



Application Note #158:

Cermetek iModem Caveats and Definitions

INTRODUCTION

Application Note # 158 summarizes key iModem operating requirements and explanations of commonly used internet acronyms. The requirements contained herein appear in various Cermetek Application Notes and Operating Instructions as **Cautions**, **Important Notes**, **Advisories** or **Important Features**. These requirements are repeated here for the convenience of the iModem user and to emphasize their importance.

CAVEATS

Caveat 1: Point-to-Point Protocol. The iModem communicates over the internet using the PPP encapsulation protocol.

Caveat 2: Password Authentication Protocol. The iModem supports the PPP identification authentication protocol PAP.

Caveat 3: Challenge-Handshake Authentication Protocol. The iModem supports the CHAP identification authentication protocol.

Caveat 4: AOL As An iModem ISP. The ISP America On Line (AOL) uses a proprietary identification authentication protocol. Currently, the iModem DOES NOT support connection to AOL accounts. However, emails can be sent to AOL email addresses.

Caveat 5: iModem Control. The serial @T[®] commands are sent over RXD and serial status messages are returned on TXD. All other serial interface lines may be utilized for the convenience of a particular application but are not required by the iModem. Unused outputs from the iModem should be left unconnected. Unused inputs should be tied to the proper logic level. Refer to the appropriate Cermetek product datasheet for a complete list of pin descriptions.

Refer to Application Note #150, General Operation of Cermetek iModem Products, for a more detailed discussion of the operation of Cermetek's iModem product family.

Caveat 6: DCE Data Speed and Format. By default all @T[®] Commands sent by the host (DTE) to the iModem over the V.24 serial interface port must be sent at **57600bps, N81** (no parity, 8 data bits and 1 stop bit) for the CH2160 family, **19200bps, N81** for the CH2165 or **2400bps, N81** for the CH2124/A family of iModem products. This data rate can be changed by the user. Refer to Cermetek Application Note #155, @T Command Set Description and Usage for CH2124/60 iModem Products.

Caveat 7: @T[®] Command Line. Only one @T[®] command is allowed per line. Refer to Cermetek Application Note #155, @T Command Set Description and Usage for CH2124/60 iModem Products.

Caveat 8: @T[®] Command Data Entry. DO NOT use the backspace key (backspace character HEX 08) to perform editing functions during data entry unless the software package being used specifically states that character editing is supported. Most terminal emulation programs do not support character editing.

Unfortunately, the user may be lead to believe that character editing is allowed because the cursor will backspace when a backspace key is depressed. However, the terminal is simply reacting to the HEX 08 character. The HEX 08 character will become part of the data stream and cause considerable debugging headaches.

Terminal emulation software packages HyperTerminal and PROCOMM DO NOT support editing. DO NOT use the backspace character (HEX 08) to edit during data entry. Use either <CR> or <CR>.<CR>, as appropriate, to terminate data entry and then re-enter the entire data stream. Refer to Application Note #157, Using MS Windows HyperTerminal with iModem Products or Application Note #160, Using PROCOMM with CH2124/60.

Cermetek's telecommunications software program **iNetWizard[®]** DOES support editing. Therefore, when using **iNetWizard[®]** to program the iModem, the backspace key may be employed to perform character editing. Refer to Cermetek Application Note # 159, Using iNetWizard[®] with CH2124/60.

Caveat 9: Verbose Message Response. Cermetek's iModem products are delivered from the factory with the internet mode active/enabled. For proper operation of the iModem **@T**[®] commands, the OK result messages (i.e., verbose messages) returned by the iModem's internal modem to the iModem's internal microprocessor must be enabled.

Disabling the verbose message response of the internal modem by issuing modem control commands such as **ATV** will de-activate all **@T**[®] commands. In this case, all modem AT commands will continue to be executed properly. However, any **@T**[®] commands issued to the iModem will not be executed and will cause the iModem to issue the NOT IN IMODEM MODE result message.

