



Application Note #325:

@T[®] Command Set Description and Usage for CH2165 iModem

INTRODUCTION

The CH2165 represents the next generation in internet enabled devices. This product provides the user with virtually unlimited command and control capabilities. Of particular interest in the context of command execution, the CH2165 communicates asynchronously with the host controller (via the V.24 EIA 232-E serial interface) and the internet (via the PSTN connection) simultaneously. Consequently, the user can intersperse CH2165 specific management commands with internet commands. Further, commands can be queued and the CH2165 will execute the commands in the order received. Lastly, the CH2165 supports 'Open Sockets' operation for those users who wish to manage all aspects of the internet connection, including but not limited to the use of proprietary protocols.

CH2165 Command Configuration. Cermetek has created a set of @T[®] command extensions for control of the internet communication function. These commands operate a fashion similar to the industry standard Hayes AT commands. This common command syntax allows users familiar with the Hayes AT command set to quickly adapt to the @T[®] command extensions. Application Note 325 describes the syntax for all allowed @T[®] commands.

CH2165 Default Configuration. Refer to Application Note # 327, [CH2165 iModem Default Configuration Profile](#), for a complete description of the default configuration parameters.

Microsoft HyperTerminal[®]. Unless otherwise indicated, all examples contained herein utilize Microsoft's HyperTerminal[®] telecommunications software package. Refer to Application Note # 157, [Using MS Windows HyperTerminal[®] with iModem Products](#), for a more detailed discussion of MS Windows HyperTerminal[®].

When using commercial telecommunications software packages to program the iModem, the user must be careful NOT to attempt to use character editing unless the software package specifically indicates that editing is supported. The CH2165 provides for a more sophisticated user serial interface and, consequently, MS Windows HyperTerminal[®] does support character editing when used with the CH2165.

If character editing is not supported, 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, the terminal emulation program 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.

CAUTION

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 editing is supported. Doing so will cause the backspace HEX character to become part of the data stream and lead to considerable debugging headaches.

@T[®] COMMAND SET

Description of @T[®] Command Set. The allowed @T[®] commands are summarized in Attachment I of this application note. Most @T[®] commands have a query function associated with the command. The allowed query commands are also summarized in Attachment I.

IMPORTANT NOTE

AS DELIVERED FROM THE FACTORY, all @T[®] Commands sent from the host (DTE) must be sent at **19200bps, N81** (no parity, 8 data bits and 1 stop bit) for CH2165 products. Although the @T[BT] command allows the DTE communication speed of the CH2165 iModem devices to be changed, the user must ensure that the DTE communication speed selected is actually supported by the DTE. Failure to due so could adversely affect communication with the iModem device or, worst case, inadvertently disable communication with the iModem device.

Command Queuing. Although the CH2165 will queue multiple commands only one @T[®] command is allowed per line.

CH2165 Command Prompts. The CH2165 prompts the user for responses by supplying the **iModem>** command prompt. For the purposes of this document, the following command prompt conventions will be observed:

iModem> signifies that the iModem device is ready to accept command inputs.

@T[®] Command Syntax. The @T[®] command syntax is identical to the industry standard Hayes AT command syntax. 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 (if the **iModem>** prompt is not present).
 Result: 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 when in the data field.

Each command line (except email message creation) has the following format:

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

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 and as noted).
 Use ? in the data field for the case of query commands. An = sign is not required for queries. Refer to Attachment I for a summary of available commands.
<CR><LF> is the termination sequence for all commands except for the email generation command, **@TM**, as described below.

The email message creation command line has the following format:

@T[MC][=name field]<CR><LF>[message body][cntrl d]

Where: **@T** is the iModem command attention sequence. Upper or lower case **T** is acceptable.
[MC] is the email message creation command. Upper or lower case characters are acceptable.
[=name field] is the email message name field. A maximum of eight alphanumeric characters are allowed. The first character cannot be a number. The = sign must precede the name field.
<CR><LF> must precede the message body and serves as the **name field** delimiter.
[message body] Any combination of legal ASCII characters may occur within the message body. Message length is limited to 100K bytes per message.
cntrl d is the termination sequence for the email message generation command.

