INTRODUCTION

Communication between the iModem and either the terminal emulation system or the DTE system is conducted over the iModem's RS232 serial port. This port is used for iModem programming and for routine communication, and may be used for embedded system debugging.

During evaluation of the iModem, it is desirable to employ a telecommunications software product to facilitate the transmission of information between the iModem evaluation board and the terminal emulation system/DTE/host system. This link is also useful for monitoring iModem communication. When system level debugging is required, Cermetek recommends terminal emulation products such as MS HyperTerminal or PROCOMM.

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. **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, <u>Using **iNetWizard**® with CH2124/60</u>, for detailed step-by-step accessing instructions. Typical iModem programming examples are also included in Application Note # 159.

If preferred, rather than using Cermetek's **iNetWizard**® program, the user may utilize PRCOMM to program the iModem. PROCOMM is available from Procom Technology, Inc., 58 Discovery, Irvine, CA 92618. It operates in the standard DOS environment.

Application Note #160 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.

GETTING STARTED

The step-by-step instructions presented below assume that PROCOMM has been properly downloaded per the manufacturer's instructions. Further, it is assumed that the software is loaded onto internal drive C in directory PCPLUS.

For the purposes of this document, the following conventions will be observed:

> **<CR>** is used to denote carriage return
> **<LF>** is used to denote line feed
> System prompts will appear in non-bold characters
> Required response(s) will appear in bold characters

In the following example:

Example 1.   C:\Windows>**cd\<CR>**

> C:\Windows>   Represents the system prompt.
> **cd\<CR>**   Represents the required user response.

ACCESSING PCPLUS

PC PLUS is accessed as follows:

Step 1.   When in MS WINDOWS, proceed to the START button in the lower left corner of the monitor screen.

Step 2.   Click on START.

Step 3.   Move the cursor to highlight SHUT DOWN, then click on SHUT DOWN.

Step 4.   Click on and select RESTART IN MS-DOS MODE, then click on OK.

Step 5.   Wait for the DOS windows prompt and enter **cd\<CR>** or **cd..<CR>** as indicated below. This will return the user to the root directory.

> C:\Windows>**cd\<CR>**
>   or
> C:\Windows>**cd..<CR>**

Step 6.   Wait for the C directory prompt and proceed as indicated below. This will access the PCPLUS directory.

> C:\>**cd pcplus<CR>**

Step 7.   Wait for the PCPLUS directory prompt and proceed as indicated below. This will initiate the PCPLUS terminal emulation software program.

> C:\PCPLUS>**pcplus<CR>**

Step 8.   The monitor screen will display the PROCOMM PLUS program banner. Enter **<CR>** to continue.

Step 9.   Verify that the proper serial communication port (i.e., COM PORT) has been selected. Proceed as follows:

    A.   Press **ALT** and **P** simultaneously. The monitor screen will display a pop-menu containing the setup tables. Review the current settings. Select the COM PORT that corresponds to the port used.

    B.   Press **ALT** and **S** simultaneously to save the COM PORT configuration and to exit the pop-up menu. Press **ESC** key to exit WITHOUT saving changes.

    C.   Press **ALT** and **P** simultaneously to verify that the proper COM PORT has been selected. If needed, change the COM PORT selection per Item B above and Save/Exit the pop-up menu by pressing **ALT** and **S** simultaneously. Press **ESC** key to exit WITHOUT saving changes.

Step 10. Verify that the proper communication speed and data format has been selected. Proceed as follows:

    A.   The connection speed and data format will be displayed in the TOOL BAR along the bottom of the monitor screen display. If the connection speed and/or the data format is not as specified below, the **@T®** commands will not function properly and it is necessary to reconfigure the PROCOMM application. The following is a summary of the required properties:

	CH2160	CH2124/A	CH2165
Bits Per Second =	57600	2400	19200
Data Bits =	8 bits	8 bits	8 bits
Parity =	None	None	None
Stop bits =	1	1	1
Flow Control =	None	None	None

This is abbreviated as **57600 N81** (for CH2160), **19200 N81** (for CH2165) and **2400 N81** (for CH2124/A).

Review the current settings. If the data speed and data format match the above requirements exactly, then reconfiguration is not required. Proceed to step 11.

If the data speed/format does not match the above requirements exactly, then reconfiguration is necessary. Proceed to B below.

    B.   Press **ALT** and **P** simultaneously. The monitor screen will display a pop-menu containing the setup tables.

    C.   Set the baud rate to **57600**.

    D.   Set the parity to **None**.

    E.   Set data bits to **8**.

     F.   Set stop bits to **1**.

     G.   Press **ALT** and **S** simultaneously to save the data format configuration and to exit the pop-up menu. Press **ESC** key to exit WITHOUT saving changes.