To re-activate the **@T**[®] commands, simply enable the verbose result message capability of the internal modem and reset the iModem. This is done as follows:

Enter:	AT[&F]]<CR>	Reset factory modem defaults
Result:	OK	
Enter:	AT[&W]]<CR>	Save factory defaults in NVRAM
Result:	OK	

After successful execution of the AT commands listed above, perform a hard reset by removing power to the iModem, wait at least 100ms, then restore power. The hard reset is required to force re-initialization of both the internal modem and the internal microcontroller.

For additional information, refer to Cermetek Application Note #150, [General Operation of Cermetek iModem Products](#) and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 10: iModem DCD and Carrier Detection. Cermetek's iModem products require that DCD be enabled. Correct DCD operation is essential for proper execution of the **@T**[®] commands. DO NOT issue the **AT&C0** command to the iModem because it will disable DCD and could lead to erratic performance of the iModem (depending on the content of the data field).

DCD enabled is the standard default configuration profile of the internal modem. For a more detailed discussion of the iModem's operation, refer to Cermetek Application Note #150, [General Operation of Cermetek iModem Products](#).

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Caveat 11: Operating The iModem In Modem Mode. In general, the iModem can be made to operate as a standard analog modem simply by sending it AT commands over the V.24 serial port. The default iModem configuration "As shipped from the factory" has hardware flow control de-activated thus allowing both AT and **@T**[®] commands to executed interchangeably.

If the iModem is to operate as a standard modem while simultaneously maintaining the capability to operate over the internet, hardware flow control CANNOT be active. Activating hardware flow control will cause the **@T**[®] commands to function erratically. If it is desired to activate hardware flow control, then DO NOT issue any **@T**[®] commands while using hardware flow control and operate the iModem strictly as an analog modem.

Caveat 12: iModem Default Configuration. Each iModem is delivered from the factory with a preprogrammed ISP account ID and password, iModem identifying name, dial-up ISP access phone number, and email destination address based on information supplied by the user at the time of order placement. Additionally, Cermetek programs a unique unit serial number and a default email message and subject title.

The default configuration is provided as a convenience to Cermetek's iModem customers and it enables the user to demonstrate proper operation of the iModem and the **iModem Network** ISP without further modification to the iModem parameters.

The default profile is intended for use on an interim basis and the user should expect that some amount of personalization/customization will be needed to tailor the iModem's performance to the user's specific application requirements. All parameters contained in the factory installed default configuration profile (except the serial number)

may be modified by the user as desired. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), for a complete description of the default iModem parameter configuration profile.

Caveat 13: iModem Network ISP Accounts. All iModem Network ISP account ID's are of the form:

username@imodem.net

Where **username** is the user email account name. The suffix **@imodem.net** MUST be specified to log onto the iModem Network ISP and is required by the POP local access Radius Server.

Caveat 14: iModem Network Database. All iModem Database account ID's DO NOT require the **@imodem.net** suffix. The **@imodem.net** suffix is only required during login and to specify the email address.

Caveat 15: iModem Default Destination Email Address. Each iModem is delivered from the factory with the default destination email address **<username.email@imodem.net>** preprogrammed. This email address accesses the **.email** service feature associated with the **username**. All features are contained in a user specific database located on the Cermetek **iModem Network** ISP. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), for a complete description of the default iModem parameter configuration. Refer to Cermetek Application Note # 161, [iModem Network ISP Database Management](#).

Caveat 16: Changing the Default iModem Internet Configuration Profile. The iModem automatically saves all configuration profile modifications invoked by the **@T[®]** commands to internal flash memory when the command is executed. These modifications constitute a permanent change to the user profile and will not be lost when power is removed. However, changing the parameters DOES NOT change the content of the email message. See caveat 18.

Caveat 17: Sending Emails. The CH2124/60 products allow sending emails by using any one of the following methods:

1. Issue software commands **@TD** or **@TDM1**.
2. Assert CH2124/60 SEND pin TTL LOW.
3. If using the CH21XX Evaluation Board, momentarily depress push-button switch S3.