DISCUSSION OF IMODEM HELP FUNCTION

HELP Command. The CH2165 iModem product contains an integral HELP feature. This feature displays command syntax and rudimentary command explanations with examples.

The available HELP Topics are displayed when the **@T[H][?]** command is executed. Individual topics are displayed by executing the **@T[H][n]** command where **n** identifies the HELP Topic. Refer to Attachment I for a listing of the available Help Topics.

ESTABLISHING AN OPEN TCP (TRANSMISSION CONTROL PROTOCOL) CONNECTION

The CH2165 iModem product supports establishment of a TCP connection independent of SMTP, POP3, UDP, DNS or other internet protocols and activities. This feature is often referred to as an 'Open Socket' connection. Because of the Open Socket feature, the user must execute the **@T[CP]** command to create the Open TCP Socket connection PRIOR to sending, retrieving or deleting email messages.

Creating the TCP Open Socket Connection. Executing the **@T[CP]** command causes the CH2165 iModem to perform the following actions (in the order indicated):

1. Go Off-Hook and dial the POP phone number specified by the **@T[N]=[n]** command.
2. Connect to internet using the Login ISP Username specified by the **@T[UI]=[username]** command and ISP Login Password specified by the **@T[PI]=[password]** command.
3. Obtain a dynamically assigned IP address and establish the Open TCP Socket connection.

After creating the TCP Open Socket connection, the user may initiate multiple SMTP, POP3, UDP, DNS or other proprietary protocol communications by issuing the appropriate commands. These communications will be conducted simultaneously and the commands will be automatically queued by the CH2165. Further, multiple send, retrieve and delete activities may be performed without closing and then re-opening the TCP connection.

Closing the TCP Socket Connection. The TCP Socket connection must be closed to terminate the internet session. This is done by executing the **@T[CT]** command. Upon receiving the **@T[CT]** command, the CH2165 iModem performs the following actions (in the order indicated):

1. Closes the TCP socket connection.
2. Disconnects to internet.
3. Goes On-Hook.

Obtaining the IP Address. Whenever the CH2165 establishes an internet connection, the Internet Service Provider (ISP) assigns an IP address to the CH2165 iModem device which allows the CH2165 to communicate with other internet devices. This IP address is a dynamic (rather than static) address. It is only valid during the current internet session and will be re-issued by the ISP to another internet device upon termination of the currently active PPP connection.

To access the CH2165 iModem's Common Gateway Interface (CGI), and to perform certain other internet activities, the IP address must be known to the user. To obtain the current IP address, execute the **@T[CS]=[ppp]** command. This command causes the CH2165 iModem to provide a complete status of the PPP connectivity information, including the IP address. See the section *Discussion Of Common Gateway Interface (CGI) Remote Access Capability*, for more details.

DISCUSSION OF IMODEM SEND MESSAGE CAPABILITY

SMTP (Send Email) Server. The CH2165 iModem supports Symbolic Name addressing. The user supplies the SMTP server symbolic name via the **@T[SS]=[symbolic name]** command and the CH2165 automatically contacts the appropriate DNS server and obtains the required SMTP server HEX IP address.

Email Message Types. The CH2165 iModem supports three basic types of email messages: pre-defined, stored and streaming email messages. These are described below.

Pre-defined: Pre-defined email messages are defined PRIOR to initiation of the email SEND activity. These messages are temporarily stored in RAM and will be lost if power is removed. Pre-defined email messages cannot exceed 100k bytes per message and 100K bytes total for all pre-defined messages.

Stored: Stored email messages are Pre-defined email messages that have been transferred to static memory. These messages will not be lost if power is removed. Stored email messages cannot exceed 100k bytes per message and 1M bytes total for all stored messages.

Streaming: Streaming email messages are defined during the email SEND activity. These messages are buffered one line at a time by the CH2165 and are not retained in RAM. Consequently, Streaming email message length is limited only by the length of time the user wishes to remain "On-Line." However, there may be a practical limit (usually <4Mbytes) imposed by the email recipient's POP3 server.