     H.   Verify that the TOOL BAR now displays **57600 N81**. If not, go back to B above and repeat the reconfiguration process.

Step 11. PCPLUS is now in Program Terminal Mode and is ready to accept **@T**® commands.

TERMINATING PCPLUS

Upon completion of the iModem programming activity, the following steps are required to exit PCPLUS and return to the MS Windows desktop screen.

Step 1. Press the **Alt** and **X** keys simultaneously. This will terminate PCPLUS.

Step 2. The monitor screen will display a pop-up screen with the question EXIT TO DOS?(Y/N)Yes. Although YES is the default, press **Y<CR>** to ensure proper termination of PCPLUS.

Step 3. The monitor pop-up screen will change to the question HANGUP LINE?(Y/N)Yes. Although YES is the default, press **Y<CR>** to ensure proper termination of PCPLUS.

Step 4. The monitor screen will display the PCPLUS prompt. Proceed as indicated to exit the DOS PCPLUS directory and return to the MS Windows desktop screen.

     C:\PCPLUS>**exit<CR>**

EXAMPLES

The following examples are included in this application note to assist the user with typical iModem programming activities. These examples were created using an iModem socketed into the CH21XX Evaluation Board. The evaluation board was connected and configured per the instructions supplied with the board. For a complete description of the CH21XX Evaluation Board connection procedure, refer to Cermetek publication iModem Evaluation Board Instructions. Refer to Application Note #158, Cermetek iModem Caveats and Definitions, for a summary of iModem operational considerations and requirements.

@T® **Command Syntax.** The **@T**® command syntax is identical to the industry standard Hayes AT command syntax. For a complete description of all available **@T**® commands, refer to Application Note #155, **@T**® Command Set Description and Usage for CH2124/60 iModem Products.

For the purposes of this document, the following conventions will be observed:

     <CR> is used to denote carriage return (equivalent to HEX 0D).
     <LF> is used to denote line feed (equivalent to HEX 0A).
Enter: is used to denote the command string to be sent to the iModem.
Action: is used to denote the action required by the user.
Response: is used to denote the response sent (or action taken) by the iModem.

Any information listed in bold is a required portion of the command string. Brackets [] not in bold are intended to serve as delimiters only and are not part of the required command string. All embedded spaces are ignored except in the data field.

Each command line has the following format:

     @T[**command**][**=data field**]**<CR>**

Where: **@T**® is the iModem command attention sequence. Upper or lower case **T** is acceptable.
     [**command**] is the specific command. Upper or lower case characters are acceptable.
     [**=data field**] is the data field. Any ASCII character is acceptable (including blank spaces).
        The **=** sign must precede the information entered in the data field (except for the case query commands).

Use **?** in the data field for the case of query commands. An **=** sign is not required for queries.

<CR> is the termination sequence for all commands except for the **@TM1** command as indicated below. Note that the **@TM1** command WILL NOT accept **<CR>** as the first character in the data field.

@T[**M1**][**=data field**]**<CR>.<CR>**.

@T® **Command Data Entry.** PROCOMM DOES NOT support editing. DO NOT use the backspace character (HEX 08) to edit during data entry. Using the backspace key to perform character editing will cause the backspace character (HEX 08) to be included in the data stream. Unfortunately, the user may be lead to believe that character editing is allowed because the cursor will backspace when the backspace key is depressed. However, PROCOMM is simply reacting to the HEX 08 character. In this case, the HEX 08 character will become part of the data stream and will cause considerable debugging headaches when the iModem attempts to execute a command string containing the HEX 08 character.

When editing is necessary, use either **<CR>** or **<CR>.<CR>**, as appropriate, to terminate data entry and then re-enter the entire data stream.

IMPORTANT NOTE

The following examples are intended to demonstrate various aspects of Cermetek iModem products while using PROCOMM® as the terminal emulation communication software. These examples are illustrative in nature. The user should consult the Device Programming Summary form supplied with each iModem for specific parametric values and settings.

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iModem Identification/Query Examples.
Example 2: Instruct the iModem to identify itself and display the firmware revision. This is also a convenient way to verify that communication with the iModem has been properly established.

   Step 1. Enter: **@T**[**I**][]**<CR>**
            Response: **CH21XX Rev. A.BBB**   Where **CH21XX** is the iModem Product and **Rev. A.BBB** is the firmware revision.

