77	CONNECT 46000 EC*	Connection at 46000 bits/s (K56flex mode)
78	CONNECT 48000 EC*	Connection at 48000 bits/s (K56flex mode) or V.90
79	CONNECT 50000 EC*	Connection at 50000 bits/s (K56flex mode)
80	CONNECT 52000 EC*	Connection at 52000 bits/s (K56flex mode) or V.90
81	CONNECT 54000 EC*	Connection at 54000 bits/s (K56flex mode)
82	CONNECT 56000 EC*	Connection at 56000 bits/s (K56flex mode)
100	CONNECT 28000 EC*	Connection at 28000 bits/s (V.90 mode)
101	CONNECT 29333 EC*	Connection at 29333 bits/s (V.90 mode)
102	CONNECT 30666 EC*	Connection at 30666 bits/s (V.90 mode)
103	CONNECT 33333 EC*	Connection at 33333 bits/s (V.90 mode)
104	CONNECT 34666 EC*	Connection at 34666 bits/s (V.90 mode)
105	CONNECT 37333 EC*	Connection at 37333 bits/s (V.90 mode)
106	CONNECT 38666 EC*	Connection at 38666 bits/s (V.90 mode)
107	CONNECT 41333 EC*	Connection at 41333 bits/s (V.90 mode)
108	CONNECT 42666 EC*	Connection at 42666 bits/s (V.90 mode)
109	CONNECT 45333 EC*	Connection at 45333 bits/s (V.90 mode)
110	CONNECT 46666 EC*	Connection at 46666 bits/s (V.90 mode)
111	CONNECT 49333 EC*	Connection at 49333 bits/s (V.90 mode)
112	CONNECT 50666 EC*	Connection at 50666 bits/s (V.90 mode)
113	CONNECT 53333 EC*	Connection at 53333 bits/s (V.90 mode)
114	CONNECT 54666 EC*	Connection at 54666 bits/s (V.90 mode)

*EC stands for the Error Control method, which appears only when the extended result codes configuration option is enabled. EC is replaced by one of the following symbols, depending on the error control method used.

V42bis	V.42 error control and V.42bis data compression
V42	V.42 error control only
NoEC	No error control protocol

Glossary

The terms in this glossary cover the topics discussed in this manual. Alternate naming is included for reference.

A

Auto reliable mode: This mode connects to a remote station by MNP or V.42 if the remote modem accepts either of these protocols. Otherwise, it connects in normal mode.

B

Baud: In data transmission, baud means the number of signal events per second. Baud is equivalent to BPS when each signal transmission represents one bit.

Bell Standard: A series of communication procedures for telephone lines and other analogue data transmission lines standardised by AT&T (American Telephone & Telegraph).

Bit: A binary digit, the smallest unit of information handled by a computer.

BPS: Bits per second, meaning the number of bits that can be transmitted or received per second. It is used as a unit of communication speed.

Buffer: A memory area in which data is temporarily stored to ensure smooth transmission and reception of data between two devices that operate at different speeds.

Busy: A code indicating the number called is busy.

Byte: Typically eight bits. One byte can represent one alphanumeric character.

C

Carrier: A modem converts the digital signals of the personal computer into analogue signals to send them through the telephone line. The analogue signals are "carrier," because they transport the data. The analogue frequency is determined by the individual communication specifications.

Checksum: A method of checking data errors. Data is divided into blocks, and the total of the data in those blocks is checked to determine whether the data has been correctly transmitted. The total value is called checksum.

Class 1: A standard for fax transmission. The Toshiba international modem supports class 1.

Command: An instruction from the computer to control the international modem. The commands of this international modem are based on the command system called AT Commands developed by Hayes, a modem manufacturer.

Command state: A state in which data from the personal computer is received as commands to control the international modem. Data from the personal computer will not be output to the telephone line.

Compression: Reduces the number of bits required to transmit information without loss of data.

CTS signal: A Clear to Send signal is an RS-232C standard that indicates the modem is ready for transmission.

D

DAA: Data Access Arrangement is a circuit that isolates a device from phone lines.

DCD signal: This signal tells the personal computer whether the modem is receiving the carrier from the opposite station.

Dial tone: The tone that is heard from the handset when it is picked up

Dial mode: Dial mode covers pulse dial and tone dial. Pulse dial means turning the dial or pressing the buttons to send pulse signals to connect to the called party. Tone dial means pressing the button to send tone signals to connect the modem to called party.

