EXHIBIT 5

User's Manual

User's Manual

TA-MPD

User   Guide

Preliminary Release 1.2

Table of Contents

SAFETY INSTRUCTIONS

When using telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons and the equipment itself, including the following:

- The power supply must be connected to a properly wired and grounded outlet.
- Never plug an analog telephone line into the   interface of the TA-MPD.
- Read and understand all instructions.
- Follow all warnings and instructions provided with the product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use this product near water; for example near a bath tub, washbowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
- Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
- Never spill liquid of any kind on the product.
- To reduce the risk of shock, do not disassemble this product. Instead, take it to a qualified service center or return it for repair.
- Avoid using the TA-MPD device during an electrical storm. There may be a remote risk of shock from lightning.
- Unplug the TA-MPD and refer servicing to qualified service personnel under the following conditions:
    1. When the power supply cord is damaged or frayed.
    2. If liquid has been spilled into the product.
    3. If the product has been exposed to rain or water.
    4. If the product has been dropped or the cabinet has been damaged.
    5. If the product exhibits a distinct change in performance.

INSTRUCTIONS MANUAL
FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, use only shielded interface cable when connecting to computer. Also, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Chapter 1: Introduction

Package Contents

Immediately after unpacking the unit, please inspect the contents. The following items should be enclosed:

- One TA-MPD Terminal Adapter
- One Six Foot RJ-45 (8 pin connector) to RJ-45 Cables
- One Fourteen Inch RJ-45 to RJ-45 Cable
- One RJ-11 (4 pin connector) to RJ-11 (4 pin connector) Cable
- One DTE Cable (DB9 female to male)
- Two 3.5" Installation Floppy Disk
- One TA-MPD User Guide
- One Quick Installation Guide
- Power Supply and Cable

If any items are missing or damaged during shipment, please contact the distributor or reseller where you purchased the product. We recommend that the customer retain the packaging container and material.

About This Product

The TA-MPD is an Integrated Services Digital Network (ISDN) Terminal Adapter (TA) for Personal Computers (PC). It allows your PC to access the Internet and transfer files at high speeds (56Kbps to 128Kbps). You configure the TA-MPD using only software. There is no need for complex hardware jumper settings.

The TA-MPD is designed to work in conjunction with the Optiset ISDN telephone to give the maximum range of capabilities for any user.

Product Features

- Network Connection: ISDN U-Interface
- One data port - two analog ports - two S/T ports (one for the Optiset)
- Asynchronous data rate: up to 230.4Kbps
- V.120 asynchronous mode
- Async to sync PPP
- Multi-link PPP (Fixed or Dynamic bandwidth allocation)
- HDLC transparent
- The B channel protocol auto adaptation
- Remote Configuration

System Requirements

The TA-MPD will perform best if your PC is equipped with the following:
- 8 Meg of RAM (minimum)
- 3 Meg of Hard Drive Space (for Windows 95 users only)
- 386 CPU or better
- Mouse
- Operating System: DOS, Windows 3.1, 3.11 or Windows 95.

Chapter 2: Hardware Installation

General Procedures

To ensure a successful installation, we recommend that the installer prepare the following items before proceeding.

1. Select adequate communication software (HyperTerminal, Terminal, ProComm Plus, etc.)

   Note: For the operation and installation of the communication software, please refer to the communication software manual.

   - If you want to use the AT command set with Windows 95 then HyperTerminal is the communications software supplied by Microsoft. (We suggest using the Man to Machine Interface, or MMI, software instead of the AT command set.)
   - For Windows 3.X, we recommend using Terminal and the AT command set to configure the TA-MPD. (Using the MMI may produce unpredictable results, although it may work perfectly.)

2. Subscribe to ISDN from your telephone service provider. **Refer to Chapter 12 for a detailed explanation of ordering ISDN.**

3. Have your personal computer (PC) or workstation ready if you plan to use the TA-MPD for data communication.

4. Check the packing list. If something is missing, call your TA-MPD vendor.

5. Be sure to register your TA-MPD to validate your warranty.

About Your TA-MPD

LEDs

On top of the TA-MPD there are nine LED indicators. The states of the LEDs are listed below.

	FLASHING	SOLID
Power		On
Line	U-Interface deactivated	U-Interface activated
TEL1	In Progress	Connected
TEL2	In Progress	Connected
Data	DTE connecting	DTE connected: Green for 1B, Yellow for 2 B
TD		Transmitting data
RD		Receiving data
DTR		Data terminal ready
TEST		Test mode on (Yellow)

Rear Connections

The rear panel provides the following. The DIP switch setup is provided in Appendix C.

U-Interface	RJ45 jack for an ISDN line
S/T-Interfaces	RJ45 jacks for ISDN S/T devices
Data	Female DB9 connector
TEL1	RJ11 jack for analog device
TEL2	RJ11 jack for analog device
DIP switch	OFF (default), refer to **Appendix C**

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Installing the TA-MPD

Plug It In

⇒ **Warning: Always turn the TA-MPD power off before connecting or disconnecting cables.**

1. Plug the DB9 cable into the TA-MPD DATA port. Insert the other end of the cable into a communication port on the PC/workstation or other Data Terminal Equipment (DTE).

2. Plug an RJ45 cable into the TA-MPD U-Interface. Insert the other end of the cable into the power supply (equipment side).

3. Plug an RJ11 cable into the power supply (wall side) and plug the other end into the ISDN wall jack.

4. Plug the RJ45 cable into the TA-MPD S/T-Interface. Insert the other end of the cable into the Optiset.

5. Plug another RJ11 cable into the TA-MPD TEL1 and/or TEL2 port. Insert the other end of the cable into any analog device (traditional telephone, modem, fax machine or answering machine).

6. Plug the power adapter into the wall socket.

Turn on the Power

Please check the LED indicators when you power on the TA-MPD. All of the LEDs should flash in a preset sequence for a few seconds. If nothing is plugged into the TA-MPD then the LED indicators will stop flashing and only the power LED and the Line LED will be lit.

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To House
Phone

To another
S/T Device

To Fax
Machine

To Optiset

To PC

U Interface

TA-MPD

To Wall
Outlet

PS2 Power Supply
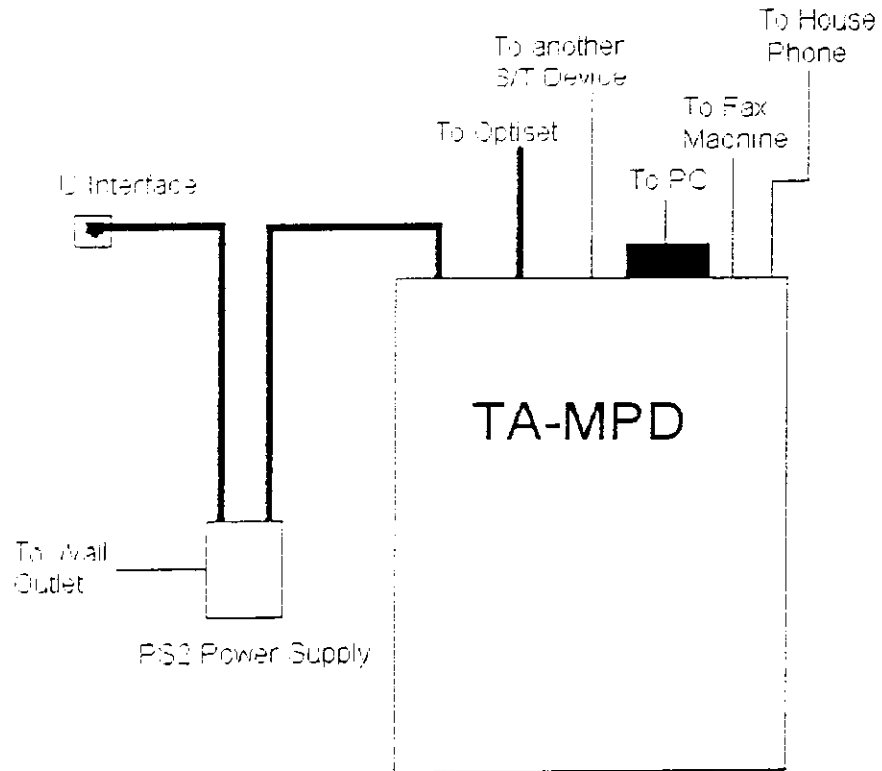
Congratulations you have just installed the
TA-MPD!