Example 3: Instruct the iModem to display the user name.

   Step 1. Enter: **@T**[**L1**][**?**]**<CR>**
            Response: **username@imodem.net**

Setup/Send Email Examples. The iModem command set contains two commands for sending email messages. These commands are **@TD** and **@TDMn**. Each command directs the iModem to send a differently formatted email message.

The **@TD** and **@TDM0** commands direct the iModem to send a pre-configured email message that contains the status (i.e., either HIGH or LOW) of the input ports. The ASCII character configuration of the body of the email message sent by either the **@TD** or the **@TDM0** commands is not user modifiable. However, the input port status can be changed at will by the user and is accurately reported by the **@TD** and **@TDM0** commands.

In contrast, the **@TDM1** command sends an email message whose content is user definable. The ASCII character configuration of the email message sent by the **@TDM1** command is currently limited to 125 ASCII characters. Blanks or spaces are allowed in the message body and each occurrence counts as 1 ASCII character. The **@TDM1** command DOES NOT report the input port status.

The **@TM1** command is used to construct the user definable email message sent with the **@TDM1** command. The **@TM1** command will accept any ASCII character (including blanks, spaces, **<CR>** and **<LF>**) in the data field. Note that the termination sequence for the **@TM1** command is **<CR>.<CR>** and not **<CR>**. Additionally, any **<CR>**

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included in the **@TM1** data field is interpreted as **<CR><LF>**. This is done to maintain compatibility with various terminal emulation programs.

Regardless of the type of email message, the user has the ability to define the content of the subject line associated with the email message. The **@TS1** command is used to set the content of the subject line. The subject line is currently limited to 15 ASCII characters. Blanks or spaces are allowed and each occurrence counts as 1 character. Note that currently the same subject line is used for both email messages.

For a more detailed discussion of the Send Email topic, refer to Cermetek Application Note #155, **@T®**Command Set Description and Usage for CH2124/60 iModem Products. Refer to Cermetek Application Note #158, Cermetek iModem Caveats and Definitions, for a summary of iModem conditions and requirements.

The following examples demonstrate various iModem setup and send email techniques.

Example 4: Send an email using the factory default ISP parameters. Note that the default parameters are pre-programmed by the factory prior to shipment and are based on the responses supplied by the user at the time of iModem order placement. Unless specifically indicated otherwise by the user, all default parameters incorporate the following assumptions:
1. A dial-up number is chosen from the same area code (if possible) as the voice phone number supplied by the user.
2. The user must first dial a 1, then area code, then phone number.
3. Whenever possible, the user account established on Cermetek's **iModem Network** ISP shall have the same user name as the user's current email address.
4. The factory installed email will be sent to **<username@imodem.net>** located on the **iModem Network** ISP. Using the user specific database resident on the **iModem Network** ISP, the email will be re-directed to the user email address <**username@userdomain.name>**. For the case of initial evaluations, this email destination address is the one supplied by the user at the time of order placement. Refer to Cermetek Application Note #161, iModem Network ISP Database Management.

For a detailed discussion of the factory installed default ISP parameters, refer to Cermetek Application Note # 156, CH2124/60 iModem Default Configuration Profile.

   Step 1. Verify the default ISP parameters.

         Enter: **@T[V][]<CR>**   Review the preprogrammed ISP configuration profile.
         Response: **ISP Number (@TN1=n): 14089908604**
                          LOGIN NAME (@TL1=n): username@imodem.net
                          POP3 LOGIN ID (@TLM=n): username
                          LOGIN PASSWORD (@TP1=n): userpassword
                          POP3 PASSWORD (@TPM=n): userpassword
                          SMTP ADDRESS (@TOS1=n): C7AB36F7
                          POP3 ADDRESS (@TOP1=n): 18D6D210
                          FROM (@TE1=n): username@imodem.net
                          NAME (@TU1=n): DeviceName
                          TO (@TA1=n): username@imodem.net
                          SUBJECT (@TS1=n): iModem Test
                          MESSAGE (@TM1=n, end with <CR>.<CR>):

                          This Message has been sent courtesy of
                          Cermetek Microelectronics, using the
                          CH21XX iModem.

                          OK

   Step 2. Send default Input Port Status email message.

