

User's Guide for ZyXEL Omni 56K and Omni 56K Plus Modems

ZyXEL

TOTAL INTERNET ACCESS SOLUTIONS

ZyXEL Communications Corporation

ZyXEL Omni 56K Modem

ZyXEL Omni 56K Plus Modem

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The following Equipment:

Product Name : 56K Modem
 Trade Name : ZyXEL Communications Corporation
 Model Number : Omni 56K Plus , Omni 56K

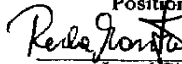
Test Standard			
EN 50081-1/1992 Electromagnetic compatibility- Generic emission standard			
	EN 55022/1994	Class B	Limits and methods of measurement of radio disturbance characteristics of information technology equipment
	EN 61000-3-2/1995	Class A	Part 2 : Limits-Section 2 : Limits for harmonic current emission (equipment input current <= 16A per phase)
	EN 61000-3-3/1995		Part 3 : Limits-Section 3 : Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current <= 16A.
EN 50082-1/1997 Electromagnetic compatibility- Generic immunity standard			
	EN 61000-4-2/1995	±8KV for Air Discharge ±4KV for Contact Discharge	Electrostatic discharge
	EN 61000-4-3/1996	3 V/m	Radio-frequency electromagnetic field
	ENV 50204/1995	3 V/m	Electromagnetic field from digital telephones
	EN 61000-4-4/1995	±0.5KV for Signal Lines ±1 KV for AC Power Ports	Electrical fast transient/burst
	EN 61000-4-5/1995	±1KV for Line to Line ±2KV for Line to Earth	Surge Measurement
	EN 61000-4-6/1996	3V	Conducted Susceptibility Measurement
	EN 61000-4-8/1993	3A/m @ 50Hz	Power Magnetic Measurement
	EN 61000-4-11/1994	30% Reduction @ 10ms 60% Reduction @100ms >95%Reduction @5000ms	Voltage Dips/Interruption Measurement

The following importer/manufacturer is responsible for this declaration:

Company Name : ZyXEL Communications Services GmbH
 Company Address : Thaliastrasse 125a/2/2/4 A-1160 VIENNA-AUSTRIA

Person is responsible for marking this declaration:

Manfred Recla
 Name (Full Name)
Vienna, November 4, 1999
 Date

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FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

GRANT OF EQUIPMENT AUTHORIZATION

Certification

ZyXEL Communications Corporation
No. 6, Innovation Rd. II
Science Based Industrial Park
Hsin-Chu Taiwan

Date of Grant: 9/14/99

Application Dated: 8/16/99

Attention: Wang Yi, Engineer

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER **188OMNI56K**

Name of Grantee **ZyXEL Communications Corporation**

Equipment Class : Part 15 Class B Computing Device Peripheral

Grant Notes

FCC Rule Parts

Frequency Range (MHz)

Output
Watts

Frequency
Tolerance

Emission
Designator

15

Mail To:
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Safety & Compliance Consulting
29 Sweetman Lane
West Milford, NJ 07480-2932



9908198315376001

In correspondence concerning this grant, please refer
to the FCC IDENTIFIER and the date of grant.

PDW

FCC 731A
October 1991

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ZyXEL Omni 56K and Omni 56K Plus Modems

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Preface

Thank you for purchasing ZyXEL Omni 56K/Omni 56K Plus modem.

About ZyXEL Omni 56K/Omni 56K Plus

The Omni 56K/Omni 56K Plus is an analog Data/Fax /Voice modem used for Internet access via PSTN line. It supports not only RS-232 com port interface but also Universal Serial Bus (USB) connection to PC. Users can plug and play USB cables without turning off the computer which makes it simple to install the modem. It can run upstream maximum rate at 33.6kbps and downstream rate at 56Kbps. The rate selection depends on the line quality, and server side configuration.

How to Use This Guide

This Guide is cataloged into 5 chapters. The first two chapters provide general information for ZyXEL Omni 56K/Omni 56K Plus modem, and the next three chapters provide advanced information for technical users who might need them for programming or other applications.

Other Reference

To quickly learn how to install and configure your Omni 56K/Omni 56K Plus modem, please refer to the *ZyXEL Omni 56K/Omni 56K Plus Modem Read Me First*.

Chapter 1

Introduction

This chapter introduces you to the features and specifications for the ZyXEL Omni 56K/Omni 56K Plus modem, and provides instructions for installing your modem.

Main Features

- ZyXEL forth generation data pump with V.90 capability.
- USB technology for easy installation.
- V.90 56K down-stream data transmission
- Fast retrain with auto fall-forward and fall-back.
- G3 14.4Kbps Fax send/receive.
- Support Fax class 1, class 2 and class 2.0 command set.
- Handset voice record and play. (Omni 56K Plus only)
- Voice digitization and compression.
- Voice record via IS101 Command Set
- Error correction & data compression.
- Microsoft 95/98 Windows plug and play compatible.
- Flash EPROM upgradeable.

Chapter 2

Installing ZyXEL Omni 56K/Omni 56K Plus

Panel Description

Front Panel LEDs

The description of front panel LEDs lists as below:

Front Panel LEDs for Omni 56K Plus

LED	Function	Description
USB	USB indication	ON: USB link is up and in use OFF: USB link is down or stays in RS-232 mode
OH	Hook Status	ON: off hook OFF: on hook
DATA	Data Traffic	ON: data transmission OFF: no data
MR	Modem Ready	ON: modem is ready OFF: modem is not ready

Table 1. Front Panel LEDs for Omni 56K Plus

Front Panel LEDs for Omni 56K

LED	Function	description
V.90	V.90 mode	ON: connection V.90 mode OFF: none V.90 mode
OH	Hook Status	ON: off hook OFF: on hook
DATA	Data transmission	ON: data transmission OFF: no data
MR	Modem Ready	ON: modem is ready OFF: modem is not ready

Table 2. Front Panel LEDs for Omni 56K

Back Panel Switches

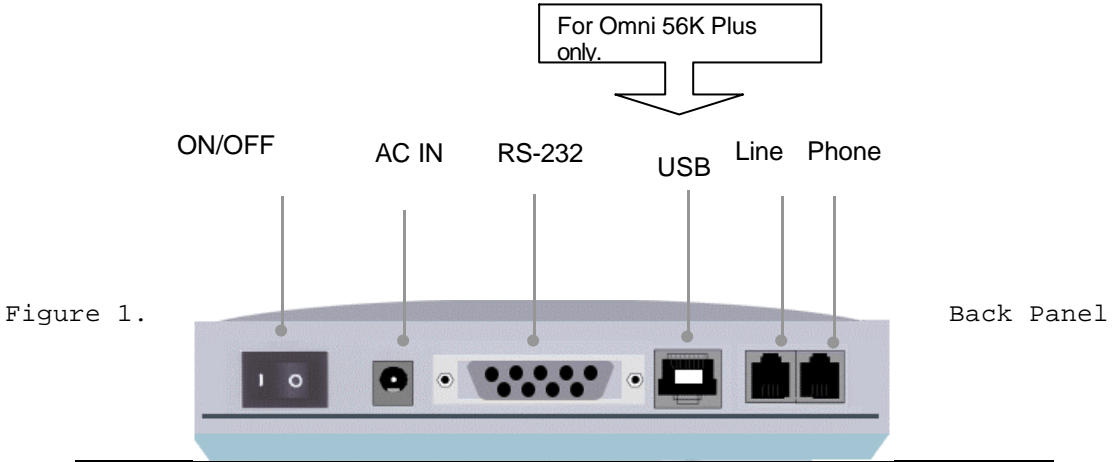


Figure 1.

Switch	Description
ON/OFF	Power ON/OFF switch
AC IN	9V-AC power input socket to connect the AC power adapter.
RS-232	Serial port DB-9 female connector to plug the RS-232 cable and connect to the serial port of a DTE or computer.
USB	Universal series bus connector that connects to any one of your devices with USB port, such as your computer or USB hub. (Omni 56K Plus only)
LINE	Analog port RJ-11 terminal jack for connecting to wall jack.
PHONE	Analog port RJ-11 terminal jack for connecting to your phone set.

Table 3. Back Panel Description

Connecting Your Omni 56K/Omni 56K Plus

For connecting your Omni 56K/Omni 56K Plus modem, please refer the following figure:

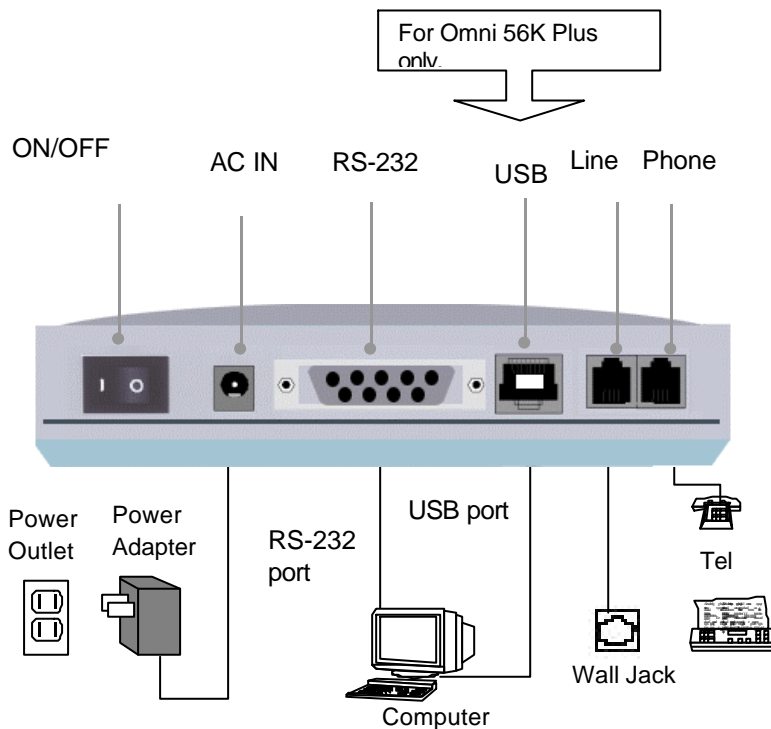


Figure 2. Back Panel Connections

USB Connector (For Omni 56K Plus Users)

The Omni 56K Plus is an USB(Universal Serial Bus)-based modem, providing a USB connector on the back panel of the device.

Getting Started

For Omni 56K Plus users, you can make connection either via USB or via RS-232; for Omni 56K users, you can only use RS-232 to connect your modem to your PC.

For Omni 56K Plus users, when you plug the USB connector attached with your Omni 56K Plus to the USB series port of your PC, the Plug and Play function of the operating system will first detect if its driver has been installed. If not, Windows will prompt you for the USB device driver.

For more information on connecting and starting your modem, please refer to *ZyXEL Omni 56K/Omni 56K Plus Modem Read Me First* that is attached with your product package.

Chapter 3

Specifications & Function Description

This chapter introduces the specifications and functions of Omni 56K/Omni 56K Plus. This chapter and the next three chapters are designed for advanced users who might need more information about Omni 56K/Omni 56K Plus modem's specifications and functions when programming or other applications.