Chapter 8: Software Installation & Configuration for Windows 3.X & DOS

Installing for Windows 3X & DOS

Follow the installation instructions provided with the communication software (Terminal, ProComm Plus   you choose.   Along with the communication software be sure to use the AT Command set in Chapter 11 of this manual.

Note: The Man to Machine Interface (MMI) can only be used with Windows 95.   The MMI may or may not work on your Windows 3.1 system.   The MMI will not work on any other systems.

Software Configuration for Windows 3X or DOS

Configure Your PC Software

The following information in your communication software needs to be configured:

- ◆ **COM Port:** You must select the COM port where the TA-MPD connects with your PC.
- ◆ **Data Rate:** You can select any one of the following data rates: 600bps, 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps and 230400bps.
- ◆ **Data Format:** The default data format of the TA-MPD is 8 data bits no parity bit and 1 stop bit (8N1) format. Besides, 7E1 and 7O1 are also supported by the TA-MPD.

- **Flow Control:** The default flow control is the hardware CTS/RTS flow control. Of course, the software (Xon/Xoff) flow control may be your choice.

- **Initial Setting:** At the beginning of your communication software execution, the program will send a series of AT commands to initialize your terminal adapter. You may enter the Initial setting into your communication software to customize the initialization. For example, for Internet access   T&F1   or   T&F2   is recommended. We suggest these as   odem Init Strings   unless you have User Profiles of your own (see Chapter 11).

Call Type	Command
HDLC Transparent	AT&F0
Async-to-Sync PPP	AT&F1
Multi-link PPP	AT&F2
V.120	AT&F5

- **Entering Switch Type:** Set the switch type using the command T!C0=n with the following codes:

n=1	AT&T 5ESS Custom switch
n=2	AT&T or Siemens NI-1 switch
n=3	NORTEL DMS-100 switch
n=4	NORTEL NI-1 switch

- **Entering SPIDs:** Set the SPID numbers with the command "AT!Cn=<number> using the following codes for

n=6	sets the SPID for Data Port #1
n=7	sets the SPID for Tel Port #1 (should be the same as Data Port #1)
n=8	sets the SPID for Data Port #2
n=9	sets the SPID for Tel Port #2 (should be the same as Data Port #2)

♦ **Entering DNs:** Set the Directory Numbers using the command "AT!Nn=<number>" with the following codes for

n=0	sets the DN for Data Port #1
n=1	sets the DN for TEL Port #1 (should be the same as Data Port #1)
n=2	sets the DN for TEL Port #2
n=3	sets the DN for Data Port #2 (should be the same as Data Port #2)

♦ Enter the Voice Port Capabilities

⇒ **AT!Bn=x**

n=1,2	Select TEL Port #1 or #2
x=0	SPEECH (default)
x=1	AUDIO

♦ **Displaying Configurations:** Use AT!C? to display your switch type and SPIDs, and use AT!N? to display your directory numbers and voice port capability settings. Many features of the TA-MPD can be customized to suit your needs. The "AT&Vn" command reports summary information on these features, as well as commands and options to set them. For more specific information on each of these commands, see Chapter 11: AT Command Set.

♦ **Saving Configurations:** When the TA-MPD is configured correctly, use the "T&W1" or "T&W2" command, which stores the active profile as User Profile #1 or #2 respectively.

⇒ *Note: The switch, SPIDs, and DNs are not saved as part of the profile, but are stored separately automatically.*

♦ **Problems:** If the response "K" from TA can not be received during any step, please refer to the section **"Problems in Command Executions"** in Chapter 11.

Chapter 9: How to Make a Data Call Using AT Commands

The TA-MPD supports various data call types (HDLC transparent, Async-to-Sync PPP, Multi-Link PPP, and V.120). The section, aking a Data Call demonstrates a data call by using the AT command set in the terminal emulation program.

Making a Data Call

The section illustrates the procedure to make a data call on the terminal type communication program, e.g., PCPLUS.

1. Verify the Dip switches 1 through 6 are in the OFF position. If not, power the unit off and set the Dip Switches to OFF. Power the unit on after the changes have been made.

2. Enter the dialing command
   ⇒ **ATD <phone number> <ENTER>**
      * The <phone number> is the phone number of the DTE that you wish to connect with and press the Enter key.
         Example: ATD4125678 <ENTER>
   ⇒ **CONNECT <baud rate/call type>**
      * If the above message is displayed, the remote site has answered. The TA-MPD is now in the On-Line state. Data transfer with the remote site is now possible.
         Example: CONNECT 38400/V.12
   ⇒ **NO CARRIER**
      * If the above message is displayed, the call has failed.

3. You can now use your application program (Browser, News, or File transfer).

4. Enter the command to terminate the data call, and escape from the On-Line state.
    ⇒ Three plus signs. (+ + +)
    ⇒ The TA-MPD will respond with   K   You enter the command.
       * **ATH <ENTER>**
    ⇒ The TA-MPD will respond with   K   again, after it is disconnected.

Note: If DIP Switch 1 (remote configuration) is set to ON (enabled) in the local side, the connecting remote side can access the local side's settings by using the AT command set. i.e., what shows on remote side monitor is local side parameters instead of its own. The remote side can modify the local user **TA-MPD** *as necessary without face-to-face contact. Also, the remote configuration works only under* **HDLC** *type; that is, set the call type to HDLC transparent before setting up the connection. During remote configuration mode, the TEST LED (yellow) will be lit.*

Chapter 11:
AT Command Set

The AT command set is widely used in almost all modem controls. You must use a terminal or the terminal emulation capability of your communication software package. In general, AT commands are responsible for instructing the TA-MPD to do a task. You send these commands to your TA-MPD from your PC using communication software. When the TA-MPD receives a command, it will respond with an AT result code on your terminal. This chapter explains the AT commands and its result codes.

Functional States

When operating via the AT command interface, the TA-MPD is always in one of the following four functional states:
1. Command Mode
2. Call-in-Progress state
3. On-Line state
4. Escape Command Mode.

The Command Mode

The Command Mode is the default mode when the TA-MPD is powered on or after a disconnect. While in this mode, the TA-MPD accepts commands from the Data Terminal Equipment (DTE).

The On-Line State

After dialing the number and completing the linkup hand shaking, the TA-MPD will make a connection with the remote terminal adapter, and enter the On-Line state. In this state the system sends and receives data. However, it does not accept commands, except for the escape sequence
++   When the link is lost or intentionally dropped the TA-MPD will clear the call and re-enter the Command Mode.

The Call-in-Progress State

The Call-in-Progress state is the transition state between the Command Mode and the On-Line state. After a call is placed, a connection must be established within a preset period of time (S7 Register). If a connection does not occur during the Call-in-Progress state, or if a key on the DTE keyboard is pressed (a dial interrupt occurs), the TA-MPD will abandon the call and re-enter the Command Mode.

The Escape Command Mode

Once the TA-MPD has entered the On-Line state, you may escape from this state by entering the escape sequence   ++   The escape sequence will cause the TA-MPD to enter the **Escape Command Mode** and respond with the   K   message. In the Escape Command Mode, most of the commands can be invoked just as in the Command Mode. In the Escape Command Mode the TA-MPD does not terminate the connection with the remote side. To return to the On-Line state from the Escape Command Mode, enter the command   TO

Guidelines for Using AT Commands

All AT commands (except the A/ command) begin with the **AT** prefix and end with pressing the ENTER key. A typical AT command line is shown below.

AT	Command String	CR

AT

- The AT prefix is known as the "**Attention Characters**. It can be uppercase or lowercase but the TA-MPD will not recognize a combination of the cases (At or aT).
- It also informs your terminal (TA-MPD) of your computer speed, parity and character length. The data character formats (how your data is structured) for the **AT** command set.

- It can be set using your communication software. It must be one of the following:
  - ⇒ 8 data bits + no parity + 1 stop bit.
  - ⇒ 7 data bits + 1 parity bit + 1 stop bit (Parity can be odd, even, mark, or space.)

Command String

- Commands can be entered one at a time or in strings (several commands at once).
- Strings can have up to 239 characters after the prefix. The prefix code must be in all uppercase or lowercase.
- The letters that follow can be any mixture of uppercase and lowercase.
  - ⇒ The backspace key can be used to edit the command string you have typed.
  - ⇒ The backspace key erases the character to the left of the cursor but will not erase the   T characters once they are typed in.
  - ⇒ To re-execute the previous command, the   / command supports re-execution of the previous command for users' convenience.

Profile Descriptions of the TA-MPD

To meet different application requirements, the TA-MPD provides a series of parameters (or registers) through which it can be configured. When the TA-MPD is in the Command Mode or Escape Command Mode, you can use commands to modify these parameters (or registers) and control the operations of the TA-MPD.