For all firmware revisions 1.261 or earlier, activating the CH21XX SEND pin will send the message type previously selected by the **@TJn** command. For all firmware revisions 1.262 or later, activating the CH21XX SEND pin will send the message type previously selected by the **@TK8** command. The **@TD** and **@TDM0** commands send the Input Port Status message regardless of the type specified by the **@TJn** or **@TK8x** command. The **@TDM1** command sends the User Defined message regardless of the type specified by the **@TJn** or **@TK8** command. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 18: Sending the User Defined Email Message. For the case of the User Defined email message (i.e., the message sent using the **@TDM1** command), the **@TM1** command must be the last ISP parameter modification command executed prior to executing the **@TDM1** the command. This means the **@TM1** must be executed after the **@TA1**, **@TE1**, **@TS1** and **@TU1** commands. This programming sequence is necessary because the **@TM1** command causes the iModem to compose the entire message and then store the complete message (including headers) into flash memory prior to initiating ISP dialup. It is the stored message that is transmitted. Failure to do this will cause unpredictable results.

Caveat 19: Sending the Input Port Status Email Message. The **@TM1** command execution requirements DO NOT apply for the case of Input Port Status email messages (i.e., messages sent using the **@TD** and **@TMO** commands). The user does not have control over the content of the message body in the Input Port Status messages.

Caveat 20: Selecting the Email Message Type with Firmware Revision 1.261 or Earlier. The **@TJn** command is used to select the email message type sent when using the SEND pin on the CH2124/60 iModem to send the email message. Command **@TJ0** selects the Input Port Status message and **@TJ1** selects the User Defined message.

Caveat 21: Selecting the Email Message Type with Firmware Revision 1.262 or Later. The **@TJn** command has been replaced with the **@TK8** command. The **@TK8** command is used to select the email message type sent when using the SEND pin on the CH2124/60 iModem to send the email message. Command **@TK8=30** selects the Input Port Status message and **@TK8=31** selects the User Defined message.

Caveat 22: Modifying the SMTP and POP3 Addresses. The SMTP server is used by the iModem to send emails to the ISP. The POP3 server is used by the iModem to retrieve emails from the ISP. Although all iModems in the CH21XX product family will accept commands to modify the both SMTP and POP3 server hexadecimal addresses, only iModem models with send email capability will use the SMTP server and, conversely, only iModem models with retrieve email capability will use the POP3 server.

Caveat 23: Auto-Redial. The **@TK1=n** auto-redial command is limited to a maximum of 15 redial attempts. This is required per FCC regulations. For a complete description of the auto-redial feature refer to Application Note # 155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 24: FailSafe BackChannel®. The **FailSafe BackChannel®** feature is an alternate email transmission path that is provided by Cermetek's **iModem Network** ISP. This feature, when enabled, will cause the last auto-redial attempt to be made as a direct connection to the **iModem Network** ISP. This feature is intended as a failsafe back up in the event that the primary ISP does not successfully transmit the outgoing email after n number of user specified redial attempts. This feature is available exclusively to Cermetek **iModem Network** ISP users. For a full description of the **FailSafe BackChannel®** feature refer to Application Note # 155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 25: Retrieving Emails. The CH2124/60 products retrieve emails by using the **@TDGn** command. The **@TDGn** command reports the total number of email messages available on the POP3 server as well as retrieving the contents of the specified email message.

Note that the POP3 server needs to know the number of the email message to be retrieved. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 26: Deleting Emails. The CH2124/60 products delete emails by using the **@TDKn** command. The **@TDKn** command reports the total number of email messages available on the POP3 server as well as deleting the specified email message.

Note that the POP3 server needs to know the number of the email message to be deleted. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 27: Rapid Succession Email Transactions. If difficulty is experienced while attempting rapid succession email transactions, Cermetek recommends increasing the delay between successive transactions. The amount of delay required will depend on the ISP server traffic and the sophistication of the specific ISP.