Specifications

Hardware Specification

Item	Specification Description
Power Requirements	9V AC
Operating Requirements	Temperature: 0° C to 40° C Humidity: 5 to 90 % (non-condensing)
Weight	220.5g
Dimensions	166mm (W) x 40mm (H) x 84mm(L)

Table 4. Hardware Specifications

Firmware Specification

Physical layer for data mode	Multi-Auto V.90 V.34bis 33.6 Kbps to 2.4 Kbps V.34 28.8 Kbps to 2.4 Kbps V.32bis 14.4/12/9.6/7.2/4.8 Kbps V.32 9.6/4.8 Kbps V.23 1200/600/75 bps V.22bis 2.4 Kbps V.22/Bell 212A 1.2K bps V.21/Bell 103 300 bps Auto Fallback/Forward
Link layer	MNP 3-4 MNP 5 V42 V42bis V42 SREJ
Flow Control	Hardware flow control: RTS/CTS Software flow control: XON/XOFF
Command set	Full AT command set Dialing type :DTMF/Pulse
Diagnostics	Poweron selftest Analog loop-back test Analog loop-back with self-test Local digital loop-back test Remote digital loop-back test Remote digital loop-back with self-test
FAX	V.17 FAX (send and receive) V.29 G3 FAX (send and receive) V.27ter G3 FAX (send and receive) EIA Class 1 Command Set EIA Class 2 Command Set EIA Class 2.0 Command Set
Voice	4 bits / sample ADPCM,9600 samples / second. On-line voice playback and recording.(Omni 56K Plus only) IS-101 voice command set.

Table 5. Firmware Specifications

Protocol Support

- Data Physical Layer
 - . ITU-T V.90
 - . ITU-T V.34bis/V.34
 - . ITU-T V.32bis/V.32
 - . ITU-T V.22bis/V.22
 - . ITU-T V.21
 - . ITU-T V.23
 - . Bell 212A
 - . Bell 103
- Fax Physical Layer
 - . ITU-T V.17
 - . ITU-T V.29
 - . ITU-T V.27ter
 - . ITU-T V.21
- Error Control and Data Compression
 - . ITU-T V.42
 - . ITU-T V.42bis
 - . MNP3-5
- Command Set
 - . Standard command set
 - . EIA Class 1 Fax Command set
 - . EIA Class 2 Fax Command set
 - . EIA Class 2.0 Fax Command set
 - . Basic AT Command set
 - . Extended AT& Command Set
 - . Extended AT* Command Set
 - . Extended AT# Command Set
 - . IS101 Voice Command set

For more information on detailed command sets, please refer to *Chapter 5*.

Omni 56K/Omni 56K Plus Capability

The data/fax/voice feature of Omni 56K/Omni 56K Plus is described as below:

Feature	Description
Data	.2W Dial-Up Line .Multi-auto/V.90/V.34bis/V.34/V.32bis/V.32/V.22bis/V.22/ Bell212A .Hardware/Software Flow Control .Error Control/Data Compression .ZyXEL AT Command Set .External Plug and Play for Windows 31/95/98 in RS232 mode External Plug and Play for Windows 98 /2000 in USB mode .Repeat Dial/Cyclic Dial .Caller ID .Distinctive Ring .AT Protection for software application
Fax	.V.17/V.29/V.27ter .G3 T.30 Protocol .EIA Class 1/Class 2/Class 2.0 command set
Voice	.4 bit IMA ADPCM .Remote Recording on PC storage. .Play and record voice via the attached telephone set. (Omni 56K Plus only) .IS-101 Command Set

Table 6. Feature Description

Data Function

Physical Layer Capability

Omni 56K/Omni 56K Plus modem is a high performance universal modem capable of transmission speed up to 56/33.6 Kbps full-duplex on a 2-wire dial-up line. Universal compatibility covers a broad range of ITU-T and BELL standards.

Standard	Bit Rate [bps]	Baud Rate [baud]	Modulation	Carrier Frequency [Hz]
V.90	28000-56000	8000	PCM	0
V.34bis/V.34	2400-33600	multiple	TCM	multiple
V.32bis	14400	2400	128-TCM	1800
V.32bis	12000	2400	64-TCM	1800
V.32bis	7200	2400	16-TCM	1800
V.32	9600	2400	32-TCM	1800
V.32 uncoded	9600	2400	16-QAM	1800
V.32	4800	2400	4-DPSK	1800

V.23	1200/75	1200/75	FSK	
V.23	600/75	600/75	FSK	
V.22bis	2400	600	16-QAM	1200 Call 2400 Ans
V.22 (BELL 212A)	1200	600	4-DPSK	1200 Call 2400 Ans
V.21	300	300	FSK	
BELL 103	300	300	FSK	

Table 7. Physical Layer Capacity

Flow Control

This feature refers to stopping and restarting the flow of data into and out of the modem's transmission and receiving data buffers. Flow control is necessary so that a device does not receive more data than it can handle. The Omni 56K/Omni 56K Plus provide two kinds of flow control methods.

Hardware CTS/RTS Flow Control

This is a bi-directional flow control where CTS and RTS are RS-232 signals which must be available on your computer. When the modem's transmission buffer is almost full, the modem will drop CTS to signal the DTE that it cannot accept data any more. Turn on the CTS to notify the DTE that it can keep sending data to the modem. On the computer software side, when the receiving buffer of the software is almost full, it will drop RTS to signal the modem to stop sending data to the DTE. Turn on the RTS and the modem will start sending data again to the DTE.

Software XON/XOFF Flow Control

This is a bi-directional flow control. XON and XOFF character defaults are decimals 17 and 19. These can be changed by modifying the S-Registers S31 and S32. Both the modem and the DTE will treat XOFF as a signal to stop transmitting data and will treat XON as a signal to restart sending data. Modems will not send these characters received from the local DTE to the remote modem.

Error Control

Error control keeps the modem data link error-free by detecting and re-transmitting erroneous data. Omni 56K/Omni 56K Plus modems support both MNP and V.42 error control protocols.

The MNP protocol was an industry standard developed and licensed by Microcom, Inc. Omni 56K/Omni 56K Plus modems support level 4 and 3 error control protocols, commonly denoted as MNP4 and MNP3.

V42 is a developed standard by CCITT. V.42 supports both LAPM and MNP4. A V.42 handshaking will try an LAPM connection first, and if not successful, it will try MNP4.

Data Compression

In the modem, the data compression is activated in an attempt to reduce the number of bits actually sent. The receiving modem applies these techniques in reverse to recover the actual data from the compressed data stream.

Omni 56K/Omni 56K Plus modems support both V.42bis and MNP5 data compression protocols. Data compression needs an error-free data link to work correctly, otherwise the corrupted compressed data stream will ruin the decompression process. MNP5 is used with MNP4 error control and V.42bis is used with V.42 error control. The compression efficiency of V.42bis is generally higher than that of MNP5. In some cases, V.42bis can be 50 % to 100% higher and in other cases it is just slightly higher. In general, it is about 50 % more efficient.

Repeat Dial

The modem will dial the default number stored in non-volatile RAM , EEPROM , repeatedly if not connected.(s38.0=1,*Dn)

Cyclic Dial

Dial the number stored in EEPROM at location n(0-3) if cyclic dial s44.3=1 is set.

If the first dial is not successful, the modem will cycle dial through the four numbers stored in memory.

Caller Number Delivery (Caller ID)

Caller Number Delivery (CND), commonly called **Caller ID**, is a new kind of phone service that may be offered by your local phone company. Check your phone company for availability. You must subscribe to it and usually pay an additional monthly service charge for this service.

With CND service, the phone company's central office will send the coded caller information to the called station. This information is sent once between the first and second ring. Your

modem can decode this caller information and present it to the connected computer/terminal during the second ring period as part of the call progress ring message. The modem will also report the Caller ID information if asked by the command **AT*T**.

There are two kinds of caller information message formats sent by the phone company.

One is the single message format which includes date, time, and caller ID

The other is the multiple message format which also includes the caller name as registered with the phone company.

The command **ATS40.2=n** is used to enable (**n=1**) or disable (**n=0**) the Caller ID detection function. The default is disabled. Enable it only when you have this service and want to enable its detection.



NOTE: The Caller ID message may cause some communication software that is not expecting it to become confused. If you plan to use the Caller ID feature, be sure you are using software that supports it.

In single message format, the modem will send a ring message to the terminal as follows:

RING

TIME: <MM-DD hh:mm>

CALLER NUMBER: <CALLER_ID> or CALLER NAME: <CALLER_NM>

RING

MM is the two-digit month message, DD is the two-digit date message, hh is the hour and mm is the minute of the time, and CALLER_ID is the phone number of the caller or CALLER_NM his/her name.

The following is an example of a caller ID message as it might appear on your screen:

RING

TIME: 04-28 12:30

CALLER NUMBER: 7135551414 or CALLER NAME: Brent Harper

RING

In the multiple message format, if the caller's number and name are available, the ring message will display both:

RING

TIME: MM-DD hh:mm

CALLER NUMBER: <Caller_ID>

CALLER NAME: <Caller_Name>

RING

Here is an example:

RING

TIME: 04-28 12:30

CALLER NUMBER: 7135551414

CALLER NAME: Tracy Huang

RING

If the caller number and name are not available, the ring message will appear as follows:

RING

TIME: 04-28 12:30

REASON FOR NO NUMBER: OUT_OF_AREA

REASON FOR NO NAME: PRIVACY

RING

The last CND message that the modem received can be displayed by using the AT*T command.

Setting **S48.0=1** will cause the modem to report CND information in its ASCII coded hexadecimal raw data format. The DTE software is responsible for explaining the data.



NOTE: Please refer to the Bellcore Technical Advisory document TR-NWT-000030 for the exact data format. The above Caller ID scheme applies to the North America area. Different countries may employ different Caller ID schemes, check if the scheme used in your country is supported before using the Caller ID feature. For most other Caller ID schemes, only the Caller telephone number is provided.

Distinctive Ring

Distinctive Ring is a phone service that may be offered by your phone company. Check your phone company for availability. With this service, you can have several phone numbers assigned to the same phone line. The phone company will send a different type of ring signal for each phone number being called. The subscriber can distinguish which number is called by which type of ring is received.

One benefit of this feature is the ability to have three numbers on the same line allowing you to list the three numbers for voice, data, and fax, respectively. You can then have your fax machine answer only the ring corresponding to the fax number and have your modem answer only the ring corresponding to the data number. A voice call will not be answered by either fax machine or data modem and it will only be answered when someone picks up the phone. You can also have the answering machine answer only the voice ring. A more complicated use is that you can have one number for multiple uses, such as one number for both data and fax.

A ring signal is a composition of repeated on and off states. Different types of rings usually correspond to different compositions of the "on" part (cadence) of the ring. Your modem can distinguish up to four types of ring signals and can be commanded to answer or not answer any one of these four types of ring signals. Following is a list of these four types of ring signals. These are the ring types used in the USA. The difference among the ring types is the two-second ON part of the ring signal. It comprises a long, double short, or triple short ring.

S-register **S40 bits 3-6** are used for distinctive ring control. Each bit controls the answering of a particular ring type. Setting a bit to "1" enables answering, setting it to "0" rejects the ring. Note that the ring may still be heard even if it is not counted as an accepted ring by the modem.

The control relationships between bits 3-6 in register S40 and the different ring types are:

Type	Bit (on)	Ring Sequence
1	3	1.2s on; 2s off
2	4	0.8s on, 0.4s off, 0.8s on; 4s off
3	5	0.4s on, 0.2s off, 0.4s on, 0.2s off, 0.8s on; 4s off
4	6	0.3s on, 0.2s off, 1s on, 0.2s off, 0.3s on; 4s off

Table 8. Different Ring Types in Register S40

Security Function

The Omni modem provides a security function, that (when enabled) prevents an unauthorized user from making a connection. Two types of security function are provided. Type 1 security is used when the remote modem is also a ZyXEL modem; type 2 security is used when the remote modem is any other brand of modem.

With the type 1 connection, the dial-in (remote) modem will send in its supervisor password for checking at the initial connection handshake, and the local modem will check this password against its pre-stored acceptable password list. With a type 2 connection, the remote terminal will be prompted to enter the password at the initial connection and the local modem will do the password checking.