Whenever you modify the values of the parameters (registers) the system automatically keeps the new values in the volatile memory. If you do not save them in a user profile, the changes are temporary and last only until the TA-MPD is reset.

The TA-MPD supports three types of profiles they contain all the parameters (registers). Values for these parameters can be saved as user profiles for later use.

1. **Active profile** - the current operating configuration of the TA-MPD.
    *   It can be configured using AT commands.
    *   The active profile is volatile and is lost when the TA-MPD is powered off.
2. **User profile** - the user custom-made configuration that is stored in memory.
    *   The TA-MPD will automatically load a user profile to the active profile whenever the system is powered down.
    *   Two user profiles are supported by the TA-MPD. They are designated 1 and 2. Use the "**AT&Wn** command to store the active profile as a user profile n and "**ATZn** command to load user profile n as the active profile where n=1 or n=2.
    *   Users must specify which user profile is used for power-up profile by issuing the command "**AT&Yn** where n=1 or n=2
3. **Factory profiles** - four sets of operating parameters commonly used for data communication.
    *   These profiles are stored in Flash ROM.
    *   They can be loaded to replace the current active profile via the command "**AT&Fn** where n=0,1,2,5.

Problems in Command Executions

If your TA-MPD did not execute a command line, make sure the following is correct:
*   You are in the Command Mode and your command line follows the format described in the paragraph entitled, "**Guideline for using AT Command**".
*   Verify your COM port speed matches any one of the following speeds: 230400, 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 or 600 bps.
*   Type T and press the ENTER key. This will lead to a response of K If not, type T&F0 and press ENTER key. If your TA-MPD still does not respond, its connection with your computer may

have a problem or your software COM port and/or IRQ was incorrectly set. To ensure you have properly installed your TA-MPD, please review the installation instructions in Chapters 2 and 8.

Description of AT Commands

A/ = Command Repeat

Format	A/

- "A/ is used to repeat the previous command line.
- For example, you can use the "A/ command to re-dial a telephone number.
- This is the only command that does not require the AT prefix and the ENTER key.
- The previous command remains in the command buffer until either the next command is entered or the TA-MPD is powered off.
- If the previous command line does not exist, an K message will be displayed.

A = Manual Answer

Format	ATA <ENTER>

- "A is used to answer an incoming data call, which is indicated by the message ING<phone number>
- Incoming calls can be answered using the TA command or by enabling the auto-answer mode via the S0 register.

D = Dial

Format	ATDnumber <ENTER>

- is used to instruct the TA-MPD to dial a telephone number.
- Some special characters, like space, and parentheses, will be ignored in a dialing command line.
- When the command is invoked in the Command Mode, the TA-MPD will enter the Call-in-Progress state and wait for an answer

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from the remote TA-MPD. The call can be aborted by pressing any key.

For some applications (such as Multi-link PPP or asynchronous inverse mux) when the two B channels have different phone numbers at the destination, the TA-MPD allows users to make two calls with different telephone numbers at the same time to bind two B channels into 128Kbps bandwidth.

DL = Last Data Call Redial

Format	ATDL <ENTER>

- TDL is used to re-dial the previous data call if the phone number still remains in the phone number buffer.
- The phone number will remain there until either the next data call is dialed or the TA-MPD is powered off.
- Once this command is executed, the TA-MPD will enter the Call-in-Progress state. You may abort this Call-in-Progress state by striking any key during this time.

DS = Memory Dial

Format	ATDS=n <ENTER>

- Where the number is an integer ranging from 0 to 9 that is the index of the phone directory stored in the memory of the TA-MPD.
- It tells the TA-MPD to dial the phone number in the internal phone directory.
- The internal phone directory may be stored by the Zn command.

E = Command Echoing

Format	ATEn <ENTER>	
n=0	Disable Command Echoing	
n=1	Enable Command Echoing (default)	

- n enables or disables echo of commands in the Command Mode or the Escape Command Mode.
- In the On-Line state, data echo is always disabled.

H = Hang up

Format	ATH <ENTER>

- allows you to clear a data call or to reject an incoming data call manually.
- When this command is invoked, the TA-MPD enters the Command mode.
- Any commands that follow the command in the same command line will be ignored.

I = Identification

Format	ATIn <ENTER>
n=0	Display maximum network rate(128000)
n=1	Display the checksum of TA ROM(28000)
n=2	Reserved
n=3	Display the model ID, Ver x.x

- instructs the TA-MPD to display its internal information, such as maximum network rate, ROM checksum, model ID, and firmware version.
- An example of the model ID and the firmware release number is shown as **Ver x.x**, where x.x is the version number.

O = Go on Line

Format	ATO <ENTER>

- command is only effective in the Escape Command Mode.
- When the TA-MPD is in the Escape Command Mode, the will force the TA-MPD to return to the On-Line state.
- Any command that follows the command in the same command line will be ignored.

Q = Quiet Mode Control

Format	ATQn <ENTER>
n=0	Result codes are displayed (default)
n=1	Result codes are suppressed

- "Qn is used to instruct the TA-MPD to display or suppress the result code after a command execution.
- Suppressing result codes are useful.
  - ⇒ For example: A printer is connected to your TA-MPD. However, you do not want the result code from the TA-MPD printed after each print action.

S? = Query S Register

Format	ATS?<ENTER>

- ? is used to query the content of all the S registers.
- All detailed information about the S registers is described in the section below entitled S Registers.

Sn? = Query Designated S Register

Format	ATSn?<ENTER>

- Where the number is the index of the specified S Register
- If you are curious about the content of one specific S Register, "Sn?" command is suitable for your use.
- Only the value of the S Register you specified is displayed.
- For further information on the S Registers, refer to the section entitled S Registers.

S = Program S Register

Format	ATSn=x <ENTER>

- Where the number is the index of the specified S Register and the number is the programmed value.

- "Sn=" command allows you to program or change the content of a specific S Register. To make sure of your change, you may also view the new value by issuing the ? or "Sn? commands. All detailed information about the S registers is described in the section entitled S Registers.

V = Result Code Format

Format	ATVn <ENTER>
n=0	Result codes are displayed as numbers
n=1	Result codes are displayed as text (default)

- "Vn determines the way result codes are sent to the DTE.
- The relationship between these two forms are shown in the section entitled, "Result Code".

X = Connect Result Code Format

Format	ATXn <ENTER>
n=0	Connect result codes are displayed in short form.
n=1	Connect result codes are displayed in complete form. (default)
n=2	Enable voice result codes and all result codes are displayed in complete form.

- determines the format of the connect result codes.
- If short form is selected, no detailed message is displayed.
- If complete form is used, DTE baud rate and call type messages are appended after the word ONNECT
- Sometimes one might need to filter incoming voice calls. After the voice result codes enable, the TA-MPD will send a RING result code. It will be followed by the caller identification telephone number, via its data port once an incoming voice call present. This allows the user to answer the call selectively according to the caller ID.

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The table below illustrates the result code format under the three settings.

Result Code Xn	0	1	2
RING	O	X	X
RING xxxx	X	O	O
CONNECT	O	X	X
CONNECT xxxx	X	O	O
VOICE CALL	X	X	O

- Where denotes the result code is defined under the setting in the column and on the contrary the result code is not defined if it is marked by

Z = Recall Stored User Profile

Format	ATZn <ENTER>
n=1	Load user profile 1 as active profile
n=2	Load user profile 2 as active profile

- loads a user profile as the active profile.
- When this command is invoked your TA-MPD will abort all existing calls and reconfigure itself to the setting stored in the selected user profile.
- The "Zn command must be the last command in the command line.

+++ = Escape Sequence

Format	

- The escape sequence causes the TA-MPD to switch from the On-Line state to the Escape Command Mode.
- The sequence consists of an escape character string followed by one interval of escape prompt delay then a valid AT command is mandatory after the TA-MPD responds. K

&C = Carrier Detect (CD) Control

Format	AT&Cn <ENTER>
n=0	CD is always on
n=1	CD goes on only when a call is established (default)

- C determines how the state of the CD LED relates to the data call status.
- The CD can be set to indicate a call establishment.

&D = Data Terminal Ready Action

Format	AT&Dn <ENTER>
n=0	TA-MPD ignores DTR signal.
n=1	TA-MPD enters the Escape Command Mode when the DTR signal goes ON-to-OFF while TA-MPD is during the On-Line state.
n=2 (default)	TA-MPD clears a data call when it detects an ON-to-OFF transition on DTR TA-MPD does nothing when it detects an OFF-to-ON transition (108/2 mode for DTR).
n=3	TA-MPD clears data call when it detects an ON-to-OFF transition on DTR. TA-MPD dials the 0th stored phone number when it detects an OFF-to-ON transition (108/1 mode for DTR).