The fundamental issues are security and industry standard business practices: the SMTP and POP3 servers WILL NOT allow two users to logon to the same email account at the same time. Consequently, successive email transactions will fail if the server has not released the email connection used for the previous email transaction. Although delays of one minute are most common, the user could experience delays of up 5 minutes (for SMTP) and 12 minutes (for POP3) during periods of peak email traffic.

Caveat 28: Terminating Emails. The CH2124/60 products allow for the termination of any email transmission (regardless of how the email transmission was initiated) by using any one of the following methods:

1. Assert CH2124/60 SEND pin TTL LOW during email transmission.
2. If using the CH21XX Evaluation Board, momentarily depress push-button switch S3 during email transmission.
3. Turn off the power to the CH2124/60.

Methods 1 and 2 above are the preferred methods because they will properly terminate the internet connection with the ISP. Turning off the power will cause the internet connection to hang, and it could take the ISP as much as 15 minutes to terminate the internet connection. Depending on the ISP, a hanging internet connection could cause difficulty for subsequent email transmission attempts until the internet connection has been properly terminated by the ISP.

Caveat 29: Telecommunications Software. Communication between the iModem and either the terminal emulation system or the DTE system is conducted over the iModem's V.24 serial port. This port is used for iModem programming and for routine communication, and may be used for embedded system debugging. When system level

debugging is required, Cermetek recommends terminal emulation products such as MS HyperTerminal or PROCOMM.

PROCOMM is a telecommunications product and is available from Procom Technology, Inc., 58 Discovery, Irvine, CA 92618. PROCOMM contains the terminal emulation program PC PLUS. PC PLUS operates in the standard DOS environment. Application Note #160, [Using PROCOMM with CH2124/60](#), employs a step by step procedure to lead the user through all necessary sequences to setup and activate PROCOMM and to access the terminal emulation program PC PLUS. Typical iModem programming examples are also included in Application Note # 160.

HyperTerminal is standard on MS Windows environments. Refer to Cermetek Application Note #157, [Using MS Windows HyperTerminal with iModem Products](#). Typical iModem programming examples are also included in Application Note # 157.

Caveat 30: iModem Personalization. iModem programming is required to personalize/customize various internet parameters and is typically a one-time event. Although the user can modify the internet parameters as often as needed, most users modify these parameters very infrequently. Cermetek's **iNetWizard**[®] program has been specifically designed to streamline the iModem programming activity and is the preferred iModem programming method. However, if desired, commercial terminal emulation products such as MS HyperTerminal or PROCOMM may also be utilized to program the iModem.

iNetWizard[®] is an MS Windows based application and is provided free of charge by Cermetek to all iModem customers. Refer to Cermetek Application Note # 159, [Using iNetWizard[®] with CH2124/60](#), for detailed step-by-step accessing instructions. Typical iModem programming examples are also included in Application Note # 159.

Caveat 31: Setting iModem Input Port Status. The iModem reports the status of INPUT 1 and INPUT 2 as part of a preprogrammed email message. The entire message (including the Input Port Status) is viewable using the **@TV1** command. Be sure that the Input Port Status message has been selected. Execute **@TJ1<CR>** or **@TK8=30<CR>** command string, as appropriate, if in doubt.

A LOW value is reported when a TTL LOW value is presented to the input pin(s). A HIGH value is reported when a TTL HIGH value is presented to the input pin(s).

To verify proper operation of TTL LOW status of the iModem input pins, connect one (or both) of the pins to GND. Issue either the **@TV1** command to the iModem and observe the INPUT 1 and INPUT 2 values reported. A LOW value should be reported when the input is connected to GND. If not, review the circuit configuration and repeat the verification activity.

To verify proper operation of TTL HIGH status of the iModem input pins, connect one (or both) of the pins to +5V through a 4.7k Ω resistor. Issue the **@TV1** command to the iModem and observe the INPUT 1 and INPUT 2 values reported. A HIGH value should be reported when the input is connected to +5V through a 4.7k Ω resistor. If not, review the circuit configuration and repeat the verification activity.