         Enter: **@T[D][]<CR>**
         Response: **<LF><CR>**   Audible modem negotiation with ISP modem

CONNECT	Successful connection to ISP
PASSWORD OK	Successful Logon to ISP email account
MESSAGE ACCEPTED	Email message accepted by ISP
HANGING UP	Termination of ISP Logon session

FOLLOWING IS THE FULL CONTENT OF THE EMAIL SENT

Subject: This is a Test
Date: Day: XX Mon Year Time   The exact date/time of the email transmission is reported here
From: username@imodem.net
To: <username@imodem.net>

Remote product message

Input 1   LOW   Depends on status of Input 1: either TTL HIGH or TTL LOW
Input 2   HIGH   Depends on status of Input 2: either TTL HIGH or TTL LOW

Example 5: Change the factory default EMAIL TO destination address. Send the Input Port Status email message to the new email destination address.

Step 1. Verify the default ISP parameters.

Enter: **@T[V][]<CR>**   Review the preprogrammed ISP configuration profile.
Response: **ISP Number (@TN1=n): 14089908604**
LOGIN NAME (@TL1=n): username@imodem.net
POP3 LOGIN ID (@TLM=n): username
LOGIN PASSWORD (@TP1=n): userpassword
POP3 PASSWORD (@TPM=n): userpassword
SMTP ADDRESS (@TOS1=n): C7AB36F7
POP3 ADDRESS (@TOP1=n): 18D6D210
FROM (@TE1=n): username@imodem.net
NAME (@TU1=n): DeviceName
TO (@TA1=n): username@imodem.net
SUBJECT (@TS1=n): iModem Test
MESSAGE (@TM1=n, end with <CR>.<CR>):

This Message has been sent courtesy of
Cermetek Microelectronics, using the
CH21XX iModem.

OK

Step 2. Change   destination   email   address   to   **<sendmemail@company.com>**   where **sendmemail@company.com** represents the user's desired "EMAIL TO" email address.

Enter: **@T[A1][=sendmemail@company.com]<CR>**
Response: **OK**

The iModem stores the Input Port Status email message in message location M0. The full message is constructed in real time as the user supplies the parameters. Unlike the User Defined email message (stored in message location M1), the Input Port Status message is updated immediately upon issuance of each **@T** command. Therefore, the user is not required to observe any particular order when modifying the current ISP parameters.

Step 3. Verify that the email destination address has been changed.

Enter: **@T[V][]<CR>**   Review the preprogrammed ISP configuration profile.
Response: **ISP Number (@TN1=n): 14089908604**

LOGIN NAME (@TL1=n): username@imodem.net
POP3 LOGIN ID (@TLM=n): username
LOGIN PASSWORD (@TP1=n): userpassword
POP3 PASSWORD (@TPM=n): userpassword
SMTP ADDRESS (@TOS1=n): C7AB36F7
POP3 ADDRESS (@TOP1=n): 18D6D210
FROM (@TE1=n): username@imodem.net
NAME (@TU1=n): DeviceName
TO (@TA1=n): sendmemail@company.com
SUBJECT (@TS1=n): iModem Test
MESSAGE (@TM1=n, end with <CR>.<CR>):

This Message has been sent courtesy of
Cermetek Microelectronics, using the
CH21XX iModem.
OK

Step 4.   Send default Input Port Status email message to **<sendmemail@company.com>**.

Enter: **@T[D][]<CR>**
Response: **<LF><CR>**   Audible modem negotiation with ISP modem
CONNECT   Successful connection to ISP
PASSWORD OK   Successful Logon to ISP email account
MESSAGE ACCEPTED   Email message accepted by ISP
HANGING UP   Termination of ISP Logon session

Because the iModem stores the Input Port Status message in message location M0, the user may issue command **@TD<CR>** or command **@TDM0<CR>** to send the Input Port Status email message. Alternatively, the Input Port Status email message may be automatically sent by activating the iModem SEND PIN (Active TTL LOW).

Note that the email message sent by activating the iModem SEND PIN may be changed using the **@TK8** command. See Example 6 below.

FOLLOWING IS THE FULL CONTENT OF THE DEFAULT EMAIL SENT

Subject: iModem Test
Date: Day: XX Mon Year Time   The exact date/time of the email transmission is reported here
From: DeviceName <username@imodem.net>
To: <sendmemail@company.com>

Remote product message

Input 1   LOW   Depends on status of Input 1: either TTL HIGH or TTL LOW
Input 2   HIGH   Depends on status of Input 2: either TTL HIGH or TTL LOW

Example 6: Create a User Defined email subject line and email message. Use the personalized ISP parameters from Example 5. Send the User Defined email.

Step 1.   Verify the default ISP parameters.