Email Message Subject Line. Regardless of the type of email message sent, the user has the ability to define the content of the subject line associated with the email message. The **@T[AS]=[subject]** command is used to set subject line content. The subject line is limited to 80 ASCII characters. Blanks or spaces are allowed and each occurrence counts as 1 character. The **<CR><LF>** characters terminate the subject line and, consequently, may not be included as subject line content.

Email Message Addressing. The CH2165 iModem supports five separate email addresses per email message. The DESTINATION address (specified by **@T[AD]=[address]** command) must be provided. All other addresses are optional and defaults will be used by the CH2165 if specific addresses are not provided by the user.

For the case of Pre-defined and Stored email messages, the CH2165 maintains the addresses with each email message. This feature allows the user to specify a unique set of addresses for each email message. For the case of Streaming email messages, the CH2165 uses the most recently specified parameters for these addresses.

The email addresses currently supported by the CH2165 are described below.

DESTINATION Email Address: This address is specified by the **@T[AD]=[address]** command and is the email address to which the email will be sent. This is the address that appears in the TCP/IP header and MUST be specified by the user. By convention, although NOT required for proper delivery of email messages, the DESTINATION email address is identical to the address following the TO: located in the email message body.

ERROR Email Address: This address is specified by the **@T[AE]=[address]** command and is the email address to which the email will be sent if an email delivery error is encountered by the specified SMTP server. If this address is not specified by the user, the CH2165 will use the FROM email address as the default ERROR email address.

FROM Email Address: This address is specified by the **@T[AF]=[address]** command and is the email address that follows the FROM: located in the body of the email message. The FROM address is the address used by the POP3 server to retrieve email. By convention, although NOT required for proper delivery of email messages, the FROM email address is identical to the sender's email address. If this address is not specified by the user, the CH2165 will use the ISP Login email address as the default FROM email address.

REPLY Email Address: This address is specified by the **@T[AR]=[address]** command and is the email address to which reply emails will be sent if the user selects the Reply Button on their browser when viewing the email. If this address is not specified by the user, the CH2165 will use the FROM email address as the default REPLY email address.

TO Email Address: This address is specified by the **@T[AT]=[address]** command and is the email address that follows the TO: located in the body of the email message. By convention, although NOT required for proper delivery of email messages, the TO email address is identical to the DESTINATION email address. If this address is not specified by the user, the CH2165 will use the DESTINATION email address as the default TO email address.

Email Message Send Commands. The CH2165 iModem command set contains one command (with two variations) for sending email messages. This command, **@T[D]=[name]**, and the allowed variations are described below.

@T[D]=[name] Command: The **@TD=name** command sends the Pre-defined or Stored email message **name**.

@T[D]=[0] Command: The **@TD=0** command sends a Streaming email message. The Streaming email message activity is terminated with the **cntrl d** character.

For the case of Pre-defined or Stored email messages, the **@TD=name** command directs the CH2165 iModem to obtain the SMTP server address, connect to the SMTP server, send email message **name** and then terminate the SMTP server connection.

For the case of Streaming email messages, the **@TD=0** command directs the CH2165 iModem to obtain the SMTP server address, connect to the SMTP server, send the streaming data supplied via the iModem's RS232 serial port. The SMTP server connection will be terminated upon receipt of the **cntrl d** ASCII character or after 90 seconds (approximately) of inactivity. Commands cannot be queued during the data entry portion of Streaming email activity

as these commands will be misinterpreted by the CH2165 as data and included in the message body portion of the email message.

The SEND PIN (Pin # 6). The CH2165 iModem SEND PIN (Pin # 6) is currently de-activated.

DISCUSSION OF IMODEM RETRIEVE AND DELETE MESSAGE CAPABILITY

POP3 (Retrieve Email) Server. The CH2165 iModem supports Symbolic Name addressing. The user supplies the POP3 server symbolic name via the **@T[SM]=[symbolic name]** command and the CH2165 automatically contacts the appropriate DNS server and obtains the POP3 server HEX IP address.