Two levels of security are provided. With level 1 security, the local modem will maintain the connection if the password check is OK, otherwise the line will be disconnected. With level 2 security, the local modem will disconnect the line if the password has been found in its pre-stored acceptable list and then will dial back the phone number corresponding to the dial-in password. The line will be simply disconnected if the password does not match.

4 user passwords may be defined. The corresponding 4 dial-back numbers are the modem's 4 stored phone numbers. Any character(ASCII 0-127) can be used in the password, the maximum password length is 8 characters.

The security functions are only accessible through AT commands in terminal mode. Any access attempt will result in the modem's prompting to enter the supervisor password. The attempt will be rejected if the entered password is not correct. The default supervisor password is ZyXEL when the modem is shipped from the factory. This supervisor password is also the password sent for automatic password checking in a type 1 connection. To modify the supervisor password, use

AT*HS

You will be asked for the original password and a new password and then to re-enter the new password for verification. For example:

PASSWORD (Enter supervisor password)

PASSWORD (Enter new supervisor password)

Verify (Enter the new supervisor password again)

OK

The command `AT*Hn` will modify the `n`th user password and the supervisor password on the screen for viewing. Again, You will be prompted to enter the supervisor password first.

The commands below will enable different types and levels of security:

Code	Description
*G0	Disables security function.
*G1	Enables type 1 and level 1 security, with password check.
*G2	Enables type 1 and level 2 security, with password check and call-back.
*G3	Enables type 1 and level 1 security, with password check.
*G4	Enables type 1 and level 2 security, with password check and call-back.
*G5	Enables type 2 and level 2 security, with password check and call-back, remote site enters the call-back number.

NOTE: Before the security type or level can be changed, the modem requires the supervisor password.

For type2 security, the remote site will be prompted to enter the user password. A maximum of 3 tries in 40 seconds is allowed. If a correct password is not entered within this time limit, the line will be disconnected. If the remote site is to enter the call-back number, it will be prompted to do so.

Fax function

Fax Physical Layer Protocol

Standard	Bit Rate [bps]	Baud Rate [baud]	Modulation	Carrier Frequency [Hz]
V.17	14400-7200	2400	TCM	1800
V.29	9600-4800	2400	QAM/DPSK	1700
V.27ter	4800-2400	1600/1200	PSK/DPSK	1800
V.21	300	300	FSK	

Table 9. Fax Physical Layer Capacity

EIA Class 1/Class 2/Class 2.0 Command Set

Please refer to Fax Command Set in *Chapter 5*.

ITU-T T.30 Fax Protocol

The ITU-T T.30 fax protocol is known as the G3 fax handshake signals and procedures. The modem takes full control of this protocol - initiating and terminating fax calls, managing the communication session, and transporting the image data. Therefore, the modem relieves the computer fax software of the T.30 protocol handling.

You modem allows for fax speeds up to 14400 bps when transmitting to a fax machine which complies with the V.17 fax standard. Speeds will fall back to 12000, 9600, or 7200 bps in poor line conditions. When connecting to a G3 fax device, your modem allows for fax speeds up to 9600 bps and will automatically fall back to 7200, 4800, and 2400 bps if the line quality is poor.

Voice Function

Voice capability stands for the modem's ability to digitize incoming voice messages, which the computer stores and forwards. It also means that the modem can playback the recorded digitized voice on line for a message announcement.

Voice IS-101 Command Set

Please refer to the Voice command sets in *Chapter 5*.

4-bit Voice Data Compression

The main issue in the digitized voice mode is the amount of storage required. A relatively simple ADPCM algorithm can reduce the speech data rate to half the rate and maintain about the same voice quality. This algorithm can also be used to reduce the speech data rate to 1/3 or 1/4 of the original rate, but with voice quality degradation. Only 4-bit ADPCM is used in Omni 56K/Omni 56K Plus.

Chapter 4

Result Codes

Result Codes

The result code is the command response or the Connect message to the DTE. The format of the result code is dependent on Xn and Vn command .The lists are as following:

Result Code for ATV0	ATV1	X0	X1	X2	X3	X4	X5	X6	X7
0	OK	0	0	0	0	0	0	0	0
1	CONNECT	0	0	0	0	0	X	X	X
2	RING	0	0	0	0	0	0	0	0
3	NO CARRIER	0	0	0	0	0	0	0	0
4	ERROR	0	0	0	0	0	0	0	0
5	CONNECT 1200		0	0	0	0	X	X	X
6	NO DIAL TONE			0		0	0	0	0
7	BUSY				0	0	0	0	0
8	NO ANSWER				0	0	0	0	0
9	RINGING				0	0	0	0	0
10	CONNECT 2400		0	0	0	0	X	X	X
11	CONNECT 4800		0	0	0	0	X	X	X
12	CONNECT 9600		0	0	0	0	X	X	X
14	CONNECT 19200		0	0	0	0	X	X	X
15	CONNECT 7200		0	0	0	0	X	X	X
16	CONNECT 12000		0	0	0	0	X	X	X
17	CONNECT 14400		0	0	0	0	X	X	X

Result Code for		X0	X1	X2	X3	X4	X5	X6	X7
ATV0	ATV1								
18	CONNECT 16800	0	0	0	0	X	X	X	
19	CONNECT 38400	0	0	0	0	X			
20	CONNECT 57600	0	0	0	0	X			
21	CONNECT 76800	0	0	0	0	X			
22	CONNECT 115200	0	0	0	0	X			
23	CONNECT 230400	0	0	0	0	X			
24	CONNECT 460800	0	0	0	0	X			
25	CONNECT 921600	0	0	0	0	X			
26	CONNECT 307200	0	0	0	0	X			
27	CONNECT 153600	0	0	0	0	X			
28	CONNECT 102400	0	0	0	0	X			
29	CONNECT 61440	0	0	0	0	X			
30	CONNECT 51200	0	0	0	0	X			
31	CONNECT624000	0	0	0	0	0			
32	CONNECT124800	0	0	0	0	0			
33	CONNECT 62400	0	0	0	0	X			
34	CONNECT 41600	0	0	0	0	X			
35	CONNECT 31200	0	0	0	0	X	X	X	
36	CONNECT 24960	0	0	0	0	X			
37	CONNECT 20800	0	0	0	0	X			
38	CONNECT 33600	0	0	0	0	X	X	X	
39	CONNECT 28800	0	0	0	0	X	X	X	
40	CONNECT 26400	0	0	0	0	X	X	X	
41	CONNECT 24000	0	0	0	0	X	X	X	
42	CONNECT21600								
100	CONNECT 56000	0	0	0	0	X	X	X	
101	CONNECT 54666	0	0	0	0	X	X	X	
102	CONNECT 53333	0	0	0	0	X	X	X	
103	CONNECT 52000	0	0	0	0	X	X	X	
104	CONNECT 50666	0	0	0	0	X	X	X	
105	CONNECT 49333	0	0	0	0	X	X	X	

Result Code for ATV0	ATV1	X0	X1	X2	X3	X4	X5	X6	X7
106	CONNECT 48000	0	0	0	0	X	X	X	
107	CONNECT 46666	0	0	0	0	X	X	X	
108	CONNECT 45333	0	0	0	0	X	X	X	
109	CONNECT 44000	0	0	0	0	X	X	X	
110	CONNECT 42666	0	0	0	0	X	X	X	
111	CONNECT 41333	0	0	0	0	X	X	X	
112	CONNECT 40000	0	0	0	0	X	X	X	
113	CONNECT 38666	0	0	0	0	X	X	X	
114	CONNECT 37333	0	0	0	0	X	X	X	
115	CONNECT 36000	0	0	0	0	X	X	X	
116	CONNECT 34666	0	0	0	0	X	X	X	
117	CONNECT 33333	0	0	0	0	X	X	X	
118	CONNECT 32000	0	0	0	0	X	X	X	
119	CONNECT 30666	0	0	0	0	X	X	X	
120	CONNECT 29333	0	0	0	0	X	X	X	
121	CONNECT 28000	0	0	0	0	X	X	X	

Table 10. Result Codes

Note: If error control result codes are enabled (X4,X5,X6,X7),the resulting message will be formatted as:

X4: **CARRIER** Rx Rate.

PROTOCOL: Error Control Level

COMPRESSION: Compression Level

CONNECT DTE Speed

X5: **CONNECT** DTE Speed/Protocol Rx Rate/Error control level

X6: **CONNECT** Rx Rate/ARQ

X7: **CONNECT** Rx Rate/ARQ/Error control level

Where ARQ denotes that Automatic **R**etransmission re**Q**uest type of error control is enabled.

Chapter 5

Command Sets

This chapter lists the command set Omni 56K/Omni 56K Plus supports. These commands include data command sets, fax command sets and voice command sets.

Data command sets

Basic AT Command Sets

Command	Options	Function & Description	Ref.
A/		Re-execute the last command once.	
A>		Re-execute the last command once or repeat the last call up to 9 times. (See also S8)	
<any key>		Terminate current connection attempt when entered in handshaking state.	
+++		Escape sequence code, entered in data state, wait for modem to return to on line command mode.	

Table 11. Basic AT Command Sets

All the Following Commands Require an “AT” Prefix:

Command	Options	Function & Description	Ref.
A		Go on-line in answer mode. (See also S39.2, S43.6)	
Bn		Handshake option.	S28.7
	B0 *	Select CCITT V.22 for 1200 bps	
	B1	Select Bell 212A for 1200 bps communication.	

Command	Options	Function & Description	Ref.
Ds		Dial s (numbers and options) that follow (see also S38.0, S35.4). The options of s are listed as follows:	
	0-9, A, B, C,D #, *	Digits for dialing	
	P	Pulse dialing	S23.1
	T	Tone dialing	S23.1
	,	Pause for a time specified in S8. Remaining digits will be dialed as in-band DTMF.	
	;	Return to command state after dialing.	
	!	Hook flash	S56
	@	Wait for a 5 second silence before proceeding , otherwise return NO ANSWER.	
	R	Reverse handshake. (go on-line in Answer mode)	S17.5
W	Wait for the second dial tone. Remaining digits will be dialed as in-band DTMF.		
DL		Dials the last-dialed number.	
DSn	n=0-3	Dial the number stored in non-volatile RAM at location 'n.'	S44.3
En		Command mode local echo of keyboard commands.	S23.0
	E0	Echo off	
	E1 *	Echo on	
Hn		On/off hook control.	
	H0 *	Hang up (on-hook) the modem or ISDN, same as 'ATH.'	
	H1	Off hook the modem.	
In		Display inquired information.	
	I0	Display numerical product code, same as 'ATI.'	
	I1	Display product information and ROM checksum.	
	I2	Display modem link status report.	
	I12	Display physical layer status.	
	I13	Display channel response for V.34	
Ln	n=0-7 4 *	Speaker volume control. The higher the value, the higher the volume.	S24.4-6
Mn		Speaker control	S21.1-2

Command	Options	Function & Description	Ref.
	M0	Speaker is always OFF.	
	M1 *	Speaker is ON until carrier detected.	
	M2	Speaker is always ON.	
	M3	Speaker is ON after the last digit is dialed out Tone dialing is not heard.	
O		Return to on-line state.	
O1		Force modem to request a retrain.	
Qn		Result code displayed.	S23.7
	Q0 *	Modem returns result code.	
	Q1	Modem does not return result code.	
	Q2	Modem returns result code but quiet after answering on a RING. (see also S42.2)	S40.1
Sr.b=n		Set bit 'b' of S-register 'r' to value 'n'. 'n' is a binary digit '0' or '1'	
Sr.b?		Display value of bit 'b' of S-register 'r'	
Sr=n		Set S-register 'r' to value 'n'. 'n' must be a decimal number between 0 and 255.	
Sr?		Display value stored in S-register 'r'	
T		Tone dial	S23.1
UPX		Download firmware to the Flash EPROM by using Xmodem protocol.	
Vn		Sets display type for Result Codes.	S23.6
	V0	Display result code in numeric form. (See also S35.7 and the result code table of 'ATXn')	
	V1 *	Display result code in verbose form.	
Xn	n=0-7 5 *	Result code options, see the Options Table.	S23.3-5
Zn	n=0-2	Reset modem and set power-on profile.	S15.5-7
	Zn	Reset modem and load user profile n (0-1).	
	Z2	Reset modem and load factory settings.	
+++		Escape sequence code , entered in data state , wait for modem to return to command state.	