- D determines how the TA-MPD handles the data terminal ready signal.

&F = Load Factory Profile

Format	AT&Fn <ENTER>
n=0	Load factory profile 0 as the active profile (for HDLC transparent calls and asynchronous DTE).
n=1	Load factory profile 1 as the active profile (for PPP calls and asynchronous DTE).
n=2	Load factory profile 2 as the active profile (for Multi-link PPP calls and asynchronous DTE).
n=3	Load factory profile 3 as the active profile (for diagnostic use only).
n=5	Load factory profile 5 as the active profile (for V.120 calls and asynchronous DTE).

- F loads a factory profile as the active profile.
- Nine-set configuration profiles suitable for various types of data calls are stored in the TA-MPD.
- Once the desired profile is loaded the system is automatically reinitialized.

&K = Flow Control Setting

Format	AT&Kn <ENTER>
n=0	Disable flow control
n=3	Bi-directional RS/CS flow control default
n=4	Bi-directional Xon/Xoff flow control

- K specifies the local flow control between the TA-MPD and the DTE.
- It takes effect only when the system is in the On-Line state after a data call has been established.

&L   Display Last Call Information

Format	AT&Ln <ENTER>
n=0	Display the information of the last data call placed on the data port.
n=1	Display the information of the last voice call placed on analog port TEL 1.
n=2	Display the information of the last voice call placed on analog port TEL 2.

- L allows you to view the information about the last calls that were placed on the data port and analog ports respectively.

&S = Data Set Ready (DR) Control

Format	AT&Sn <ENTER>
n=0	DR always on (default)
n=1	DR on during communication

- S determines how the TA-MPD handles the data set ready signal.

&V = View Configuration Profile

Format	AT&Vn <ENTER>
n=0	Display the active profile.
n=1	Display the user profile 1.
n=2	Display the user profile 2.
n=3	Display system parameters and analog port setting

- V allows you to view the active and stored user profiles.

&W = Store Active Profile as User Profile

Format	AT&Wn <ENTER>
n=1	Store active profile as user profile 1
n=2	Store active profile as user profile 2

&Y = Select Profile on Power-Up

Format	AT&Yn <ENTER>
n=1	Select user profile 1 as the default profile
n=2	Select user profile 2 as the default profile

- Yn determines a user profile to be loaded as the default active profile each time the TA-MPD is powered on or reset.

&Z = Store Phone Directory

Format	AT&Zn=phone number<ENTER>

- n (ranging from 0 to 9) represents the stored numbers in the phone directory.
- Zn stores a phone number in location of the phone directory.

&Z? = List Phone Directory

Format	AT&Z?<ENTER>

- Z? instructs the TA-MPD to list all the phone numbers that were stored in the phone directory.

!B = Set Analog Port Attribute

Format	AT!Bn=x<ENTER>
n=1,x=0	Set the attribute of analog port TEL 1 to SPEECH type.
n=1,x=1	Set the attribute of analog port TEL 1 to AUDIO type.
n=2,x=0	Set the attribute of analog port TEL 2 to SPEECH type.
n=2,x=1	Set the attribute of analog port TEL 2 to AUDIO type.

- If supplementary service is used and a call comes in while the analog port is in use, the TA-MPD will send the call waiting tone to the user. This tone signifies the second call.
- However, this is not always welcome especially during modem or facsimile connection. The call waiting tone may disturb the carrier signal and corrupt the connection. To avoid such annoying problems, the !B command allows you to select the attribute of the two analog ports.

- Users may disable the call waiting tone by selecting AUDIO type.
- In short if your analog port is connected to a telephone set, you may choose SPEECH type for call waiting service. On the other hand, if it is connected to a modem or FAX machine, it is recommended that you set the port to AUDIO type.

!Bn? = Query Analog Port Attribute

Format	AT!Bn? <ENTER>
n=1	Query the attribute of the analog port TEL 1
n=2	Query the attribute of the analog port TEL 2

- Bn? is used to query the attribute of the specified analog port that were stored by entering the Bn= commands.

!Cn = Set Switch Type and SPIDs

Format	AT!Cn=Switch/SPID <ENTER>
n=0	Sets the switch type
n=6	Sets the SPID of data port 1
n=7	Sets the SPID of the analog port TEL 1
n=8	Sets the SPID of data port 2
n=9	Sets the SPID of the analog port TEL 2

- C0= sets the switch type by the following codes:
  is AT&T 5ESS Custom switch
  is AT&T or Siemens NI-1 switch
  is NORTEL DMS-100 switch
  is NORTEL NI-1 switch

!Cn? = Set Switch and SPID Settings

Format	AT!Cn? <ENTER>
n=blank	Query all !C settings
n=0	Query the switch type setting
n=6	Query the SPID of data port 1
n=7	Query the SPID of the analog port TEL 1
n=8	Query the SPID of data port 2
n=9	Query the SPID of the analog port TEL 2

- C? is used to query a summary of the switch type setting and all SPID settings.

!E0 = Set CACH/EKTS

Format	AT!E0=n <ENTER>
n=0	CACH/EKTS Disabled
n=1	CACH/EKTS Enabled

- CACH/EKTS allows Additional Call Offering functions that allow the TA-MPD to release a channel for incoming speech calls.

!E0? = Query CACH/EKTS

Format	AT!E0? <ENTER>

!F0 = Program eature Keys"

Format	AT!F0=n1/n2/n3 <ENTER>
n1=0~255	Conference Feature Key, default value is 60
n2=0~255	Transfer Feature Key, default value is 61
n3=0~255	Drop Feature Key, default value is 62

- No two can equal the same value.

!F0? = Query eature Keys"

Format	AT!F0? <ENTER>

!N = Store Self Directory Number

Format	AT!Nn=phone number<ENTER>
n=0	Store the self directory number of data port #1
n=1	Store the self directory number of the analog port TEL 1
n=2	Store the self directory number of the analog port TEL 2
n=3	Store the self directory number of data port #2

- !N is used to store the local directory numbers (the user phone numbers) assigned to your TA-MPD.
- Users may also assign an individual extension number to each port on the TA-MPD.

!N? = Query Self Directory Number

Format	AT!N?<ENTER>

!R = Screen Incoming Calls

Format	AT!Rn=x<ENTER>
n=0	data port
n=1	analog port TEL 1
n=2	analog port TEL 2
x=0	Accept all incoming calls (default)
x=1	Reject all incoming calls
x=2	Accept calls listed in the stored phone directory

- The "!R instructs the TA-MPD to screen an incoming call for an individual port.
- x=0 or 1 forces the TA-MPD to answer or reject a call unconditionally.
- However, you may want your data or analog ports to answer a call according to a list for security or privacy sake. The TA-MPD can be set to screen incoming calls. When a call comes in, the TA-MPD looks up the stored phone directory (stored by Zn command). Only the call whose phone number matches a number in the directory will be answered.

%A0 = Select Numbering Plan

Format	AT%A0 =n <ENTER>
n=0	unknown (default)
n=1	ISDN numbering plan

%A2 = Select Call Type

Format	AT%A2 =n <ENTER>
n=0	HDLC transparent rate adaptation
n=1	asynchronous-to-synchronous PPP protocol
n=2	Multi-link PPP
n=3	asynchronous inverse mux
n=5	V.120 rate adaptation

- A2 allows you to select the protocol for your data call.
- Option 1 and 2 (when n=1) 2 is designed especially for the Internet access application.
- If you choose asynchronous-to-synchronous PPP, you can make a 64Kbps connection.
- To achieve a maximum ISDN transmission, choose multi-link PPP. This establishes a 128Kbps connection.
- To make bandwidth utilization more effective the TA-MPD adds and drops a B channel dynamically according the real data throughput.
- You can refer to the @M6 @M8 and @M9 commands to get more detailed information about dynamic bandwidth allocation control.
- In some cases, one user establishes a 128Kbps Internet session but another user wants to make a voice call. Command @M5=1 will instruct the TA-MPD to release a B channel from the original MP link.

%A2? = Query Call Type

Format	AT%A2? <ENTER>

- A2? instructs your TA-MPD to display the call type for the next data call.