Enter: **@T[V][]<CR>**   Review the preprogrammed ISP configuration profile.
Response: **ISP Number (@TN1=n): 14089908604**
LOGIN NAME (@TL1=n): username@imodem.net
POP3 LOGIN ID (@TLM=n): username
LOGIN PASSWORD (@TP1=n): userpassword
POP3 PASSWORD (@TPM=n): userpassword
SMTP ADDRESS (@TOS1=n): C7AB36F7

POP3 ADDRESS (@TOP1=n): 18D6D210
FROM (@TE1=n): username@imodem.net
NAME (@TU1=n): DeviceName
TO (@TA1=n): sendmemail@company.com
SUBJECT (@TS1=n): iModem Test
MESSAGE (@TM1=n, end with <CR>.<CR>):

This Message has been sent courtesy of
Cermetek Microelectronics, using the
CH21XX iModem.

OK

Step 2. Create a User Defined email subject line.

    Enter: **@T[S1][=Test Email 1]<CR>**   New email subject line
    Response: **OK**

Step 3. Customize the body of the email message.

    Enter: **@T[M1][=This is test email 1.<CR>]<CR>.<CR>**   Note the use of the **<CR>.<CR>**
                                                                      termination sequence

    Response: **OK**

The iModem stores the User Defined message in message location M1. The full message is constructed in real time as the parameters are supplied by the user and are stored temporarily in internal memory. Although the email message body is updated into message memory area M1 immediately upon issuance of the **@TM1** command, the subject line (**@TS1** command), EMAIL TO (**@TA1** command) and EMAIL FROM (**@TE1** command) modifications are temporarily stored in flash memory and are only updated into message memory area M1 after the **@TM1** command is issued. Therefore, the user should modify the message body after all other desired modifications have been made to the subject line, EMAIL TO and EMAIL FROM parameters. Following this procedure will insure that the desired modifications are properly transferred to message location M1.

Step 4. Verify the content of the User Defined email.

    Enter: **@T[M1][?]<CR>**
    Response: **This is test email 1.**   Note that the **<CR>.<CR>** termination sequence is repeated
                    .   verbatim in the message text. This sequence is needed by
                                           the various internet protocols to indicate end-of-message.
                  OK   The **<CR>.<CR>** will not appear in the transmitted email.

Step 5A. Send User Defined email message to **<sendmemail@company.com>**.

    Enter: **@T[DM1][]<CR>**   Send User Defined email message M1
    Response: **<LF><CR>**   Audible modem negotiation with ISP modem
              CONNECT   Successful connection to ISP
              PASSWORD OK   Successful Logon to ISP email account
              MESSAGE ACCEPTED Email message accepted by ISP
              HANGING UP   Termination of ISP Logon session

Alternatively, the user may redefine the default message as M1 from the factory set default M0 and use the iModem SEND PIN to send the email. Activating the iModem SEND PIN (Active TTL LOW) after redefining M1 as the default message will send the User Defined message rather than the default Input Port Status message.

Step 5B. Redefine the User Defined email message M1 as the message to be sent when the SEND PIN (Pin # 6) is activated (Active TTL LOW). Send the User Defined email message to **<sendmemail@company.com>**.

Enter:	**@T**[**K8**][**=31**]**<CR>**	Set M1 as email message sent when SEND PIN activated
Response:	**OK**	

Action:	**Set SEND PIN Low**	Momentarily activating the SEND PIN (TTL LOW) automatically sends email
Response:	**<LF><CR>**	Audible modem negotiation with ISP modem
	CONNECT	Successful connection to ISP
	PASSWORD OK	Successful Logon to ISP email account
	MESSAGE ACCEPTED	Email message accepted by ISP
	HANGING UP	Termination of ISP Logon session

Step 5C. Use the redefined default email message M1 as the message to be sent when the SEND TO pin is activated. Send the User Defined email message to **<sendmemail@company.com>** using push switch S3 on the CH21XX Evaluation Board. Note that the use of push switch S3 is made with the following assumptions:
1. The user has configured the CH21XX Evaluation Board per the instructions supplied with the evaluation board.
2. The user has verified proper operation of the evaluation board.
3. PROCOMM is active so as to monitor the response messages sent from the iModem.

Action:	**Momentarily Depress S3**	Momentarily activating the SEND PIN (TTL LOW) automatically sends email
Response:	**<LF><CR>**	Audible modem negotiation with ISP modem
	CONNECT	Successful connection to ISP
	PASSWORD OK	Successful Logon to ISP email account
	MESSAGE ACCEPTED	Email message accepted by ISP
	HANGING UP	Termination of ISP Logon session

Properly executing the instructions in Step 5A, 5B or 5C will produce the identical email listed below.