Table 12. AT Command Sets Requiring an "AT" Prefix

Extended AT& Command Sets

Command	Options	Function & Description	Ref.
&Bn		Data rate, terminal-to-modem. (DTE/DCE)	S28.6
	&B0	DTE rate follows connection rate. (See also S44.6)	
	&B1 *	DTE/DCE rate fixed at DTE setting (See also S18, S20, and S44.6)	
&Cn		Carrier Detect (CD) options	S21.4
	&C0	CD always ON (See also S42.7)	
	&C1 *	CD tracks presence of carrier (See also S38.3, S42.7)	
&Dn		Data Terminal Ready (DTR) options. (See also S25)	S21.6-7
	&D0	Ignore DTR signal, assume DTR is always ON.	
	&D1	108.1, DTR OFF-ON transition causes dial of the default number. (See also 'AT*Dn' and S48.4)	
	&D2 *	108.2, Data Terminal Ready, DTR OFF causes the modem to hang up.	
	&D3	Same as &D2 but DTR OFF causes the modem to hang up and reset from profile 0.	
&F		Load factory settings to RAM as active configuration.	
&Gn		Guard tone options	S28.4-5
	&G0 *	No guard tone (within USA, Canada).	
	&G2	1800 Hz guard tone.	
&Hn		Data flow control, DTE/DCE.	S27.3-5
	&H0	Flow control disabled.	
	&H3 *	Hardware (CTS/RTS) flow control.	
	&H4	Software (XON/XOFF) flow control.	
&Kn		Modem error control and data compression.	S27.0-2
	&K0	No error control.(Same as AT&K)	
	&K1	MNP4 (See also S41.0).(include MNP3)	
	&K2	MNP4+MNP5 (See also S38.5, S41.0).	
	&K3	V.42+MNP4.	
	&K4 *	V.42+V.42bis, compatible with &K2 (See also S38.5).	

Command	Options	Function & Description	Ref.
&Nn		Modem link mode options (DCE/DCE). (See also S43.7, S48.1)	S19
	&N0 *	Multi-Auto, auto negotiate highest possible link rate: V.90,V.34bis, V.32bis, V.32, V.22bis, V.22 and Bell 212A, G3 Fax V.17/V.29/V.27ter.	
	&N3	V.32 9600T/9600/7200T/4800	
	&N4	V.32 9600/7200/4800	
	&N5	V.32 4800	
	&N12	V.23 1200/75	
	&N13	V.23 600/75	
	&N14	V.22bis 2400/1200	
	&N15	V.22 1200	
	&N16	V.21 300	
	&N17	V.32bis 14400/12000/9600/7200/4800	
	&N18	V.32bis 12000/9600/7200/4800	
	&N19	V.32bis 7200/4800	
	&N24	BELL 212A 1200	
	&N25	BELL 103 300	
	&N60	V.34 33600	
	&N61	V.34 31200	
	&N62	V.34 28800	
	&N63	V.34 26400	
	&N64	V.34 24000	
	&N65	V.34 21600	
	&N66	V.34 19200	
	&N67	V.34 16800	
	&N68	V.34 14400	
	&N69	V.34 12000	
	&N70	V.34 9600	
	&N71	V.34 7200	
	&N72	V.34 4800	
	&N73	V.34 2400	
	&N99	V.90 28000	
	&N98	V.90 29333	
	&N97	V.90 30666	
&N96	V.90 32000		
&N95	V.90 33333		

Command	Options	Function & Description	Ref.
	&N94	V.90 34666	
	&N93	V.90 36000	
	&N92	V.90 37333	
	&N91	V.90 38666	
	&N90	V.90 40000	
	&N89	V.90 41333	
	&N88	V.90 42666	
	&N87	V.90 44000	
	&N86	V.90 45333	
	&N85	V.90 46666	
	&N84	V.90 48000	
	&N83	V.90 49333	
	&N82	V.90 50666	
	&N81	V.90 52000	
	&N80	V.90 53333	
	&N79	V.90 54666	
	&N78	V.90 56000	
&Pn		Pulse dial make/break ratio.	S23.2
	&P0 *	make / break=39% / 61%	
	&P1	make / break=33% / 67%	
&Rn		RTS (Request To Send) function selection.	S21.5
	&R0	CTS tracks RTS, response delay is set in S26.	
	&R1 *	Ignore RTS, assumes RTS always ON.	
&Sn		Data Set Ready (DSR) function selection.	S21.3
	&S0 *	DSR overridden, DSR always ON.	
	&S1	DSR according to CCITT (ITU-TSS). (See also S41.5, S44.4)	
&Tn		Modem testing.	S16
	&T0	Terminate test in progress.	
	&T1	Initiate Analog Loop-back (ALB) test.	
	&T3	Initiate Local Digital Loop-back (LDL) test.	
	&T4	Grant Remote Digital Loop-back request from remote modem.	S14.1
	&T5	Deny Remote Digital Loop-back request from remote modem.	S14.1
	&T6	Initiate Remote Digital Loop-back (RDL) test.	

Command	Options	Function & Description	Ref.
	&T7	Initiate Remote Digital Loop-back with self test. (RDL+ST)	
	&T8	Initiate Analog Loop-back with self test. (ALB+ST)	
&Vn		View profile settings.	
	&V0	View current active settings.	
	&Vn	View the (n-1) user profile settings (n=1-2)	
	&V3	View factory default settings.	
&Wn	n=0-1	Save current settings to user profile n in non-volatile RAM. (See also S35.6)	
&Yn		Break handling. Destructive Break clears the buffer. Expedited Break is sent immediately to the remote system.	S28.2-3
	&Y0	Destructive, expedited.	
	&Y1 *	Nondestructive, expedited.	
	&Y2	Nondestructive, unexpedited.	
&Z?		Display all the phone numbers stored in non-volatile RAM.	
&Zn=s	n=0-3	Store phone number/s to NVRAM at location n (n=0-3) use AT*Dn or ATS29=n to set the default dial pointer.	

Table 13. Extended AT& Command Sets

Extended AT* Command Sets

Command	Options	Function & Description	Ref.
*Cn		Character length, including start, stop and parity bit.	S15.3-4
	*C0 *	10-bit character length	
	*C1	11-bit character length	
	*C2	9-bit character length	
	*C3	8-bit character length	
*Dn	n=0-3	Set default dial pointer at telephone directory location 'n.'	S29
	*D0 *	(See also S35.4 and S38.0)	
*En		Modem error control negotiation.	S21.0
	*E0 *	if error control negotiation fails, keep the non-error control connection.	
	*E1	If error control negotiation fails, disconnect the call (hang-up).	
*Gn	*G0	Disables security function. (Default)	
	*G1	Enables type 1 security, with password check.	
	*G2	Enables type 1 security, with password check and call back.	
	*G3	Enables type 2 security, with password check.	
	*G4	Enables type 2 security, with password check and call back.	
	*G5	Enables type 2 security, with password check and call back; remote site enters the call-back number.	
	*G9	Reset the supervisor password to "ZyXEL".	

Command	Options	Function & Description	Ref.
		<p>Note:</p> <ol style="list-style-type: none"> 1. The command *Gn requests supervisor password checking. 2. In security type 1, the remote site must be a ZyXEL modem. 3. In security type 2, the remote site can be any other type of modem. 4. The modem can store 4 (0-3) telephone numbers. If call back security is disabled, the modem will search the password table to check the remote modem's password. If they match, the modem will keep the connection, otherwise the modem will hand up. If call back security is enabled, the modem will complete the password checking. If there is no match, the modem will disconnect the line, otherwise the modem will disconnect the line, find the corresponding phone number and call back immediately. The remote modem should be set to auto-answer the call and response. 	
*HS		Modifies supervisor password.	
Note: The default supervisor password is ZyXEL.			
*Hn	N=0-3	Modifies the user password table at location 'n.'	
*Pn	n=0-15 *Pg *	Set transmission power level; ranges from -8 dBm to -15 dBm. (Default: -11 dBm)	S17.1-4
*Qn		Action taken when line quality changes.	S27.6-7
	*Q0	No action to poor signal quality.	
	*Q1	Retrain action taken if signal quality is poor. (See also S41.2)	
	*Q2 *	Adaptive rate, automatic fall-back or forward.	
	*Q3	Disconnect if signal quality is poor.	
*T		Recall the last CND (Caller ID) information.	S40.2
*V		Views password table.	

Table 14. Extended AT* Command Sets

Extended AT# Command Sets

Command	Options	Function & Description	Ref.
#En		Modem status in escape state	
	#E0	Disable the report of modem status in escape state	
	#E1	Enable the report of modem status in escape state	

Table 15. Extended AT# Command Sets

Fax command sets

Service Class 1 Commands

Command	Description	Value
+FCLASS=n	Service Class Identification and Control	n=0: Sets to modem mode n=1: Sets to Class 1 mode n=2.0: Sets to Class 2.0 mode n=8: Sets to Voice mode
+FTS=n	Stop Transmission and pauses	n=0-255 in 10 ms units.
+FRS=n	Wait for Silence	n=0-255 in 10 ms units.
+FTM=<MOD>	Transmit Data with <MOD> Carrier	See table 16
+FRM=<MOD>	Receive Data with <MOD> Carrier	See table 16
+FTH=n	Transmit HDLC Data with <MOD>=3 Carrier	n=3
+FRH=n	Receive HDLC Data with <MOD>=3 Carrier	n=3

Table 16. Service Class 1 Commands

The value of <MOD> parameters lists as below:

Value	Modulation	Speed
3	V.21 ch 2	300
24	V.27ter	2400
48	V.27ter	4800
72	V.29	7200
73	V.17	7200
74	V.17 short train	7200
96	V.29	9600
97	V.17	9600
98	V.17 short train	9600
121	V.17	12000
122	V.17 short train	12000
145	V.17	14400
146	V.17 short train	14400

Table 17. The Value of <MOD> Parameters

Service Class 2 Commands

The following Class 2 commands are supported and implemented as per TIA PN2388 (8/20/90):

Command Syntax	Description
+<command>=<value>	Execute a command or set a parameter.
+<command>=?	Read permissible settings.
+<command>?	Read current setting.