%A3=n = Select B Channel for Leased Line

Format	AT%A3 =n <ENTER>
n=1	B1 channel
n=2	B2 channel

- A3 determines which B channel will be used for leased line connection.
- To make a leased line connection, set the bit 3 of the DIP switch at the rear panel to the ON position.
- The call types asynchronous inverse mux and multi-link PPP are not supported in leased line application.

%L3 = Select Data Forwarding Character

Format	AT%L3=n <ENTER>
n=0	none
n=2	Carriage Return (default)

- L3 is used to define specified characters as data forwarding characters.
- When the character is received from the DTE, the current packet is forwarded. This includes this character.
- When call type is PPP hexadecimal number 7E is used as the default forwarding character.

%L4 = Set the Idle Timer Delay

Format	AT%L4=n <ENTER>
n=0	No data forwarding on time-out (default)
n=1 to 255	Data forwarding on time out of value multiplied by 50ms

- L4 is used to define the duration of an interval between successive characters received from the DTE.
- When exceeded will cause the PAD (Packet Assembler / Disassembler) to terminate the assembly of a packet and to forward the packet just as if a forwarding character had been recognized.

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@M3 = CHAP Encryption Control

Format	AT@M3=n <ENTER>
n=0	Disable CHAP password encryption protocol (default)
n=1	Enable CHAP password encryption protocol

- CHAP is a password encryption protocol that is used to guarantee the security during password authentication with ISP.
- If CHAP encryption is enabled, one should turn off the CHAP option in your application program.
    ⇒ For example: the equire encrypted password option of the server type menu under WIN95 Dial-Up Networking icon.

@M5 = Bandwidth Release Control on a Voice Call Request

Format	AT@M5=n <ENTER>
n=0	Disable bandwidth release when there is a voice call request.
n=1	Enable bandwidth release when there is a voice call request. (default)

- M5 is used to determine whether to release a B channel during an MP session when there is a voice call request.

@M6 = Define Throughput Threshold to Add a Second Channel

Format	AT@M6=n <ENTER>

- Where n ranges from 0 to 64 and the unit is in kilobits per second. (if n=0 to 64, and the unit is in kilo-bits per second.)
- When a multi-link PPP call is established the TA-MPD begins to monitor the traffic and might allocate the bandwidth according to the real throughput.
- If the throughput is under a pre-defined threshold and persists a period, it will release a B channel.
- If the traffic is getting above another threshold and persists a period it will try to make a second call and bind the two B channels together for transmission.

@M8 = Define Throughput Threshold to Release a Second Channel

Format	AT@M8=n <ENTER>

"n   ranges from 0 to 64 and the unit is in kilobits per second.

- When   M8 is set to 0, it indicates the TA-MPD won release a second channel even though the throughput is very low.

@M9 = Define the Persist Time to Add or Drop a Second Channel

Format	AT@M9=n <ENTER>

"n   ranges from 0 to 255 and the unit is in 5 seconds.

S Registers

The S Registers are variables used to control various local operating characteristics of the DTE (enabling the auto-answer mode). A detailed description of the S Registers is given in the following table.

Register	Value	Unit	Description
S0	0-255	count	Establishes the number of RING result codes after which the TA-MPD answers the call. A value of 0 disables auto-answer mode. (default=0)
S1	0-255	count	Read-only. S1 is incremented each time the TA-MPD sends a RING result code to the DTE. It is cleared when the call is answered or cleared. (default=0)
S2	0-127	ASCII code	Used to define the escape character. Escape process is disabled if the value in S2 is greater than 127. (default=43)
S3	0-127	ASCII code	Used to define the character. Recognized as a carriage return CR by TA-MPD. (default=13)
S4	0-127	ASCII code	Used to define the character. Recognized as line feed LF by TA-MPD. (default=10)

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S5	0-127	ASCII code	Used to define the character. Recognized as backspace (BS) by TA-MPD. (default=8)
S7	1-50	seconds	Specifies the maximum waiting time between end of dialing process and completion of connection. Value of 0 means TA-MPD waits indefinitely. (default = 50)
S12	0-255	1/10 seconds	Determines prompt delay after TA-MPD receive an escape string (default = 10)
S25	0-255	1/20 seconds	Determines minimum time that a change in DTR must persist in order to be recognized by TA-MPD. (default = 2)

Result Code

Result codes are informational messages sent from the TA-MPD and displayed on your monitor. These messages are the TA-MPD response to the commands you issue to the TA-MPD. A result code can be either a word or a numeric representation.

♦ *By default, your TA-MPD returns a word response after a command is issued. For example, if your TA-MPD successfully executes a command line, it will send you the response K However, if your TA-MPD is operating under a programming language that either cannot handle character strings or handles them inefficiently, you may choose to use the 0 command to have your TA-MPD return numerical responses.*

Num	Word	Description
0	OK	Command has been successfully executed
1	CONNECT	TA-MPD has made a connection
2	RING (caller_id) (call type)	TA-MPD has detected an incoming ring
2	VOICE1RING (caller_id)	A voice call comes in at the analog port TEL 1.

2	VOICE2RING {caller ID}	A voice call comes in at the analog port TEL 2.
3	NO CARRIER	Line has been disconnected
4	ERROR	TA-MPD has found an error in your command line
5	CONNECT 1.2K/{call type}	TA-MPD has made a 1200bps connection
6	NO DIAL TONE	Network out of order or channel unavailable or channel unacceptable or resources unavailable
7	BUSY	TA-MPD has detected a busy signal while dialing a call
10	CONNECT 2.4K/{call type}	TA-MPD has made a 2400bps connection
11	CONNECT 4.8K/{call type}	TA-MPD has made a 4800bps connection
12	CONNECT 9.6K/{call type}	TA-MPD has made a 9600bps connection
16	CONNECT 19.2K/{call type}	TA-MPD has made a 19200bps connection
17	CONNECT 38.4K/{call type}	TA-MPD has made a 38400bps connection
18	CONNECT 57.6K/{call type}	TA-MPD has made a 57600bps connection
21	CONNECT 115.2K/{call type}	TA-MPD has made a 115200bps connection
22	CONNECT 230.4K/{call type}	TA-MPD has made a 230400bps connection

Note:

1. *{caller id} indicates the phone number of the calling terminal adapter.*

2. *{DTE speed} indicates the COM port speed of your communication software.*

3. *{call type} indicates the call type of the current data call. If you dialed the call, the call type should be same as the &2 setting.*

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Chapter 12:
Configuring Your ISDN Connection

Congratulations on your decision to purchase the TA-MPD and ISDN service. You have chosen a product and service that provides both high speed data access and voice communications simultaneously, while offering ultimate reliability and flexibility. This chapter provides information which will help you order ISDN service from your local ISDN service provider (i.e., Telephone Company) that fits your communication needs and makes use of the various capabilities of the TA-MPD and the Optiset NI-1200S ISDN Desktop terminal.

Background on ISDN Ordering

Ordering ISDN can be as easy as requesting basic phone service from the Telephone Company - most of the questions that the ISDN service provider will ask you are the same in both cases. For example, since ISDN was designed to work over the existing wire supporting your current telephone service, you will probably not have to specify any unique wiring changes or additions. However, there are some specialized capabilities of ISDN that will require you to provide additional information related to your ISDN equipment selection. The best way to provide this additional information is through an ISDN Ordering Code (IOC). An IOC reflects the services and features supported by a particular piece of ISDN equipment and is designated by an alphabetic letter code such as U or V, which is also known as EZ ISDN 1 or 1A, respectively. Selecting a particular IOC defines your ISDN line service profile and is given a unique Service Profile IDentifier (SPID) by your service provider.

Most ISDN connections in North America require the use of one or more Service Profile IDentifiers (SPIDs). These are numbers that uniquely identify your terminal to the local phone network and you normally have to program the SPIDs into your terminal. For most users, your SPID is based on your telephone number. Your ISDN service provider will tell you your SPID. In the absence of this information, you may try the following generic SPID:

(Area Code) Telephone Number + 0101

For example, if your telephone number is (123) 456-7890, then your SPID would be 12345678900101.

Although this method will generally produce the correct SPID, be aware that it is not applicable to all configurations and it may not be supported in all areas of the country.

The ISDN service provider will also provide you with one or more telephone numbers (also called Directory Numbers, or DNs) that will be assigned to your ISDN line and terminal. You normally also have to program these into your terminal, as well. Instructions on what you need to do with the SPID(s) and DN(s) are included in the terminal documentation.

Finally, depending on the type of ISDN capabilities that you request, you may also need to program feature buttons on your ISDN terminal, e.g., the Optiset. The ISDN service provider representative will provide the information you need on which buttons to program, if appropriate, and the terminal equipment documentation will tell you how to do it.