FOLLOWING IS THE FULL CONTENT OF THE USER DEFINED EMAIL SENT

    Subject: **Test Email 1**
      Date: **Day: XX Mon Year Time**   The exact date/time of the email transmission is reported here
   From: **DeviceName <username@imodem.net>**
      To: **<sendmemail@company.com>**

    This is test email 1.

Example 7: Fully customize the email message. Send the User Defined email using the alternate ISP. Note that the use of an alternate ISP necessitates the following changes:
1. New local access ISP PHONE NUMBER.
2. New user EMAIL ACCOUNT or ADDRESS.
3. New USERNAME.
4. New user PASSWORD.
5. New MAIL SERVER IP ADDRESS.

Step 1. Verify the default ISP parameters.

Enter:	**@T**[**V**][]**<CR>**	Review the preprogrammed ISP configuration profile.
Response:	**ISP Number (@TN1=n): 14089908604**	
	LOGIN NAME (@TL1=n): username@imodem.net	
	POP3 LOGIN ID (@TLM=n): username	
	LOGIN PASSWORD (@TP1=n): userpassword	
	POP3 PASSWORD (@TPM=n): userpassword	
	SMTP ADDRESS (@TOS1=n): C7AB36F7	
	POP3 ADDRESS (@TOP1=n): 18D6D210	
	FROM (@TE1=n): username@imodem.net	

> **NAME (@TU1=n): DeviceName**
> **TO (@TA1=n): sendmemail@company.com**
> **SUBJECT (@TS1=n): iModem Test**
> **MESSAGE (@TM1=n, end with <CR>.<CR>):**
> **This is test email 1.**
>
> **OK**

Step 2. Verify the content of the User Defined email.

Enter: **@T[M1][?]<CR>**
Response: **This is test email 1.**   Note that the **<CR>.<CR>** termination sequence is
                                            repeated verbatim in the message text. This sequence is
            .   needed by the various internet protocols to indicate
                                            end-of-message.
            OK   The **<CR>.<CR>** will not appear in the transmitted email.

Step 3. Change the ISP local access phone number.

Enter: **@T[N1][=5551212]<CR>**   Where **555-1212** is the new local access phone number
Response: **OK**

Step 4. Change the username.

Enter: **@T[L1][=myname@imodem.net]<CR>**   Where **myname** is the new username
Response: **OK**

Step 5. Change the password.

Enter: **@T[P1][=password]<CR>**   Where **password** is the new password
Response: **OK**

Step 6. Change the local SMTP email (i.e., Send To) server address. The local email server address can be
         obtained by calling the ISP's technical support line. Be sure to convert the address to hexadecimal.
         Refer to Cermetek Application Note # 148, Procedure to Convert Between Decimal, Hexadecimal and
         ASCII Formats.

Enter: **@T[OS1][=AAABBBCC]<CR>**   Where **AAABBBCC** is the HEX address
Response: **OK**

Step 7. Change the local email account/address.

Enter: **@T[E1][=account@isp.com]<CR>**Where **account@isp.com** is the new user account
Response: **OK**

Step 8. Change the email subject line.

Enter: **@T[S1][=Test Email 2]<CR>**   New email subject line
Response: **OK**

Step 9. Customize the body of the email message.

Enter: **@T[M1][=This is test email 2.<CR>]<CR>.<CR>**   Note the use of the **<CR>.<CR>**
                                                                termination sequence

Response: **OK**

The iModem stores the User Defined message in message location M1. The full message is
constructed in real time as the parameters are supplied by the user and are stored temporarily in internal
memory. Although the email message body is updated into message memory area M1 immediately
upon issuance of the **@TM1** command, the subject line (**@TS1** command), EMAIL TO (**@TA1**

command) and EMAIL FROM (**@TE1** command) modifications are temporarily stored in flash memory and are only updated into message memory area M1 after the **@TM1** command is issued. Therefore, the user should modify the message body after all other desired modifications have been made to the subject line, EMAIL TO and EMAIL FROM parameters. Following this procedure will insure that the desired modifications are properly transferred to message location M1.

Step 10. Verify that the ISP parameters have been modified correctly.