Table 18. Command Syntax

Command	Description	Value
+FAA= <i>n</i>	Auto-answer mode parameter: Answer as set by +FCLASS.	n=0
	DCE answers and auto-determines type.	n=1
+FBADLIN= <value>	Bad line threshold (number of consecutive bad lines for a bad page parameter): Determine if Copy Quality OK on the T.30 flow chart . <value>=0 to 255; a value of 0 implies that error checking is disabled.	0-255
+FBOR= <i>n</i>	Phase C data bit order: Select direct bit order.	n=0
	Select reversed bit order in receiving mode for phase C data.	n=1
+FBUF?	Buffer size; read only parameter: Allow DTE to determine the characteristics of the DCE's buffer size.	
+FCIG="string"	Local fax station ID string, for polling Rx.	
+FCLASS= <i>n</i>	Service class selection: Refer to +FCLASS Class 1 command in previous section.	
+FCON	DCE responds fax connection .	
+FCQ= <i>n</i>	Copy quality check capability parameter: No copy quality check capability.	n=0
	Only check 1D phase C data.	n=1
	Check both 1D and 2D phase C data.	n=2
+FCR= <i>n</i>	"Capability to receive" parameter: DCE will not receive message data or poll a remote device.	n=0
	DCE receives message data or polls a remote device.	n=1
+FDCC= <i>vr,br,wd,l n,df,ec,bf,st</i>	DCE capabilities parameters: Vertical resolution: Normal; 98 lpi.	vr=0
	Vertical resolution: Fine; 196 lpi.	vr=1

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Command	Description	Value
	Bit rate: 2400 bit/s; V.27ter.	br=0
	Bit rate: 4800 bit/s; V.27ter.	br=1
	Bit rate: 7200 bit/s; V.29 or V.17.	br=2
	Bit rate: 9600 bit/s; V.29 or V.17.	br=3
	Bit rate: 12000 bit/s; V.17.	br=4
	Bit rate: 14400 bit/s; V.17.	br=5
	Page width: 1728 pixels in 215mm.	wd=0
	Page width: 2048 pixels in 255mm.	wd=1
	Page width: 2432 pixels in 303mm.	wd=2
	Page length: A4; 297mm.	ln=0
	Page length: B4; 364mm.	ln=1
	Page length: unlimited length.	ln=2
	Data compression format: 1-D; modified Huffman.	df=0
	Data compression format: 2-D; modified Read.	df=1
	Error correction disabled.	ec=0
	Disable binary file transfer.	bf=0
	Minimum scan time/line: 0 ms.	st=0
	Minimum scan time/line: 5 ms.	st=1
	Minimum scan time/line:10 ms (normal); 5 ms (fine).	st=2
	Minimum scan time/line:10 ms.	st=3
	Minimum scan time/line:20 ms (normal); 10ms (fine).	st=4
	Minimum scan time/line:20 ms.	st=5
	Minimum scan time/line:40 ms (normal); 20ms (fine).	st=6
	Minimum scan time/line:40 ms.	st=7
+FDCS= <i>vr,br,wd,ln,df,ec,bf,st</i>	Current session parameter; refer to +FDCC command.	
+FDIS= <i>vr,br,wd,ln,df,ec,bf,st</i>	Current session negotiation parameter; refer to +FDCC command.	
+FDR	Receive phase C data command; initiates document reception.	
+FDT= <i>df,vr,wd,ln</i>	Transmit phase C data command: release the DCE to proceed with negotiation.	
+FET= <i>n</i>	End of page or document command:	
	More pages; same document.	n=0
	End of document; another document follows.	n=1
	No more pages or documents.	n=2

Command	Description	Value
	Procedure interrupt; another page follows.	n=4
	Procedure interrupt; end of document, another document follows.	n=5
	Procedure interrupt; end of document.	n=6
+FK	Regular fax abort command.	
+FLID="string"	Local ID string parameter.	
+FLO=n	Flow control options:	
	No flow control.	n=0
	Set XON/XOFF software flow control.	n=1
	Set CTS/RTS hardware flow control.	n=2
+FLPL=n	Document for polling command:	
	The DTE has no document available for polling.	n=0
	Indicate a document available for polling.	n=1
+FMDL?	Request DCE model .	
+FMFR?	Request DCE manufacturer .	
+FMINSP=n	Minimum phase C speed parameter:	
	2400 bps.	n=0
	4800 bps.	n=1
	7200 bps.	n=2
	9600 bps.	n=3
	12000 bps.	n=4
	14400 bps.	n=5
+FPHCTO= <value>	DTE Phase C response time-out: Determine how long the DCE will wait for a command after reaching the end of data when transmitting in Phase C. <value>=0 to 255; 100 ms units.	0-255
+FPTS=n	Page transfer status	
	Received page good.	n=1
	Page bad; retrain requested.	n=2
	Page good; retrain requested.	n=3
	Page bad; procedure interrupt requested.	n=4
	Page good; procedure interrupt requested.	n=5
+FREL=n	Phase C received EOL alignment:	
	The EOL patterns are bit aligned as received.	n=0
	The last received bits of EOL patterns are byte aligned by the DCE, with necessary zero fill bits inserted. Refer to TIA PN-2388 for details.	n=1
+FREV?	Request the DCE revision identification.	
+FSPL=n	"Enable polling" command:	
	Disable polling.	n=0
	Enable polling.	n=1

Table 19. Supported Commands (per TIA PN2388 8/20/90)

All other +F commands are not supported, but the modem will respond OK. In many cases this means "don't care."

Response	Value	Function and Description
+FCFR		Confirmation .
+FCIG:"string"		Report remote ID response CIG.
+FCON		Facsimile connection response.
+FCSI:"string"		Report remote ID response CSI.
+FDCC:vr,br,wd,ln,df,ec,bf,st		Report session parameters response; refer to +FDCC=.... command.
+FDCS:vr,br,wd,ln,df,ec,bf,st		Report session negotiation parameters response; refer to +FDCC=.... command.
+FDTC:vr,br,wd,ln,df,ec,bf,st		Report remote capabilities response; refer to +FDCC=.... command.
+FET:n		Post page message response; refer to the +FET=n command.
+FHNG:n		Call termination status response.
	n=00	Normal and proper end of connection.
	n=10	Transmit error on phase A hang up code.
	n=20	Transmit error on phase B hang up code.
	n=40	Transmit error on phase C hang up code.
	n=50	Transmit error on phase D hang up code.
	n=70	Receive error on phase B hang up code.
	n=90	Receive error on phase C hang up code.
n=100	Receive error on phase D hang up code.	
+FNSC:"HEX string"		Report the non-standard facilities command frame.
+FNSF:"HEX string"		Report the non-standard facilities frame response.
+FNSS:"HEX string"		Report the non-standard setup frame response.
+FPOLL		Remote polling indication.
+FPTS:n		Receive page transfer status response; refer to +FPTS=n command.
+FTSI:"string"		Report remote ID response TSI.
+FVOICE		Transition to Voice response.

Table 20. Class 2 Command Responses

Class 2 Flow Control

Flow control is necessary to match the DTE-DCE data rate to the line-signaling rate while transmitting or receiving Group 3 (T.4) data. In Class 2 fax mode, both hardware (RTS/CTS) and software (XON/XOFF) flow control are enabled.

Service Class 2.0 Commands

Command	Description	Value
+FDT	Transmit phase C data command: releases the DCE to proceed with the negotiation.	
+FDR	Receive phase C data command: initiates document reception.	
+FKS	Terminate a Session , orderly fax abort.	
+FIP	Initialize Service Class 2.0 Parameters.	
+FCLASS=n	Service Class Identification and Control	n=0,1,2,0,8;refer to the +FCLASS Class 1 command
+FMI?	Identify DCE Manufacturer	ZyXEL
+FMM?	Identify DCE	Omni 56K/Omni 56K Plus
+FMR?	Identify DCE Revision	Vx.x
+FCC=vr,br,wd,ln,df,ec,bf,st	Establish DCE Capabilities	
	Vertical Resolution	vr=0:Normal;98 lpi vr=1:Fine;196 lpi
	Bit Rate	br=0:2400 bps br=1:4800 bps br=2:7200 bps br=3:9600 bps br=4:12000 bps br=5:14400 bps
	Page Width	wd=0:1728 pixels in 215mm wd=1:2048 pixels in 255mm wd=2:2432 pixels in 303mm
	Page Length	ln=0:A4;297mm ln=1:B4;364mm ln=2:unlimited length
	Data Compression Format	df=0:1-D df=1:2-D
	Error Correction	ec=0:Disable
	Binary File Transfer	bf=0:Disable

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	Minimum Scan Time/Line	st=0:0 ms st=1:5 ms st=2:10 ms (normal); 5 ms (fine) st=3:10 ms st=4:20 ms (normal); 10 ms (fine) st=5:20 ms st=6:40 ms (normal);20 ms (fine) st=7:40 ms
+FIS=vr,br,wd,ln,df,ec,bf,st	Current Session negotiating parameters	The same as above
+FCS=vr,br,wd,ln,df,ec,bf,st	Current Session Parameters	The same as above
+FLI="string"	Local Facsimile station ID String, TSI/CSI	
+FPI="string"	Local Facsimile station ID String, CIG	
+FLP=n	Indicate Document available for polling	n=0:No document n=1:A document is available
+FSP=n	Enable/Disable polling	n=0:Disable n=1:Enable
+FNR=rpr,tpr,idr,nsr	Negotiation Reporting Enable	rpr= 0:Receiver parameters are not reported. rpr=1:Receiver parameters are reported. tpr= 0:Transmitter parameters are not reported. tpr=1:Transmitter parameters are reported. idr= 0: ID Strings are not reported. idr=1: ID Strings are reported. nsr= 0:Non-standard frames are not reported. nsr= 1:Non-standard frames are reported.
+FIE=n	Procedure Interrupt parameter	n=0:Disable n=1:Enable
+FPS=n	Page Transfer Status	n=1:Received page is good. n=2:Page is bad; retrain is requested. n=3:Page is good; retrain is requested. n=4:Page is bad; procedure

		interrupt is requested. n=5:Page is good; procedure interrupt is requested.
+FLO=n	Flow Control Select	n=0:No flow control n=1:Sets XON/ XOFF software flow control n=2:Sets CTS/RTS hardware flow control
+FPR=n	Serial Port Rate Control	n=0:Automatic DTE rate detection by the DCE n>0:Serial rate is fixed at the value multiplied by 2400 bps.
+FBO=n	Phase C Data Bit Order	n=0:Selects direct bit order n=1:Selects reversed bit order
+FEA=n	Phase C Received EOL alignment	n=0:EOL patterns are as received
+FCR=n	Capability to Receive	n=0:Not receive message data or poll a remote device. n=1: Receives message data or poll a remote device.
+FCQ=<rq>,<tq>	Copy Quality disable/enable	rq= 0:Receive copy quality check is disable. rq=1:Receive copy quality check is enable. tq= 0:Transmit copy quality check is disable. tq=1:Transmit copy quality check is enable.
+FRQ=pql,cbl	Receive Quality Thresholds	pql= 0-64h:Specifies the percentage of good lines cbl= 0-ffh:Specifies the maximum tolerable number of consecutive bad lines.
+FAA=n	Adaptive Answer Mode	n=0:Answers as set by +FCLASS n=1:Answers and auto-determines the call type.
+FCT=n	Phase C Timeout	n=0-ffh,1 sec units
+FMS=n	Minimum Phase C Speed	n=0:2400 bps n=1:4800 bps n=2:7200 bps n=3:9600 bps n=4:12000 bps

		n=5:14400 bps
+FBS?	Buffer Size	512,256

Table 21. Service Class 2.0 Commands

Voice AT Commands

Command	Function	Option	Default	Description
+FLO	Flow control select.	0,1,2	2	0: NO flow control. 1: (XON/XOFF)Software flow control. 2: (RTS/CTS)Hardware flow control.
+VIP	Initialize parameters.	N/A	N/A	+VSD=15,70 (15*4, 7 second) +VTD=100 (1 second) +VRN=10 (10 second) +VRA=70 (7 second) +VGR=0 (Enable AGC) +VGT=128 +FLO=2 (RTS/CTS) +VIT=70 (7 second)
+FCLASS	Voice/data/fax selection	0,1,2,0,8	0	0: DATA. 1: CLASS 1 FAX. 2.0: CLASS 2.0 FAX. 8: VOICE.
+FMI?	Manufacturer ID.	N/A	ZyXEL	
+FMM?	Model ID	N/A	Omni 56K	
+FMR?	Revision	N/A	Vx.xx	
+VRX	Voice recording	N/A	N/A	Start recording.
+VGR	Set the gain for the received voice sample.	0	0	0: Automatic gain control(AGC)
+VGT	Set the gain for the transmitted voice sample.	0-255	128	0: Silence 1-255: The larger the value, the louder the voice will be.