Note: Be sure to order your ISDN line with National ISDN standards instead of switch-specific Custom settings.

Configuring for the TA-MPD

There are several ways to configure the TA-MPD in combination with the Optiset. The following four configuration options (A, B, C, D) are representative of the features and capabilities typically sought by ISDN users. They are supported by most ISDN service providers through a set of core IOCs (with slight modifications) and related tariffs.

Config Option	Core IOC* Name	No. of SPIDs	No. of DNs For Voice Calls			No. of DNs for Data Calls		Multi-Link PPP?	Comments
			Optiset	Tel Port 1	Tel Port 2	Data Port 1	Data Port 2		
A	U,V	2	1	1	0	1	0	No	Basic voice and data service
B	Ux,Vx	2	1	1	0	1	0	No	Basic data, enhanced voice
C	Uy,Vy	2	1	1	0	1	0	Yes	Enhanced voice and data
D	Uz,Vz	3	1	1	1	1	1	Yes	Full voice and data service

* The difference between U and V is that V provides advanced call forwarding with message waiting indication for C.O. based Voice Mail service.
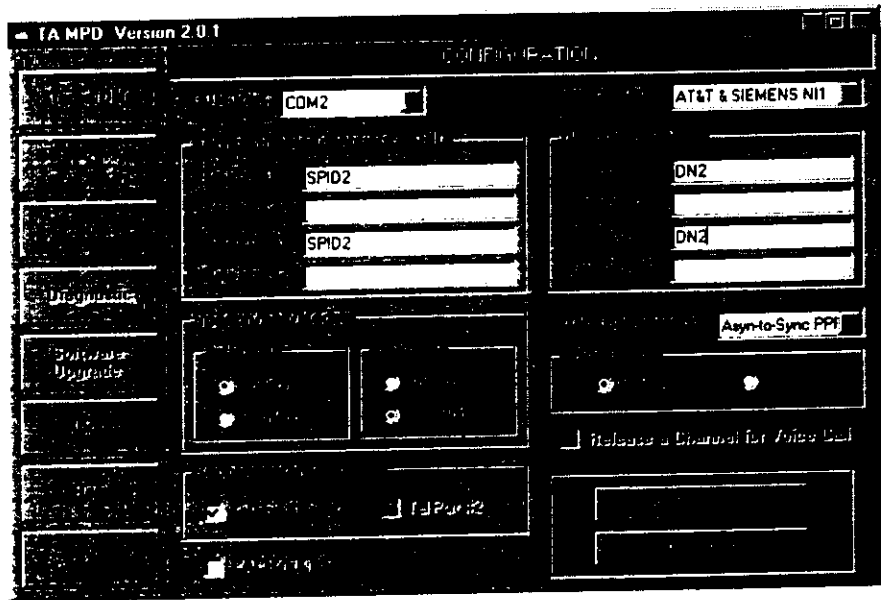
Configuration Option

This option represents a basic voice and data service configuration for the TA-MPD and the Optiset. It uses SPID1/DN1 for the Optiset and SPID2/DN2 for the TA-MPD. Tel Port #1 can be configured for use as either a fax/modem line or a basic speech line without supplementary services (i.e., no call waiting, conference, transfer, or drop). Data Port #1 is set up for Internet access using PPP. This configuration is widely supported by all ISDN service providers.
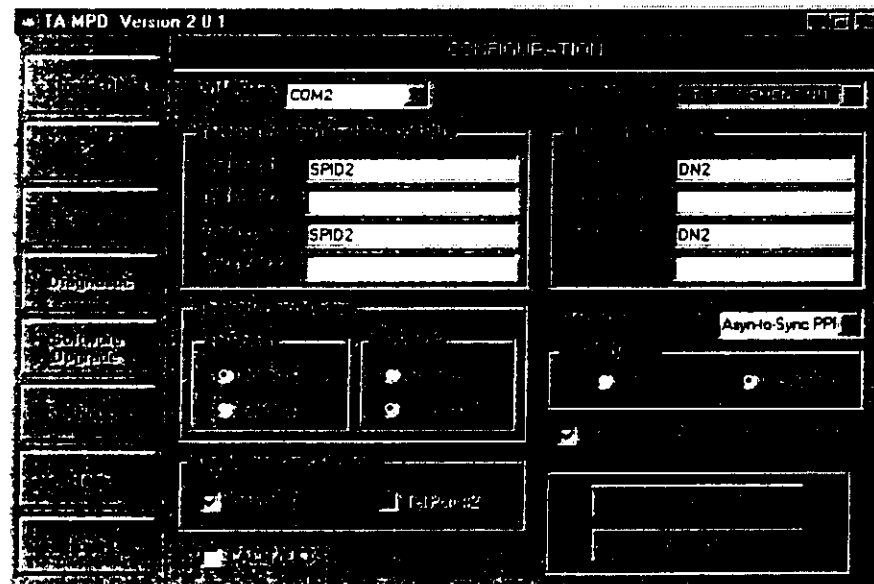
Configuration Option B
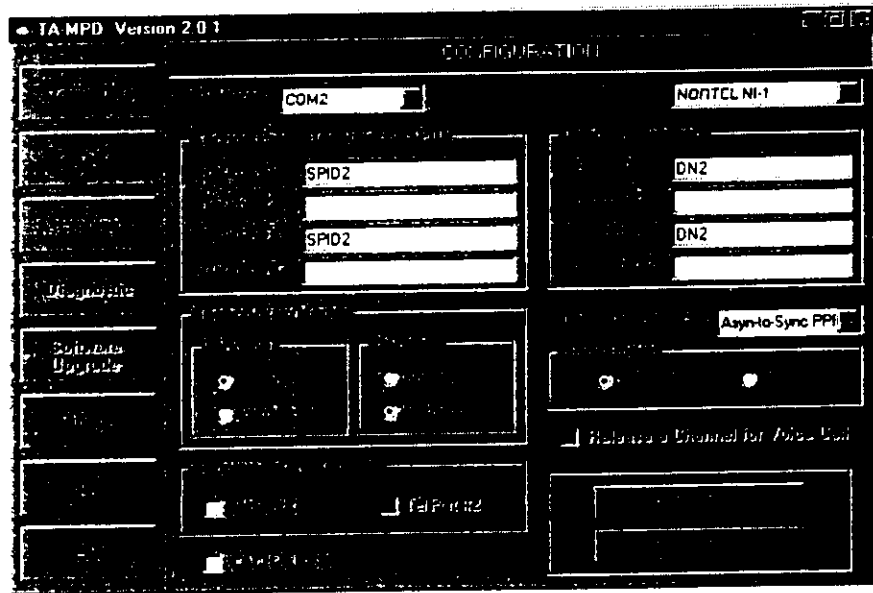
This option is identical to Option A with the addition of supplementary services for Tel Port #1. That is, all voice features such as caller ID, call waiting, conference, transfer, and drop are supported.
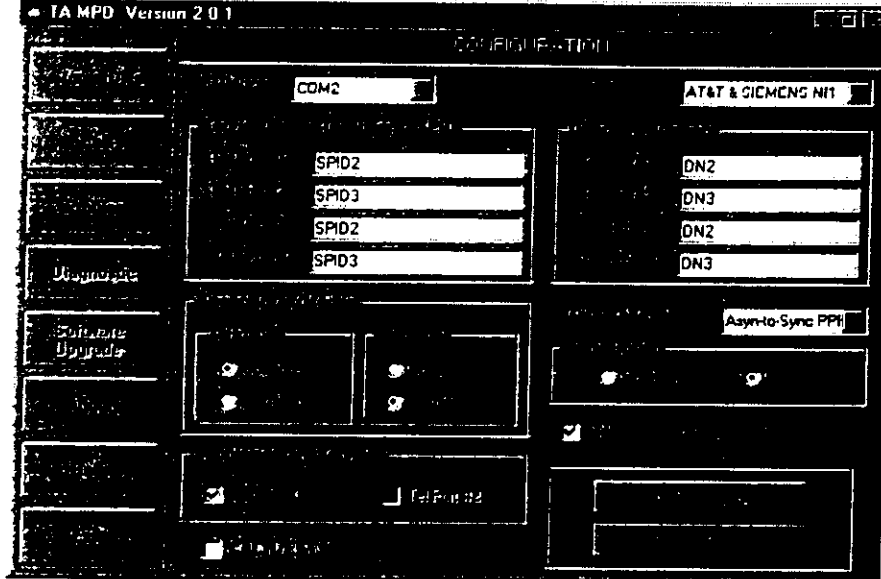
Configuration Option L

This option represents an enhanced voice and data service configuration for the TA-MPD and the Optiset. It uses SPID1/DN1 for the Optiset and SPID2/DN2 for the TA-MPD. Tel Port #1 can be configured for use as either a fax/modem line or a speech line with supplementary services (i.e., caller ID, call waiting, conference, transfer, and drop). Data Port #1 is set up for Internet access using Multilink PPP. This configuration is not as widely supported by ISDN service providers as Option A. It can only be used if your ISDN service provider   serving central office equipment supports the simultaneous access of both ISDN B-channels using a single SPID/DN for data calls.