DSR signal: This signal tells the personal computer whether the modem is ready for communication.

DTR signal: This signal tells the modem whether the personal computer is ready for communication.

E

Echo: Displays keyboard entry on the computer terminal.

EIA: Electronic Industries Association is a manufacturers group that sets standards for data communications equipment.

Error control: Detection of errors in data communication. Requests retransmission of data in which errors were found.

Escape code: This code is used to return to the command state without disconnecting the line when the international modem is online.

F

FIFO: First-In/First-Out means the first data that enters a buffer is the first to be retrieved.

Fallback: To reduce a modem's speed. If the remote modem cannot communicate as fast as the local modem, the local modem will reduce its speed.

Flow control: Flow control ensures smooth data communication. If operating speed differs between the personal computer and modem or between your modem and a remote modem and if the remote station runs short of buffer capacity, a transmission halt request is sent from the receiver to the transmitter. When the receiver has enough buffer capacity to resume receiving data, a transmission restart request is sent. There are two ways of flow control, XON and OFF control codes and CTS and RTS signals.

Frequency: The number of times a signal repeats an identical cycle within a certain time period.

Full duplex: Communications mode that uses two channels to conduct simultaneous two-way communication.

G

Guard time: An interval before and after an escape sequence that prevents the modem from interpreting the escape sequence as data.

H

Half duplex: Communications mode that allows two-way transmission but in only one direction at a time.

Handshake: After a telephone line is connected from one station to another, some signals are exchanged according to the ITU-T or Bell standard to confirm that the standard is the same between the calling and called stations prior to starting data communication between them. This exchange of signals is called handshake.

Hangup: Hangup means disconnecting a telephone line to terminate communication.

I

ITU-T Standard: A series of communication procedures for telephone lines and analogue data transmission standardised by ITU (International Telecommunications Union, formerly CCITT).

M

Modem: Computers process digital signals, but telephone lines carry analogue signals only. Thus, the digital signals output by computer are converted (modulated) into analogue signals, which are carried through the telephone line to the opposite end, where the analogue signals are converted back (demodulated) into digital signals. The device to modulate and demodulate these signals is called the modem.

Modem port: The port to send and receive data to and from the modem of a remote station.

MNP: A protocol developed by Microcom, a modem manufacturer in the United States, which with an error correcting function built into the modem itself corrects errors in the modem

N

Normal mode: Error correction is not made by MNP or V.42, but even if serial port speed is different from modem port speed, the buffers in the modem and its flow control function permits communication without changing their speeds.

O

On hook/Off hook: On hook means the "handset is on the telephone," and off hook means it is off. The line is disconnected from the international modem when the handset is on hook, and connected to the international modem when it is off hook.

Online: Online means a state in which data communication is possible with a remote modem. In the online state, data from the personal computer is output via the international modem to the telephone line.

P

Parity: An error detection bit added to a group of bits to make the sum of the bits even or odd. Parity can be set to even, odd or none.

Protocol: A collection of rules and conventions setting out the timing and format for data exchange.

Public line: A line served by a telephone company to be connected to an opposite station via the exchange.

Pulse dialling: A dialling method that uses pulses instead of tones to generate a telephone number. Generally associated with rotary dial phones, although some push-button phones can be used on pulse lines.

R

Reliable mode: Reliable mode is for error-free communication by MNP or V.42.

Result code: This code returns to the computer the results of executing a command sent from it to the international modem in characters or numeric values.

RJ11: A 6-pin telephone interface that is standard in most countries.

RTS signal: A Request to Send signal is an RS-232C standard that indicates the modem is ready to receive data.

S

S-register: The S-register stores the parameters for various commands and modem operations.

Serial port: A port through which serial data is sent and received by the computer one bit at a time.

Stop bit: A bit used in serial communication that marks the end of a character.

T

Test function: When normal communication is not possible, this function checks the modem, personal computer, and telephone lines to determine if they are normal.

Tone dialling: A dialling method that uses tones instead of pulses to generate a telephone number. Generally associated with push-button phones, although some push-button phones can be connected to pulse lines.

U

UART: Universal Asynchronous Receiver Transmitter is the circuit interface between the modem and computer. It receives serial bit data from the modem and converts it into bytes for the computer; and it converts byte data from the computer into bit data for serial communication.

X

XON/XOFF: flow control: A protocol used by devices receiving data. It uses two signals: transfer ON and transfer OFF. The signals are controlled by software.

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