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+VLS	Select a voice I/O device.	0,1 (Omni 56K Plus only), 2	0	0: The DCE is on hook. Local phone connected to Telco line. 1: The DCE is on-hook and is connected to the local phone. The local phone is also provided with power. The modem can record/play through the local phone set. (Omni 56K Plus only) 2: The DCE is off-hook and is connected to the Telephone line. The local phone is provided with power. The modem can record/play through the local telephone line.
+VRA	Ring back goes away timer	0 – 255	70	0 : turn off the timer 1-255: Defines the period without ringback (after at lease one ringback has been detected) in 100 -ms units.
+VRN	Ring back never come timer	0 – 255	10	0 : turn off the timer 1-255: Defines the period without ringback after dialing in 1 sec unit.
+VTX	Voice transmit mode	NA	NA	Switches to voice transmit mode.
+VSD	Silence detection	Threshold, Period (0-255), (0-255)	15,70	Threshold: 0: Disable silence detection. 1-255: The smaller the value, the more sensitive to the silence detection it will be. Period: 1-255: The required period of silence detection before DCE reporting the silence event. 0: Disable silence detection. Unit: 0.1 second
+VSM	Selection of compression method	4;ZyXEL ADPCM; 4 Bit;(9600)	4,9600	IMA 4 bit ADPCM. Sample rate : 9600
+VTS= [x,y,z]	Dual Tone Generation	x: 0-3000 Hz y: 0-3000 Hz z: 0-1000(10ms)	NA	x: first tone frequency y: second tone frequency z: duration in 10ms unit
+VTS= {x,y}	DTMF Tone Generation	x:0-9,*,#, A-D y:0-1000 (10ms)	NA	x: DTMF digits (0-9,*,#, A,B,C,D) y: duration in 10ms unit

+VTS= x,x...	DTMF Tone Generation	x:0-9,*,#, A-D	NA	x: DTMF digits (0-9,*,#, A,B,C,D) Duration:+VTD setting. (in 10ms unit)
+VTD	Set default duration of DTMF tone.	1-255	100	Unit: 0.01 second.
+VIT	Inactivity timer.	0-255	70	Unit: 0.1 second.

Table 22. Voice AT Commands

Voice Shielded DTE Commands

Command	Description
<DLE>p	Pause, suspend voice data to the output device in playback state.
<DLE>r	Resume, resume suspended voice data in playback state.
<DLE><ETX>	Terminate voice playback state, switch to online voice command mode after completing remaining data in buffer.

Table 23. Voice Shielded DTE Commands

Voice Shielded DTE Responses

Response Code	Description
<DLE>0 - <DLE>9 <DLE>*,<DLE># <DLE>A-<DLE>D	DTMF digit detected
<DLE>a	Answer Tone detected
<DLE>b	Busy detected
<DLE>c	Calling Tone detected
<DLE>d	Dial tone detected
<DLE>e	European Data Modem Calling Tone detected
<DLE>f	Bell Answer Tone detected
<DLE>h	The local handset on hook
<DLE>q	Quiet detected
<DLE>s	Silence detected
<DLE>H	The local handset on hook
<DLE>u	Transmission Under run in playback state
<DLE><ETX>	End of stream

Table 24. Voice Shielded DTE Responses

S-Register Descriptions

In most bit-mapped S-registers, the default bit value is 0. Non-0 default values are followed by an asterisk. In some cases, default values are shown in the reference column preceded by +. Some bits are reserved for factory use and should not be changed.

Basic S-Registers "ATSn=x"

Command	Function & Description	+Ref.
S0=	Sets the number of rings on which the modem will answer. 0 value disables auto-answer.	+000
S1=	Counts and stores number of rings from an incoming call.	+000
S2=	Defines escape code character, default '+' (43 dec.). A value of 128-255 disables the escape code.	+043
S3=	Defines ASCII Carriage Return.	+013
S4=	Defines ASCII Line Feed.	+010
S5=	Defines ASCII Backspace. A value of 128-255 disables the Backspace key's delete function.	+008
S6=	Sets the number of seconds the modem waits before dialing if 'X0' or 'X1' is selected. If a setting of 'X2,' 'X7' is selected, the modem will dial as soon as it detects a dial tone. This register also sets the time-out interval for the "W" dial modifier to wait for the dial tone. (See also S41b4)	+003
S7=	Sets duration, in number of seconds modem waits for a carrier.	+060
S8=	Sets duration, in seconds, for pause (,) option in Dial command and pause between command re-executions for Repeat (>) command.	+002
S9=	Sets duration, in tenths of a second of remote carrier signal before recognition. (Ignored if in non-FSK or half-duplex operation)	+006
S10=	Sets duration, in tenths of a second, modem waits after loss of carrier before hanging up.	+007
S11=	Sets duration and spacing, in milliseconds, of dialed Touch-Tones.	+070

Table 25. Basic S-Registers "ATSn=x"

Command	bit	dec	hex	Function and description	Ref.
S13=	bit	dec	hex	Bit-mapped register.	+000
	1	2	2	Capture modem manufacturer information during V.42 handshake, can be displayed at AT12 <Last Speed/Protocol> line if available ('Flash' or 'ZyXEL' stands for ZyXEL connection)	

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Command	bit	dec	hex	Function and description	Ref.
S14=	bit	dec	hex	Bit-mapped register:	+002
	1	0	0	Grant Remote Digital Loop-back test request.	&T4
	2	2	2	Deny Remote Digital Loop-back test request.	&T5*
S15=	bit	dec	hex	Bit-mapped register.	+066
	0,1	0	0	Even parity	
		1	1	Odd parity	
		2	2	No parity	*
	2	0	0	1 stop bit	*
		4	4	2 stop bits	
	4,3	0	0	10 bit character length	*C0*
		8	8	11 bit character length	*C1
		16	10	9 bit character length	*C2
		24	18	8 bit character length	*C3
	7-5	0	0	Profile 0 as active settings after power on.	Z0
32		20	Profile 1 as active settings after power on.	Z1	
64		40	Factory default as active settings after power on.	Z2*	
S16=		dec	hex	Test status register.	+000
		0	0	No test in progress.	&T0
		1	1	Analog Loop-back test in progress.	&T1
		3	3	Local Digital Loop-back test in process.	&T3
		6	6	Remote Digital Loop-back test in process .	&T6
		7	7	Remote Digital Loop-back with self-test in process.	&T7
		8	8	Analog Loop-back with self test in progress.	&T8
S17=	bit	dec	hex	Bit-mapped register.	+022
	4-1	0-30	0-1E	Set transmit power level from 0 to -15 dBm. (See also S35b3) (Default *P11)	*Pn
	5	0	0	Normal dial. (Default)	D
		32	20	Reverse dial, go on-line in answer mode.	DR
S18=		dec	hex	Force modem to fix baud rate when answering.	+000
		0	0	Disable fixed baud function.	
		1-46	1-2E	Enable baud rate to be fixed when answering. Baud rate value settings (n) the same as S20	
S19=		dec	hex	Modem connection mode, same	+000/&Nn
		0-99	0-63	setting value as 'AT&Nn' command.	
S20=		dec	hex	DTE speed (bps). Auto detected from AT Command.	+001
		0	0	230400 bps	
		1	1	115200 bps (Default)	
		2	2	76800 bps	

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Command	bit	dec	hex	Function and description	Ref.
		3	3	57600 bps	
		4	4	38400 bps	
		5	5	19200 bps	
		6	6	16800 bps	
		7	7	14400 bps	
		8	8	12000 bps	
		9	9	9600 bps	
		10	A	7200 bps	
		11	B	4800 bps	
		12	C	2400 bps	
		13	D	1200 bps	
		14	E	460800 bps	
		15	F	300 bps	
		16	10	307200 bps	
		17	11	153600 bps	
		18	12	102400 bps	
		20	14	61440 bps	
		21	15	51200 bps	
		22	16	624000 bps	
		24	18	124800 bps	
		25	19	62400 bps	
		26	1A	41600 bps	
		27	1B	31200 bps	
		28	1C	24960 bps	
		29	1D	20800 bps	
		46	2E	921600 bps	

Note: Only the speeds up to S20=15 are supported by auto speed detection.

S21=	bit	dec	hex	Bit mapped register.	+178
	0	0	0	Maintain a non-error control connection when modem error control handshake fails. (Default)	*E0
		1	1	Drop connection when modem error control handshake fails.	*E1
	1-2	0	0	Speaker is always OFF.	M0
		2	2	Speaker is ON until carrier is detected. (Default)	M1*
		4	4	Speaker is always ON.	M2
		6	6	Speaker is ON after last digit is dialed out until carrier detected.	M3
	3	0	0	DSR is always ON. (Default)	&S0

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Command	bit	dec	hex	Function and description	Ref.
		8	8	According to CCITT. (see also S44.4, S41.5)	&S1
	4	0	0	CD is always ON.	&C0
		16	10	CD tracks presence of data carrier. (see also S38.3) (Default)	&C1
	5	0	0	CTS Follows RTS in synchronous mode. Response delay set in S26.	&R0
		32	20	Ignore RTS (CTS always ON) in synchronous mode. (Default)	&R1
	6-7	0	0	Assume DTR always On.	&D0
		64	40	108.1, DTR OFF-ON transition causes dial of the default number.	&D1
		128	80	108.2 Data Terminal Ready, DTR OFF causes the modem to hang up and return to command state. (Default)	&D2
192		C0	108.2, DTR OFF causes the modem to hang up and reset the modem to profile 0 after DTR dropped.	&D3	
S23=	bit	dec	hex	Bit mapped register.	+105
	0	0	0	Command echo disabled.	E0
		1	1	Command echo enabled. (Default)	E1
	1	0	0	Tone dial. (Default)	T
		2	2	Pulse dial.	P
	2	0	0	Pulse dial make/break ratio = 39% / 61% (Default)	&P0
		4	4	Pulse dial make/break ratio = 33% / 67%	&P1
	3-5	0	0	ATX0 (See result code table)	X0
		8	8	ATX1	X1
		16	10	ATX2	X2
		24	18	ATX3	X3
		32	20	ATX4	X4
		40	28	ATX5, error control result code is enabled. (Default)	X5
		48	30	ATX6, error control result code is enabled.	X6
	6	0	0	Display result code in numeric format. (see S35.7)	V0
		64	40	Display result code in verbose format. (Default)	V1
7	0	0	Modem returns result code. (Default)	Q0	
	128	80	Modem does not return result code. (see also S40.1)	Q1	
S24=	bit	dec	hex	Bit mapped register.	
	6-4	16-112	10-70	Speaker volume control, increments of 16 in decimal value.	L0-7
S25=		0-255	0-FF	Specify the time delay that DTR signal needs to be	+000