Configuration Option 2

This option represents a full voice and data service configuration for the TA-MPD and the Optiset. It uses SPID1/DN1 for the Optiset with support for CACH EKTS and SPID2/DN2 and SPID3/DN3 for the TA-MPD. Both Tel Port #1 and Tel Port #2 can be configured for use as either a fax/modem line or a speech line with supplementary services. Data Port #1 and #2 are set up for Internet access using Multilink PPP. This configuration is not as widely supported by ISDN service providers as Option A.

Configuring the Optiset

For each of the TA-MPD configurations above, the Optiset programming from a button layout and feature assignment perspective is the same.

Options A, B and C provide non-EKTS voice features, including Flexible Calling, Call Forwarding Variable, Additional Call Offering, and Calling Number Identification (which includes Redirecting Number Delivery). The Flexible Calling feature includes the ability to conference, transfer, drop, and hold calls. Additional Call Offering is equivalent to the familiar Call Waiting feature popular with analog voice service.
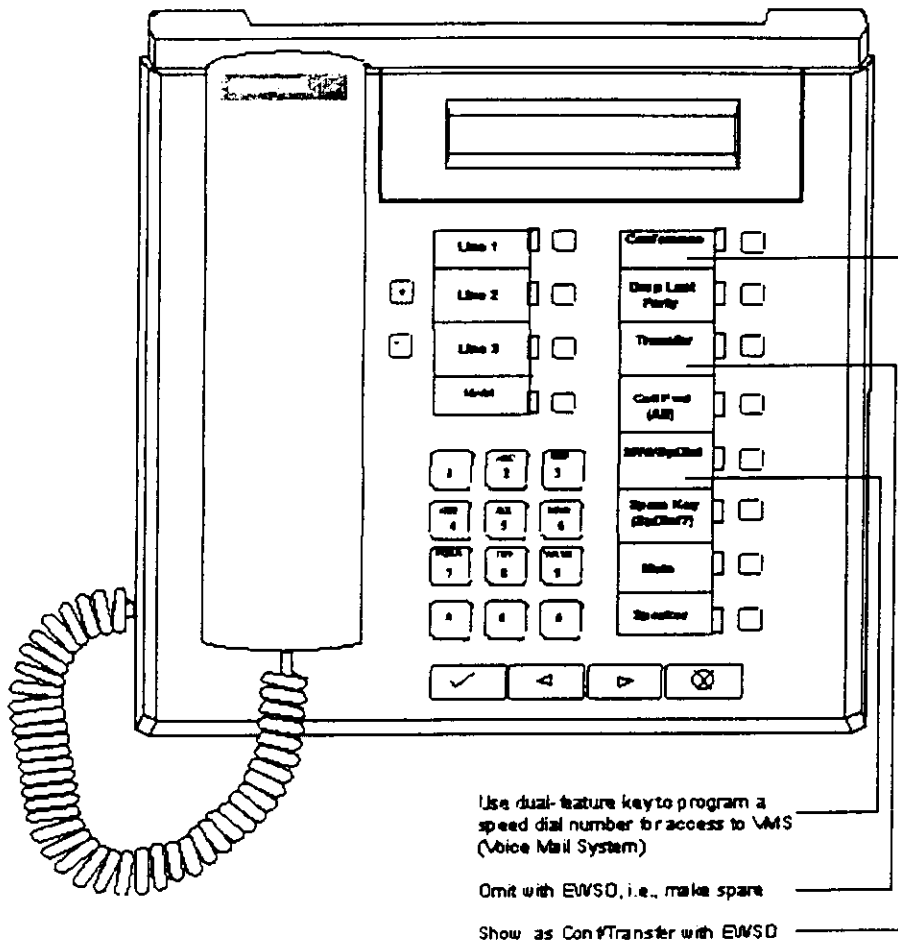
Option D substitutes CACH EKTS voice features for the non-EKTS voice capabilities provided with Options A, B and C.

Optionally, all four configurations can provide Advanced Call Forwarding Variable, i.e., Call Forwarding Variable, Call Forwarding Busy, Call Forwarding Don Answer, and Message Waiting Indicator (MWI) as part of a Voice Mail Service offering.

With all four configurations, the Directory Number assigned for the Optiset will have three separate line appearances, i.e., three buttons/lights are available for making or receiving voice calls.

Given the above information, the following button layout for the Optiset is
suggested:

Use dual- feature key to program a
speed dial number for access to VMS
(Voice Mail System)

Omit with EWSD, i.e., make spare

Show as Conf/Transfer with EWSD

Notes:

1. The major ISDN-capable telephone switching systems are the 5ESS (Lucent), DMS-100 (Nortel) and the EWSD (Siemens). Although all three are built to National ISDN standards, some variations in feature operation and support exist among them.

2. EKTS stands for Electronic Key Telephone Service and represents a functional emulation of so-called Key Systems widely used in small businesses.

3. CACH stands for Call Appearance Call Handling, which is a method by which calls are handled and delivered to the Optiset under control of the Central Office. CACH EKTS allows for the sharing of DNs among terminals in an EKTS group.

4. Non-EKTS implies that the Optiset manages the call appearance, i.e., controls the delivery of calls to the individual line appearances (buttons), instead of the Central Office. No sharing of DNs among terminals.

Chapter 13:
Troubleshooting Tip

1. If you can only sometimes make and receive calls, or can only
   receive calls, you may have selected the incorrect switch. It is
   important to note that all AT&T switches are 5ESS and all NORTEL
   switches are DMS-100. The important difference is whether they are
   operating National ISDN (NI-1) or Custom. Choose the NI-1
   settings for these switches in your MMI and Configure TA.

2. To Display all the D-Channel signaling messages type
   ⇒ **AT^ <ENTER>**
   > *Example: DIAG:*
   > *08 01 39 05 04 03 80 90 A2 18 01 89 34 01 40*
   > *3B 02 82 81 6C 09 41 81 35 35 35 31 30 30 30*
   > *96 7B 01 81*
   > *END*

   To disable this function, use any other AT command.

3. If your Supplementary Services is not operating correctly, verify the
   following information:
   ⇒ Both Speech and Supplementary Service are selected for the
      analog ports using supplementary services.
   ⇒ AT!F0=xx/xx/xx This is usually set for 60/61/62 and
      corresponds to Conference, Transfer, and Drop. You
      Telephone Company can give you the correct numbers.

4. If you are having trouble connecting to the TA-MPD, and your
   mouse is locking up, verify which COM port each is using. If you
   have a serial mouse using COM port 1 or 3, then install the TA-MPD
   on COM port 2 or 4. If you have a PS/2 mouse, or your mouse is
   using COM port 2 or 4, install your TA-MPD on COM port 1 or 3.

5. If you are having trouble getting the TA-MPD to properly configure using the MMI, look at the top of the MMI window. It should say A-MPD Version 2.0.1   contact our technical support immediately if not, or download the newest version from our Web site.
    If the MMI version is correct, start a terminal connection (see Chapter 8) and type **ATI3 <ENTER>**. The response should be er 3.01   if this is not the response, contact our technical support line to get the newest version. You can also download the newest version from our Web site. To upgrade the TA-MPD, follow the directions given by our technical support or on the web site. For Web site downloads, go to www.alpha-tele.com, select   upport & Services   and select   A-MPD

6. If the data port calls at 128K will not drop to 64K to allow incoming calls, please verify the following information:
    ⇒ In the MMI, you have set the **Data Call Protocol** to   sync-to-Sync PPP   with the **PPP Option** set to   LP   and the **Release a Channel for Voice Call** is checked. By terminal, set "AT@M5=1
    ⇒ The SPIDs and DNs for each Data port and corresponding Tel Port are the same (i.e. Data #1 and Tel #1 are the same).
    ⇒ Your line is provisioned with CACH/EKTS or ACO. Without CACH/EKTS or ACO, the TA-MPD will only drop a channel for outgoing calls, not incoming calls.