POP3 Username and Password. Unlike the send email SMTP server, the retrieve email POP3 server requires a POP3 Username (**@T[UM]=[username]**) and POP3 Password (**@T[PM]=[password]**). These MUST be specified by the user and may or may not be identical to the Login Username and Login Password, respectively.

POP3 Email Organization. The POP3 server numerically orders all cached emails beginning with integer number 1 and proceeding in ascending order. New emails received are added starting with the next available integer number. Integer numbers ARE NOT skipped. When an email message is deleted, POP3 rennumbers all subsequent emails downward to use the newly available email message number.

To retrieve a specific email message, the integer email message number must be known. By the executing **@T[ES]** command, the CH2165 will provide a complete inventory of all emails currently cached for the email account specified by **@T[UM]=[username]**. The email message number and subject line will be displayed for each cached email message.

Retrieve Email Message Types. The CH2165 iModem supports one basic type of email message retrieval: streaming email retrieval. This is described below.

Streaming: Streaming email messages are retrieved one TCP/IP packet at a time. The retrieved data is extracted from the TCP/IP email packet and provided as streaming data out the V.24 (EIA 232-E) serial interface of the CH2165 iModem. No data is cached by the CH2165. The retrieval email message length is limited only by the length of time the user wishes to remain "On-Line." The user's application must be prepared to accept the V.24 (EIA 232-E) serial interface streaming data as it is supplied by the CH2165.

IMPORTANT NOTE

Retrieved emails, after extracted from the TCP/IP email packet, contain COMPLETE email header and tracking information. It is the user's responsibility to process the data as it is presented to the user's application via the CH2165 iModem's V.24 (EIA 232-E) serial interface.

Opening the POP3 Mailbox. The POP3 server is used for both email retrieval and email deletion activities. The CH2165 iModem product supports establishment of a POP3 connection independent of the number and order of retrieval and/or deletion activities. Because of this architecture, the user must first open the POP3 mailbox via the **@T[EO]** command before email deletion and/or retrieval can be attempted.

POP3 Email Inventory. Once the POP3 mailbox is opened, an inventory of all email cached on the POP3 server can be obtained by executing the **@T[ES]** command. The **@T[ES]** command will provide the email message subject line and message number for each email message cached.

POP3 Email Deletion. Once the POP3 mailbox is opened, multiple email deletions via the **@T[ED]=[message number]** command can be performed. Deletions can be interspersed with retrievals in any order desired by the user. The POP3 mailbox must be closed upon completion of the deletion/retrieval activities via the **@T[EQ]** command.

POP3 Email Retrieval. Once the POP3 mailbox is opened, multiple email retrievals via the **@T[ER]=[message number]** command can be performed. Retrievals can be interspersed with deletions in any order desired by the user. The POP3 mailbox must be closed upon completion of the deletion/retrieval activities via the **@T[EQ]** command.

Closing the POP3 Mailbox. The POP3 server is used for both email retrieval and deletion activities. The CH2165 iModem product supports establishment of a POP3 connection independent of the number and order of retrieval

and/or deletion activities. Because of this architecture, the user must close the POP3 mailbox via the @T[EQ] command upon completion of all deletion/retrieval activities.

DISCUSSION OF IMODEM QUERY CAPABILITY

Most @T[®] commands have query options that allow the user to review the current status of the configuration profile. Refer to Attachment I for a summary of the allowed query commands.

DISCUSSION OF IMODEM INTERNET COMMUNICATION STATUS CAPABILITY

iMODEM @T[®] Result Messages. In addition to the standard modem AT command result codes and messages, the CH2165 displays all internet messages received by the CH2165 while executing various iModem @T[®] internet related commands. Refer to @T[®] Examples section of this application for detailed examples.