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Command	bit	dec	hex	Function and description	Ref.
				OFF before it will be recognized, in 10 ms units. If S25=0, the delay time is set to 4 ms.	
S26=		dec	hex	RTS/CTS delay.	+000
		0-255	0-FF	Set the delay, in 10 millisecond units between the RTS and modem's CTS response in synchronous mode. (see '&Rn' command)	&Rn
S27=	bit	dec	hex	Bit mapped register.	+156
	0-2			Modem error control.	
		0	0	No error control.	&K0
		1	1	MNP4 + MNP3 (see also S41.0)	&K1
		2	2	MNP4 + MNP5 (see also S38.5, S41.0)	&K2
		3	3	V.42+MNP4	&K3
		4	4	V.42 + V.42bis (compatible with &K2) (Default)	&K4*
	3-5	0	0	Flow control disabled.	&H0
		24	18	Hardware (RTS/CTS) flow control. (Default)	&H3
		32	20	Software (XON/XOFF) flow control.	&H4
		40	28	Reserved.	&H5
	6-7			Signal quality.	
		0	0	No response to poor signal quality.	*Q0
		64	40	Retrain action taken if signal quality is poor.	*Q1
		128	80	Adaptive rate (auto fall-back /forward) when signal quality changes.(Defaults)	*Q2
192		C0	Disconnect when signal quality is poor.	*Q3	
S28=	bit	dec	hex	Bit mapped register.	+068
	2-3	0	0	Destructive, expedited break.	&Y0
		1	4	Non-destructive, expedited break. (Default)	&Y1
		10	8	Non-destructive, un-expedited break.	&Y2
	4-5	0	0	No guard tone. (Default)	&G0
		16	10	550 Hz guard tone.	&G1
		32	20	1800 Hz guard tone.	&G2
	6	0	0	DTE/DCE rate follows link rate. (See also S18, S44b6)	&B0
		1	64	DTE/DCE rate is fixed at the DTE setting, range from 300-460.8 Kbps. (default, also see S18, S44b6)	&B1
S29=		0-3	0-3	Set default dial phone number pointer, use AT&Zn=s to store phone numbers in EEPROM.	+000 *D
S31=		0-255	0-FF	Holds the ASCII decimal value of the XON .	+017
S32=		0-255	0-FF	Holds the ASCII decimal value of the XOFF.	+019
S35=	bit	dec	hex	Bit mapped register.	+032

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Command	bit	dec	hex	Function and description	Ref.
	1	2	2	Disable aborting from terminal during modem handshaking.	
	3	8	8	Add 16dB attenuation to the leased line transmission power.	
	5	32	20	Enable Selective Reject in V.42. (Default)	
	7	128	80	Enable extended numerical result codes from 50-65 when an error corrected connection is made. Use with ATV0. (see result code table)	V0 S23.6
S36=	bit	dec	hex	Bit mapped register.	
	7-5	0	0	No security function. (Default)	*G0
		32	20	Type 1* security, with password check.	*G1
		64	40	Type 1* security, with password check and call back.	*G2
		96	60	Type 2* security, with password check.	*G3
		128	80	Type 2* security, with password check and call back.	*G4
	160	A0	Type 2* security, with password check and call back; call-back number from remote.	*G5	
S38=	bit	Dec	hex	Bit mapped register.	+000
	0	1	1	Repeatedly dialing default number if not connected.	*Dn, S29
	3	0	0	CD tracks the carrier. (Default)	&C0
	3	8	8	DCD ON/OFF sequence follows UNIX standard, DCD ON before connect message is sent, DCD off after last DCE response is sent.	&C1, S21.4
	4	16	10	Auto-mode fax receiving disabled, hang up if a fax call is received. (Default)	&N0
	5	32	20	Disable MNP5 negotiation.	&Kn
S39=	bit	dec	hex	Bit mapped register.	+032
	2	4	4	Reverse the answers. Answer in originating mode.	ATA
S40=	bit	dec	hex	Bit mapped register.	+000
	1	2	2	No result code is displayed in answer mode.	Q2
	2	4	4	Enables caller ID detection.	
	3	8	8	Enables type 1 ring detection.	
	4	16	10	Enables type 2 ring detection.	
	5	32	20	Enables type 3 ring detection.	
	6	64	40	Enables type 4 ring detection.	
S41=	bit	dec	hex	Bit mapped register.	+000
	0	1	1	Special MNP compatibility. (see also S27.0, S38.5)	&Kn
	3	8	8	Enable CCITT signals 140 and 141 on EIA-232D interface.	
	4	16	10	In X2-X7 setting, modem waits for S6 seconds before dialing and ignores dial tone detection.	

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Command	bit	dec	hex	Function and description	Ref.
	5	32	20	DSR follows DCD and pulses for 0.5 sec after DCD on-off transition.	&Sn
	6	64	40	Force S0>=2; doesn't answer on the first ring.	S0
	7	128	80	Ignore calling tone, not to be used as fax detection.	
S42=	bit	dec	hex	Bit mapped register.	+000
	1	2	2	Enables throughput averaging.	
	2	4	4	CND message will be forced on even if ATQ2 is set.	
	3	8	8	Disable escape sequence code in answer mode.	
	4	16	10	Disable V.17 14,400 Fax in calling mode, no effect to answering mod.	
	6	64	40	Disable 'RINGING' result code.	Xn
	7	128	80	DCD forced on but pulse off for 0.5 seconds at carrier loss.	&C0
S43=	bit	dec	hex	Bit mapped register.	+008
	6	64	40	Enable 1.5 sec, pause between off-hook and modem answering.	
	7	128	80	Modem hang-up if the line condition does not permit modem to run at the highest speed set by '&Nn' command.	
S44=	bit	dec	hex	Bit mapped register.	+000
	3	8	8	ATDSn initiates auto-dial of the stored numbers consecutively until connection is made (cyclic dial).	DSn
	4	16	10	DSR follows DTR. (see also S41.5)	&S1
	6	64	40	When selected with '&B0', DTE speed fixed at 38400 when the link speed is above 9600. DTE speed fixed at 9600 if link speed is 7200. If it is below 7200, DTE speed follows link speed. When selected with &B1, DTE speed fixed at current rate when an ARQ connection is made, when a non-ARQ connection is made, DTE speed follows the link speed. (See also S18)	&Bn
S45=		dec 0-255	hex 0-FF	Delay during which the CND silence detection is disabled, in 20 ms units. (See also S46)	+100
S46=		dec 0-255	hex 0-FF	CND silence detection interval.	+028
				To process the CND, silence must be detected for the specified interval, in 20 ms units.	
S48=	bit	dec	hex	Bit-mapped register.	+000
	0	1	1	Cause CND information to be reported in raw format.	
	2	4	4	Enable data calling tone (CNG) sending.	
	3	8	8	Reverse the V.23 channel speed. Originate mode modem speed (Send/Receive) 1200/75; Answer	&N12

Command	bit	dec	hex	Function and description	Ref.
				mode modem speed (Send/Receive) 75/1200.	
	4	16	10	(Work with &D1 command) DTR ON will have the modem dial the default number and DTR OFF will have the modem hang-up and reset to profile 0. When the modem is idle (waiting for command), it will not dial any number when DTR changes from ON to OFF.	
S52=	bit	dec	hex	Bit-mapped register.	+000
	7	0	0	Select 'Mark' as the first signal of the V.23 handshaking sequence. (Default)	&N12
		128	80	Select 'Space' as the first signal of the V.23 handshaking sequence.	&N12
S56=		dec	hex		+000
		0-255	0-FF	Hook flash detect time, in units of 10ms,. A value of zero use country-specific default duration.	
S57=	bit	dec	hex	Bit-mapped register.	+016
	4	16	10	Enables the reporting of Class 1 capability in the response to +FCLASS=?	

Table 26. Extended S-Registers "ATSn=x"

Bit	S-register bit number, 'b', used in 'ATSr.b=n' and 'ATSr.b=?'
dec	Decimal value, 'x', used in 'ATSn=x'
hex	Equivalent Hexadecimal value.
+nnn	Factory default when listed in 'Reference' column.
Note:	'AT' is omitted when an AT command is referred to in the 'Reference' column..

Chapter 6

Firmware Upgrade

The ZyXEL Omni 56K/Omni 56K Plus provides firmware upgrade function that you can upgrade the firmware either by upgrade software provided in the CD-ROM that comes with your modem package, or by terminal program such as Bitware or Hyperterminal To obtain the latest firmware version, please go to ZyXEL's website site at <http://www.zyxel.com>.

Upgrading by Software

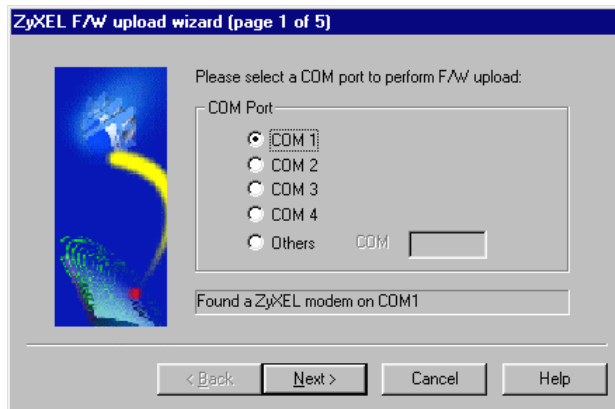
To upgrade the firmware by provided software, follow the steps listed below:

Step 1. Insert the CD-ROM that comes with your modem package into your CD-ROM driver.

Step 2. Double-click on Zyfwm.exe icon, as shown below, in your CD-ROM.



Step 3. You will see the first screen of ZyXEL F/W upload wizard as shown below. Select COM Port that is connecting with your modem, then click on **Next**.



Step 4. Click on **Browse** to find the directory that your latest firmware file is located, then click on **Next** to start uploading.



Follow the upload wizard to complete upgrade process. After finishing, you may use your modem again.



NOTE: To obtain the latest firmware version, please go to ZyXEL's website site at <http://www.zyxel.com>.

Upgrading by Terminal Program

To upgrade the firmware by terminal program, you have to prepare a terminal program first, such as terminal function in Bitware or Hyperterminal in Windows, then follow the instructions listed below. For more information on how to install Bitware on your computer, please refer to the *Read Me First* that comes with your modem package.

Step 1. Start your terminal program.

Step 2. Type in 'atupx' it will show a message as below:

You have chosen XModem protocol with 128 byte block length and
checksum tail to upload the firmware file to update your modem,
data in Flash ROM will be erased!!
Are you sure (Y/N)?

Step 3. Be sure you have a new version of firmware file on hand, then click 'Y.'
The terminal will response:

Erase the flash ROM now. Please wait.

Then, it will continue to show:

Ready to program to flash. Please start upload.

Step 4. Now, select XModem checksum mode to send the new firmware to your modem.
Enter the file name then start uploading.

Glossary

Analog: Not digital. Analog quantities may have any value.

Analog loopback test: Testing method in which the modem's analog output signal is connected to the analog input.

Answer: In a connection between two modems, one modem works as the recipient (in answer mode) and the second modem as the initiator (originate mode).

ARQ: Automatic Retransmission reQuest - Standardized method in error control protocols.

ASCII: American Standard Code for Information Interchange. This code assigns a 7-bit numerical value to characters, digits and control characters. An ASCII character is a 7-bit character with a decimal value ranging from 0 to 127.

Asynchronous: Data transfer method in which a character's data bits are framed by additional bits (start bit, parity bit and stop bit). There are variable idle times between characters.

AT command: The commands used with an intelligent modem. Every command line is started with the AT prefix (ATtention). To send an AT command to a modem, you must have communications software running.

Auto-answer: Modem's ability to automatically answer a call after a set number of rings.

Baud: Unit of modem transmission speed. Characters pre second. Named after Baudot, a French engineer who developed the Baudot code - the precursor of today's ASCII code.

bis: Old French word for two.

Bit: Smallest unit of information. A bit can have one of two states: ON (1; set) and OFF (0; not set). By combining a number of bits, a computer can code any information. A byte consists of 8 bits. Therefore a byte can have any one of 28 (256) states.

Bit rate: Count of data bits transmitted per time unit. The framing bits needed for asynchronous transfer are also counted in the calculation of the bit rate. In general, the bit rate is ten times the character rate.

bps: Unit of measurement. Bits per second.

Carrier: The carrier is a modulated tone and is used by the modem to transfer the data.

CCITT: Comité Consultatif International Thonique et Traphique; former name for the ITU-TSS (ITU-T), the international standard making organization for telecommunications.