7. If the TEST LED (yellow) is on, Check if DIP Switch 1 (remote configuration) is set to ON (enabled) in the local side. Set DIP Switch 1 to OFF to continue normal usage.
    If DIP switch 1 is off, try reloading the latest firmware file (see Chapter 5)

If you have any other problems, questions, or suggestions, contact our customer support department.

Alpha Telecom Customer Support	
By Phone:	205.881.8743
By Fax:	205.880.9720
By Email:	Support@Alpha-Tele.com
Web Site	**www.Alpha-Tele.com**

Appendix C:
Dip Switch Settings

Bit	Remote Configuration		
Bit 2	Local Loopback	ON: enable	OFF: disable
Bit 4	Reserved		
Bit 6	Forced Software Download	ON: enable	OFF: disable

Appendix D: TA-MPD Specifications
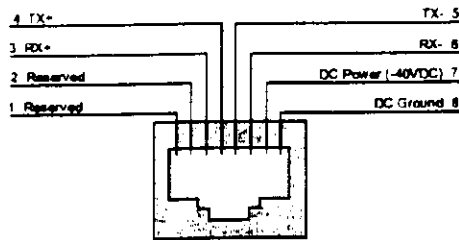
U-Interface

- U-Interface conforms to ANSI T1.601, 1992
- Connector: RJ-45
- Line: Two-wire, full duplex
- Data Rate: 144 Kbps available to subscriber
- Line Code: 2B1Q per T1.601, 1992
- O/P Amplitude   2.5V, zero to peak
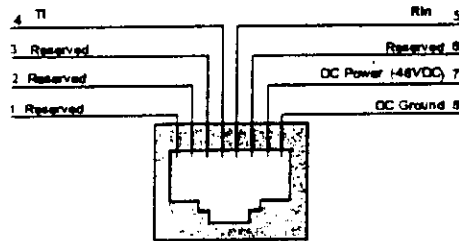
U-Interface Pin Assignment

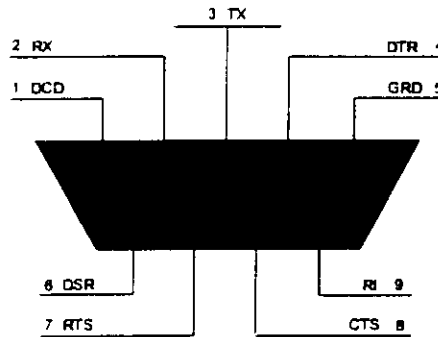## S/T-Interface

- S/T-Interface conforms to ANSI T1.605, 1991
- Connector: RJ-45
- Line: Four wire, full duplex
- Data Rate: 144 Kbps
- Line Code: AMI, 100% duty cycle per T1.605, 1992; ITU/CCITT I.430
- O/P Amplitude   0.75V, zero to peak

S/T-Interface Pin Assignment

D:1

Data Interface
- Data Interface conforms to ANSI
- Connector: DB-9 female
- Asynchronous data rate: 230.4 Kbps
- Dial-up Interface: AT command (Async), DTR assertion
- Loopback for self-test & for DTE diagnosis (local, network, remote)
- B-channel protocol: V.120; Clear channel (64 Kbps); HDLC transparent; PPP Multilink Protocol (MP-PPP)
- Dynamic bandwidth allocation when using MP-PPP; BACP

RI - Ring Indicator	DTR - Data Terminal Ready
CTS - Clear to Send	TX - Transmit
RTS - Ready to Send	RX - Receive
DSR - Data Set Ready	DCD - Data Carrier Detect

Analog Interface
- Analog Interface conforms to ANSI
- Connector: RJ-11
- REN: 5
- Power Feeding: -48V, 25mA minimum
- Ringing Signal: 87 Vrms, 20Hz, Sine wave
- Dialing: DTMF & Pulse (10 pps & 20 pps)
- Tone Generation: Busy Tone
- Caller ID Interface: FSK signal between the first & second ring
- Programmable bearer capability: Speech or 3.1 KHz audio (fax/modem)
- Supplementary Service: Call Waiting, Hold, Transfer, Three-party Conference

Power
- AC/DC power adapter: 110V ± 10V, 60Hz
- Output: -48 VDC, .25 A
- Consumption: <8 Watts

Switch Capability/DSS1 Protocol
- North American NI-1 (AT&T, NORTEL, Siemens)
- North American Custom: AT&T, NORTEL

Physical Dimensions
- 153mm(w) x 191mm(d) x 64mm(h)
- 6 w) x 7.5 d) x 2.5 h)

Operating System
- Windows 3.1 & 3.11
- Windows 95
- MS DOS

Advanced Features
- Remote on-line configuration
- Software upgradeable by downloading to the DB9 port
- Local loopback for DTE initiating loop test
- Network loopback

Environment
- Operating Temperature: 32°F to 122°F and 0°C to 50°C
- Storage Temperature: -13°F to 140°F and -25°C to 60°C
- Relative Humidity: 0 to 95% non-condensing

Appendix E: Glossary

BRI *Basic Rate Interface*. An ISDN line composed of (2B+D) two 64Kbps B Channels and one 16Kbps D Channel. The B Channel may be used for both voice and data signals. The D Channel is used for signaling and X.25 packet access. All channels are full duplex.

B Channel *Bearer* Channel. ISDN bearer service channel operating at 56 or 64 Kbps, carrying user voice or data, circuit switched, packet, or frame-mode services may be obtained on this channel.

CO *Central Office*. A location for the local telephone switch. The switch connects and routes the end user calls to the ISDN network.

CPE *Customer Premises Equipment*. According to the FCC, any communications equipment placed at the customer site, including modems, telephone sets, PBXs, and NT1s.

Custom. A *switch* setting in the local Telephone Company Central Office.

D Channel *Data* Channel. The ISDN out-of-band signaling channel, carrying ISDN user-network messages. It can be used to carry packet or frame-mode user data. The D Channel operates at 16Kbps in a BRI.

Full Duplex. The transmitting of information in both directions at once.

ISDN *Integrated Service Digital Network*. A digital network that provides a wide variety of communication services. A standard set of user-network messages, and integrated access to the network.

ISP *Internet Service Provider*. A company that provides access to the Internet.

Kbps *Kilobits per second* (1000 bits per second). A term used to describe the speed of transferring data.

LED *Light Emitting Diode*. A diode placed within a circuit. It lights indicating specified statuses.

MLP *Multilink Protocol*. An ISDN Internet connection combining both B Channels for a 112Kbps or 128Kbps data rate. Sometimes described as PPP/MP (Point to Point/Multilink Protocol).

NI-1 *National ISDN-1.* Defined by Bellcore, *NI-1* a process of identifying and implementing ISDN service features in a consistent way across different vendor switches and CPE, resulting in a more consistent service definition and CPE portability. A *switch* setting that could be used by your telephone company.

NT1 *Network Termination 1.* An ISDN device on the customers' premise responsible for the termination of the ISDN line.

Packets. A term used to describe the transmission of data in block form.

PC *Personal Computer.* A small frame computer designed for a single user.

POTS *Plain Old Telephone Service.* A term used to refer to an analog telephone.

PPP *Point-to-Point Protocol.* An ISDN Internet connection using one B Channel for a 56Kbps or 64Kbps data rate.

Protocol. A set of guidelines used for the interaction of computers and like devices.

S/T The protocol reference point where an ISDN device attaches to an NT1 device.

SOHO *Small Office/Home Office.* A term used to signify the size of a business.

SPID *Service Profile Identification.* The number that each terminal equipment uses to identify itself to the Telephone Company.

Switches In North America the switches that support ISDN are AT&T 5ESS, NORTEL DMS-100, and SIEMENS EWSD. Most switches have *Custom* or *NI-1* settings available.

TA *Terminal Adapter.* A protocol converter used to allow non-ISDN terminal equipment to access the network using ISDN protocols and procedures.

TE *Terminal Equipment.* ISDN compatible equipment that translates the digital signal to a user interface (phone, modem, TA, or PC

TEI *Terminal Endpoint Identifier.* A subfield in the LAPD address field that identifies a given TE device on the ISDN interface.

TID *Terminal Identifier.* A one to four digit number attached to the phone number. It is used identify terminal equipment.

TR *Termination Resistance.* An equal amount of resistance (50 or 100 Ohms) applied to both the NT1 device and to the TE farthest from the NT1. It reduces the reflection and it insures the maximum power of the transmitted signal. Thus, it improves signal quality.

U The protocol reference point between ISDN network termination (NT1) equipment and the central office.

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