    Enter: **@T[V][]<CR>**   Review the preprogrammed ISP configuration profile.
    Response: **ISP Number (@TN1=n): 5551212**
                    LOGIN NAME (@TL1=n): myname@imodem.net
                    POP3 LOGIN ID (@TLM=n): myname
                    LOGIN PASSWORD (@TP1=n): password
                    POP3 PASSWORD (@TPM=n): userpassword
                    SMTP ADDRESS (@TOS1=n): AAABBBCC
                    POP3 ADDRESS (@TOP1=n): 18D6D210
                    FROM (@TE1=n): account@isp.com
                    NAME (@TU1=n): DeviceName
                    TO (@TA1=n): sendmemail@company.com
                    SUBJECT (@TS1=n): Test Email 2
                    MESSAGE (@TM1=n, end with <CR>.<CR>):

                    This is test email 2.
                    OK

Step 11A.   Send User Defined email message to **<sendmemail@company.com>** using the new ISP.

    Enter: **@T[DM1][]<CR>**   Send User Defined email message M1
    Response: **<LF><CR>**   Audible modem negotiation with ISP modem
                    CONNECT   Successful connection to ISP
                    PASSWORD OK   Successful Logon to ISP email account
                    MESSAGE ACCEPTED   Email message accepted by ISP
                    HANGING UP   Termination of ISP Logon session

    Alternatively, the user may redefine the default message as M1 from the factory set default M0 and use the iModem SEND PIN to send the email. Momentarily activating the iModem SEND PIN (Active TTL LOW) after redefining M1 as the default message will send the User Defined message rather than the default Input Port Status message.

Step 11B.   Define default email message as User Defined message M1. Send the User Defined email message to **<sendmemail@company.com>** by activating the iModem SEND PIN (Active LOW TTL).

    Enter: **@T[K8][=31]<CR>**   Set M1 as the default email message for SEND PIN only
    Response: **OK**

    Action: **Set SEND PIN Low**   Momentarily activating the SEND PIN (TTL LOW) automatically sends email
    Response: **<LF><CR>**   Audible modem negotiation with ISP modem
                    CONNECT   Successful connection to ISP
                    PASSWORD OK   Successful Logon to ISP email account
                    MESSAGE ACCEPTED   Email message accepted by ISP
                    HANGING UP   Termination of ISP Logon session

Step 11C.   Send the User Defined email message to **<sendmemail@company.com>** using push switch S3 on the CH21XX Evaluation Board. Note that the use of push switch S3 is made with the following assumptions:
    1. The user has configured the CH21XX Evaluation Board per the instructions supplied with the evaluation board.
    2. The user has verified proper operation of the evaluation board.
    3. PROCOMM is active so as to monitor the response messages sent from the iModem.

Action:	**Momentarily Depress S3**	Momentarily activating the SEND PIN (TTL LOW) automatically sends email
Response:	**<LF><CR>**	Audible modem negotiation with ISP modem
	CONNECT	Successful connection to ISP
	PASSWORD OK	Successful Logon to ISP email account
	MESSAGE ACCEPTED	Email message accepted by ISP
	HANGING UP	Termination of ISP Logon session

Properly executing the instructions in Step 11A, 11B or 11C will produce the identical email listed below.

FOLLOWING IS THE FULL CONTENT OF THE USER DEFINED EMAIL SENT

Subject: **Test Email 2**
Date: **Day: XX Mon Year Time**   The exact date/time of the email transmission is reported here
From: **DeviceName <account@isp.com>**
To: **<sendmemail@company.com>**
     This is test email 2.

Retrieve Email Examples. Unlike the send email SMTP server, the retrieve email POP3 server needs to know the number of the message the user wishes to retrieve. This number is specified as **n** in the **@TDGn** retrieve email command.

The **@TDGn** command directs the iModem to connect to the internet, retrieve email message number **n** and then terminate the internet connection when the message has been retrieved. Currently, the iModem will accept email message numbers from 1 to 99 (inclusive). The following iModem ISP parameters are utilized to uniquely identify the email message to be retrieved:
1. The username as specified by the **TL1** command.
2. The EMAIL FROM internet account as specified by the **TE1** parameter.
3. The POP3 server as specified by the **TOP1** parameter.

The **@TDGn** command reports the total number of email messages available on the POP3 server as well as retrieves the contents of email message **n**. **@TDGn** will retrieve only one message per command issuance. After the specified email has been retrieved, the iModem terminates the internet connection. Additional emails must be retrieved by issuing additional **@TDGn** commands.

For a more detailed discussion, refer to Cermetek Application Note #155, **@T**[®] Command Set Description and Usage for CH2124/60 iModem Products.

The following example illustrates the retrieve email feature of the iModem.

Example 8: Use of the CH2160 to retrieve the email message sent in example 7 above.

Step 1. Verify the default ISP parameters.