Caveat 32: User Defined Email Message. The iModem command **@TM1** is used to establish the content of the user definable email message. This message is limited to 125 ASCII characters (including **<CR>** and **<LF>**). Blanks or spaces are allowed and each occurrence counts as 1 character. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

The termination sequence for the **@TM1** command is **<CR>.<CR>** and not **<CR>**. Additionally, any **<CR>** included in the **@TM1** datafield is interpreted as **<CR><LF>**. This is done to maintain compatibility with various terminal emulation programs. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 33: Email Message Subject Line. The iModem command **@TS** is used to enter the content of the user email subject line. Regardless of which type of email message is sent, the iModem user has the ability to define the content of subject line associated with the email messages. The subject line is currently limited to 15 ASCII characters. Blanks or spaces are allowed and each occurrence counts as 1 character. Refer to Cermetek Application Note # 156, [CH2124/60 iModem Default Configuration Profile](#), and Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 34: iModem ISP Password. The iModem command **@TP** is used to establish the user password for the ISP account. Blanks or spaces are not allowed. Refer to Application Note #155, [@T Command Set Description and Usage for CH2124/60 iModem Products](#).

Caveat 35: Hard Reset. When required by the application to perform a hard reset (i.e., power shutdown and then power re-start), remove power for at least 150ms before restoring power.

DEFINITIONS

- CHAP.** Challenge Handshake Authentication Protocol. CHAP is considered to be a strong authentication protocol and is invoked periodically during the connection.
- Datagram.** A PDU in the network layer. The datagram consists of the IP header and any traffic encapsulated into the IP data field.
- DNS.** Domain Name System. Used for server operations.
- FTP.** File Transfer Protocol. Used for more elaborate file transfer services.
- HTTP.** HyperText Transfer Protocol. For transfer of web traffic (such as Web pages).
- IP.** Internet Protocol. One part of the two part system (TCP/IP). IP is responsible for routing the datagrams through the network from source host to destination host.
- ISP.** Internet Service Provider. The ISP provides the connection between the user and the NAPs.
- LCP.** Link Control Protocol. A major component of PPP and is used to define the operations for configuring the link and for negotiating the options. The authentication option to be invoked is included in LCP. LCP is also responsible for link termination.
- NAP.** Network Access Point. These are the major intersection points of the internet. The ISPs are connected to the internet at the NAPs. All NAPs operate at speeds of at least 100Mbit/s and are primarily responsible for exchanging data between ISPs.
- NCP.** Network Control Protocol. A major component of PPP and is used to negotiate certain options and parameters.
- PAP.** Password Authentication Protocol. PAP is not intended to be a strong authentication protocol. PAP provides a comparable level of security to that experienced by a conventional user who logs in at a remote host. PAP is the most common authentication protocol.
- PPP.** Point-to-Point Protocol. PPP is used to encapsulate network layer datagrams over a serial communications link. PPP consists of two major protocols: LCP and NCP.
- POP.** Point of Presence. Local dial-up access point to the internet.
- PDU.** Protocol Data Unit. Data packet sent from the Application Layer to the Transport Layer.
- SMTP.** Simple Mail Transfer Protocol. This is used primarily for message transfer services (electronic mail).
- SONET.** Type of ISP leased line used to carry internet traffic.
- TCP.** Transmission Control Protocol. One part of the two part system (TCP/IP). TCP is responsible for accepting traffic from the user application, breaking it up into small pieces (called TCP segments) acceptable to the network and reassembling the traffic at the receiving side. It is also responsible for detecting errors on an end-to-end basis and for re-sending traffic that was erred or lost in the network.
- UDP.** User Datagram Protocol. UDP is a connectionless protocol that can be used in place of TCP for less sophisticated applications.

POP3. Server Protocol used for email retrieve and email delete.

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