CD: *See DCD.*

Class 2: A standard for fax transfers using a fax modem. Currently several drafts exist which are incompatible with each other. ZyXEL modems support the draft PN-2388 of Aug. 20th 1990, and the final 2.0 standard.

CNG: Call negotiation tone. A calling fax machine sends this tone before connecting to quickly establish a fax connection. A data modem may also have a data calling tone.

Command mode: In command mode, a modem accepts commands from the local DTE. Data transfer is suspended while the modem is in command mode.

Compatibility: If components are compatible, they work with each other.

COM port: Another name for the serial port on a PC.

Compression: *See data compression.*

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CRC: Cyclic redundancy check; an error checking protocol.

CTS/RTS: Control signal lines on an RS-232C serial interface. These lines are needed to use hardware flow control.

Cursor: A special marker on a display.

Data bit: In asynchronous transfers, a character is composed of data bits (the actual information) and framing bits (start bit, stop bit/s, parity bit). The framing bits are needed to recognize whether a character has been successfully transmitted and where a new character starts.

Data compression: Recoding of information. The same information is represented by less data bits. ZyXEL modems use MNP4 and V.42 compression schemes.

Data packet: Block of data which is framed by error control groups. A block consists of up to 256 8-bit groups. Data packets are used in synchronous transfer.

Data pump: The important module doing modulation and demodulation for a modem. The data pump is decisive for the quality and the speed of a modem's transfer capabilities.

DCD: Data Carrier Detected - a control signal line of the RS-232C interface.

DCE: Data Circuit Terminating Equipment or Communications Equipment - a modem is a DCE.

Demodulation: Transferring analog signals into digital data bits.

Digital: Digital data consists of a series of bits. A bit may have only one of two states. Analog data may have any value.

Digital loopback test: A modem test procedure which transfers the received digital data back to the modulator and transmits them out.

DIP switch: Dual inline package switch. DIP switches are abundant in the world of electronic equipment. They are used to set certain parameters on a printer, modem or other peripheral devices. You will not find any DIP switches in ZyXEL modems. ZyXEL modems let you perform all settings from the front panel or through command sequences.

DLE: The ASCII code that is used in voice data mode to separate data segments from command segments.

DSP: Digital signal processor. ZyXEL modems are equipped with this/these device(s). DSPs generate, process and analyze all signals.

DSR: Data Set Ready - a control signal line of the RS-232C standard.

DTE: Data Terminal Equipment - a computer or a terminal.

DTMF: Dual Tone Multi-Frequency. The technology used in pushbutton telephones, commonly known as touchtone, of generating audible notes to represent numbers.

DTR: Data Terminal Ready - a control signal line of the RS-232C standard interface. Some computers set this signal when they are turned on, even if they are not able to receive data.

Echo: For a modem user, echo has two meanings: A modem can return all received characters to its local terminal/computer so they can be seen on-screen. The other meaning of the term "echo" is that part of the analog signal the modem sent out is bounced back by the telephone network to the modem's receiver, mixing there with the remote modem's signal.

EDR: Extended Distinctive Ring - A feature of ZyXEL modems which helps to distinguish between data, fax and voice calls.

EEPROM: An Electronically Erasable and Programmable Read Only Memory. Such a device is used in ZyXEL modems to store settings and profiles. An EEPROM does not lose data when the modem is turned off.

EIA: Electronic Industry Association (of North America); this organization was the first to draft a standard serial port (RS-232C).

EPROM: Electrically Programmable Read Only Memory. A memory chip which may be programmed electronically, but must be exposed to ultraviolet radiation to be erased.

Error correction: A method to compensate for errors which occurred in the transmission path. Error correction is done by the modems and is transparent to the DTEs. The most familiar correction methods are MNP5 and V.42bis.

Fax: Long distance copy; facsimile - transfer of graphical data between two fax units. The graphical data is compressed during transfer (G3).

FIFO-Buffer: First-in-first-out buffer. A buffer of this type is used in the 16550 type UARTs which allow higher data throughput rates on PCs.

Firmware: The ZyXEL modems' system software is located in flash EPROMs. Depending on the size of the EPROM(s), some features may or may not be available.

Flash: Memory designed for multi-purposes.

Flow control: Method to stop and start the data flow to avoid loss of data.

Front panel: The front panel on the ZyXEL modems consists of LED indicators and key switches.

Full-duplex: Transmission link where transmission can take place in both directions simultaneously.

FSK: Frequency Shift Keying - a frequency modulation scheme.

G3 fax: Several fax standards exist. Most available fax machines use the group 3 (G3) standard. This standard defines the compression of graphic data and a transmission speed of up to 14400 bps with an automatic fallback to 2400 bps if the telephone line is bad.

Handshake: At the beginning of a connection, the modems must negotiate and initialize the protocols to be used and the speed at which the connection is to be established. This negotiation phase and the following initialization phase is called handshake.

HDLC: High-level Data Link Control - protocol for synchronous transfer.

High-speed modem: A modem that works at bit rates higher than 9600 bps.

Hook-Flash: The hook-flash is a signal used in a dial sequence. This signal may be used for call transfers or to request an outside line on certain PABX.

Hz: Hertz. A unit of measurement for frequency. Cycles per second.

Internet: The worldwide collection of networks and computers, linked together to create a global community for information exchange.

Interrupt: In a computer, some tasks must be performed regularly and without delay. This is possible because the CPUs provide special interrupt vectors. These vectors each point to some short program sequence. An interrupt stops the currently running program and the segment to which the vector points is executed.

ITU-TSS: International Telecommunications Union - Telecommunication Standards Sector. New name for the standard making organization CCITT. See CCITT.

ISP: Internet Service Provider. A company that provides subscribers with access to the Internet, usually through telephone lines via modems.

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LAPM: Link Access Procedure for Modems - a protocol which controls the handshake between two modems.

Layer protocol: A standard of the ISO (International Standards Organization) which defines everything regarding data communications from the hardware to the screen display in seven levels.

LED: Light Emitting Diode - a display element.

LINE: The jack on the rear panel which is connected to the wall phone outlet.

Mailer: A program which works with a remote BBS and requests and distributes messages automatically.

Memory: A fast storage component of a computer where data can be saved and from where it can be retrieved.

MNP: Protocols for error correction and data compression from Microcom, Inc.

Modem: An artificial word concatenated from **mod**ulator and **dem**odulator. A modem translates the digital signals received from its local DTE to analog signals which are transmitted via a telephone line. At the other end, the analog signals are demodulated and sent to the DTE as digital signals again.

Modulation: Translating digital states to analog waveforms.

Off-line: A modem which is not connected to another modem is off-line.

On-line: A modem which is engaged in a connection with another modem is on-line.

Originate : In a modem connection, one modem must work in the originate mode, the other in the answer mode.

Packed data: Data from which redundant information has been removed. Some file extensions denote packed files. Standard extensions are .ZIP, .ARC, .LZH, .TAR, .ZOO and others. If you transfer packed data don't use MNP5 compression.

Parity: A method to check whether a character has been correctly transmitted in asynchronous transfer. Usual settings are even parity and odd parity. In a connection, the modems at both ends must use the same parity settings.

Parity bit: The parity bit is sent as additional information with the data bits in asynchronous transfers. It controls the integrity of the transferred data. If parity is even, the parity bit is set if an uneven number of data bits is sent in the character, resulting in an even number of set bits.

PC: Personal Computer - acronym for computers which are compatible with the IBM PC or AT computers.

PHONE: Jack to which a telephone set may be connected.

Processing unit: A computer's brain. Here all the necessary calculations are performed.

Protocol, file transfer: Many protocols have been developed to ensure reliable data transfer at maximum speed, among them Xmodem, Ymodem, Zmodem and Kermit. With modern modems, the use of integrated hardware protocols (MNP4 and V.42) is recommended. The G-flavors of the above mentioned Ymodem and Zmodem allow transfers of multiple files with no additional error correction.

PSTN: The public network that delivers telephone services worldwide.

Public Domain: A special form of distributing software. Public domain software authors make no claim to commercialize their rights.

QUIET: A state in the voice mode of ZyXEL modems. Quiet is detected after a long pause in voice data.

RAM: Random Access Memory - working memory. The modem uses it among many other uses to store information on sent, but not yet acknowledged data.

Redundancy: Extra data that does not generate additional information.

Remote location: The modem at the other end of the line (the one you are calling or that is calling).

Reset: Return a device into a defined base status.

Retrain: The re-initialization process a modem is doing with the remote modem when the receiving condition becomes bad.

ROM: Read Only Memory. The ROM holds the system software and the profiles and settings of the modem (refer to EEPROM).

RS: Abbreviation of recommended standard.

RTS/CTS: *See CTS/RTS.*

RXD: Line for the received data on a serial port following RS-232C.

Security function: Features of the ZyXEL modems which help deny illegitimate contacts to your computer system through telephone lines.

Self-test: Ability of the modem to check its components and operations for faults.

Serial port: Communication path through which data is transferred bitwise. Only one wire each is available for transmitted and received data.

Shareware: A distribution method for software. The author lets the user try out the fully functional software for a certain amount of time at no charge. If the customer wants to keep and use the product after the period, he must pay the requested fees. This method depends heavily on the honesty of the user.

Signal to noise ratio: A measure for the signal quality of a connection.

SILENCE: Status detected in voice mode. If the modem returns a silence message, no voice energy was detected after a connection was established.

Speech digitalization: Changing spoken sound into digital data which can be pro-cessed and saved by a computer.

SRAM: Static Random Access Memory. A memory device used to store both program and data.

S-register: Abbreviation of status-register. The currently used parameters are stored in the status registers. S-registers are a part of the modem's internal memory.

SREJ: Selective Reject - extension of the V.42 protocol which allows the more efficient handling of retransmission of erroneous data blocks.

Start bit: In asynchronous transfers, a new character is introduced by the start bit.

Symbol speed: Speed at which a signaling unit is transferred. In modern modem modulation, a signaling unit is no longer a single bit. Thus, the bit speed is different from the symbol speed.

Stop bit: In asynchronous transfers, every character is terminated by one or two stop bits which show where a character ends.

Synchronous: In synchronous transfer, a dedicated control signal line transmits a clock signal which paces the transmitted data. In highspeed connections, the transfer between two modems is always synchronous, even if the DCE to DTE connection is asynchronous.

T.30: A standard for fax transfers.

TAE6: A standard for a telephone wall outlet used in some countries, particularly in Germany.

ter: Old French word for three.

Terminal equipment: A computer running terminal software is used as terminal equipment in modem connections.

Terminal program: A program which emulates the operation of a hardware terminal on a computer's screen and keyboard.

Token: A token is a reencoding of information in less bits; basically an abbreviation.

Transfer mode: Data can be transferred either synchronously or asynchronously.

Transfer rate: The speed at which the data bits are effectively transferred.

UART: Universal Asynchronous Receiver and Transmitter; a special IC chip which controls the serial port. Different models are available for PCs. Models with an internal buffer usually allow higher transfer rates.

V.: The ITU-TSS V. - standards describe data transfer via telephone lines.

Western jack: Telephone wall outlet connector used in the USA and other countries.

X.: The ITU-TSS X.-standards describe data transfer in public data networks.

XModem: A widely used, though somewhat aged, file transfer protocol. The use of 128 byte data blocks severely limits the achievable throughput.

XON/XOFF: Software flow control. The data flow is stopped by sending ASCII character Control-Q (dec. 17; hex \$11) and restarted by Control-S (dec. 19; hex \$13).

YModem: A file transfer protocol which uses data blocks of 1 Kbyte and transfers filenames and more than one file in one transfer.

ZModem: A file transfer protocol with variable block size, reinitiation of aborted transfers and transfer of several files in one transfer along with file (and path) names.

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