Enter:	**@T[V][]<CR>**	Review the preprogrammed ISP configuration profile.
Response:	**ISP Number (@TN1=n): 5551212**	
	LOGIN NAME (@TL1=n): myname@imodem.net	
	POP3 LOGIN ID (@TLM=n): myname	
	LOGIN PASSWORD (@TP1=n): password	
	POP3 PASSWORD (@TPM=n): userpassword	
	SMTP ADDRESS (@TOS1=n): AAABBBCC	
	POP3 ADDRESS (@TOP1=n): 18D6D210	
	FROM (@TE1=n): account@isp.com	
	NAME (@TU1=n): DeviceName	
	TO (@TA1=n): sendmemail@company.com	
	SUBJECT (@TS1=n): Test Email 2	
	MESSAGE (@TM1=n, end with <CR>.<CR>):	

This is test email 2.

OK

Step 2.   Retrieve email message 1.

Enter:	**@T[DG][1]<CR>**	Retrieve email message 1.
Response:	**<LF><CR>**	Audible modem negotiation with ISP modem.
	CONNECT	Successful connection to ISP. DCD (Pin 17) active TTL LOW.
	PASSWORD OK	Successful Logon to ISP email account. RXD (Pin 11) and TXD (Pin 10) active.
	Y Messages	Where **Y** is the number of email messages available.
Date:	**Day: XX Mon Year Time**	The exact date/time of the email transmission is reported here.
From:	**DeviceName <account@isp.com>**	
Subject:	**Test Email 2**	
	This is test email 2.	Note that the **<CR>.<CR>** termination sequence is repeated verbatim in the message text. This sequence is needed by the various internet protocols to indicate end-of-message.
	.	The **<CR>.<CR>** will not appear in the transmitted email.
	RETRIEVAL COMPLETE	Email message retrieval complete.
	SERVER CLOSED	POP3 connection closed.
	HANGING UP	Termination of ISP Logon session.

Delete Email Examples. Just as for the case of retrieve email, the email POP3 server needs to know the number of the message the user wishes to delete. This number is specified as **n** in the **@TDKn** delete email command.

The **@TDKn** command directs the iModem to connect to the internet, delete email message number **n** and then terminate the internet connection when the message has been deleted. Currently, the iModem will accept email message numbers from 1 to 99 (inclusive). The following iModem ISP parameters are utilized to uniquely identify the email message to be deleted:
1.   The username as specified by the **TL1** command.
2.   The EMAIL FROM internet account as specified by the **TE1** parameter.
3.   The POP3 server as specified by the **TOP1** parameter.

Like the **@TDGn** command, the **@TDKn** command reports the total number of email messages available on the POP3 server as well as deleting email message **n**. The number of email messages is reported BEFORE email message **n** is deleted. **@TDKn** will delete only one message per command issuance. After the specified email has been deleted, the iModem terminates the internet connection. Additional emails must be deleted by issuing additional **@TDKn** commands.

For a more detailed discussion, refer to Cermetek Application Note #155, **@T® Command Set Description and Usage for CH2124/60 iModem Products**.

The following examples illustrate the delete email feature of the iModem.

Example 9: Use the CH2160 to delete email message # 5.

Step 1.   Verify the default ISP parameters.

Enter:	**@T[V][]<CR>**	Review the preprogrammed ISP configuration profile.
Response:	**ISP Number (@TN1=n): 5551212**	
	LOGIN NAME (@TL1=n): myname@imodem.net	
	POP3 LOGIN ID (@TLM=n): myname	
	LOGIN PASSWORD (@TP1=n): password	

POP3 PASSWORD (@TPM=n): userpassword
SMTP ADDRESS (@TOS1=n): AAABBBCC
POP3 ADDRESS (@TOP1=n): 18D6D210
FROM (@TE1=n): account@isp.com
NAME (@TU1=n): DeviceName
TO (@TA1=n): sendmemail@company.com
SUBJECT (@TS1=n): Test Email 2
MESSAGE (@TM1=n, end with <CR>.<CR>):
This is test email 2.

OK

Step 2. Delete email message 5.

Enter:	**@T[DK][5]<CR>**	Delete email message 5.
Response:	**<LF><CR>**	Audible modem negotiation with ISP modem.
	CONNECT	Successful connection to ISP. DCD (Pin 17) active TTL LOW.
	PASSWORD OK	Successful Logon to ISP email account. RXD (Pin 11) and TXD (Pin 10) active.
	Y Messages	Where **Y** is the number of email messages available.
	MESSAGE DELETED	Email message deleted.
	SERVER CLOSED	POP3 connection closed.
	HANGING UP	Termination of ISP Logon session.

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