DISCUSSION OF COMMON GATEWAY INTERFACE (CGI) REMOTE ACCESS CAPABILITY

The CH2165 iModem product supports a direct remote access data input method utilizing Common Gateway Interface (CGI) technology. This graphical interface is an alternative to executing various @T[®] commands to modify the CH2165 iModem's configuration profile parameters. To access this CGI feature, the CH2165 iModem must be actively connected to the internet and its dynamic IP address must be known. Simply enter the iModem's IP address into the URL window in any internet browser and the browser will automatically connect to the iModem using the CGI interface. Follow the steps below to use the CGI feature.

Step 1: Verify that the CH2165 local access ISP Parameters are correct. Verify that the current ISP Username and Password and local access POP phone number contained in the CH2165 are correct. Execute the required @T[®] commands to verify and modify these parameters, as appropriate.

Step 2: Connect the CH2165 to the Internet. Execute the @T[CP] command. This causes the CH2165 iModem to perform the following actions automatically.

1. Go Off-Hook and dial the POP phone number specified by the @T[N]=[n] command.
2. Connect to internet using the Login ISP Username specified by the @T[UI]=[username] command and ISP Login Password specified by the @T[PI]=[password] command.
3. Obtain a dynamically assigned IP address and establish the TCP Open Socket connection.

```
iModem> @tcp
Result: Audible modem negotiation tones (if iModem Evaluation Board used)
iModem> CH2165 returns iModem> prompt when ready for next command
```

Step 3: Obtain the CH2165 IP Address. Execute the @T[CS]=[ppp] command. This causes the CH2165 to obtain and display the current ppp connectivity information.

```
iModem> @tcs=ppp
Result: ppp0 Link encap:Point-to-Point Protocol
inet addr:68.130.93.10 P-t-P:68.130.64.14 Mask:255.255.255.255
UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1524 Metric:1
RX packets:3 errors:1 dropped:0 overruns:0 frame:0
TX packets:3 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:3
```

The IP address is the decimal number following the **inet addr:.** In Step 3 above, it is **68.130.93.10**.

Step 4: Type the CH2165 IP Address into the Browser URL window. Type the CH2165 IP address obtained in Step 3 into the browser window. The browser will display the Cermetek web page stored on the CH2165. See the example in Figures 1A and Figure 1B. Note that this web page contains the following additions to the bottom right corner (see Figure 1B): **Configure iModem** and **Write Flash**.

```
Enter iModem IP Address into browser URL window
Result: Cermetek web page displayed (see Figure 1A and 1B)
```

This window is the access portal to the CGI interface.



Figure 1A. Upper portion of Cermetek Web page stored in CH2165. This is the window used to access the CH2165 CGI feature.



Figure 1B. Lower portion of Cermetek Web page stored in CH2165. This is the window used to access the CH2165 CGI feature. Note the CONFIGURE IMODEM and WRITE FLASH items in the lower right corner.

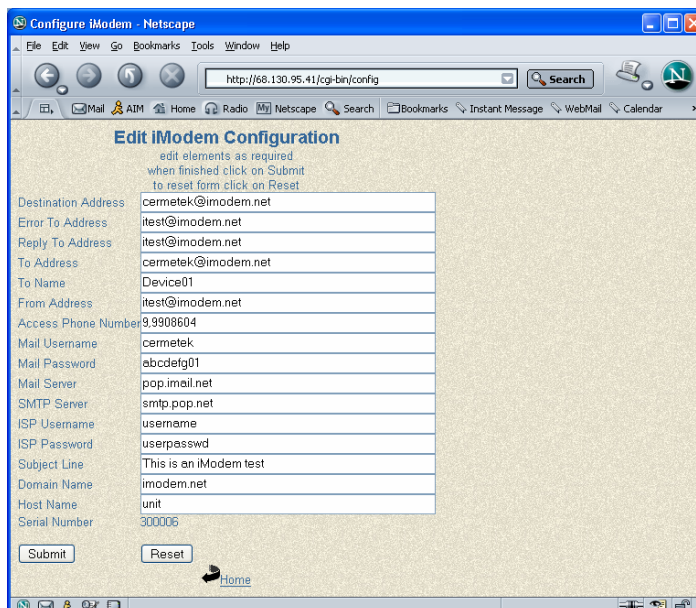


Figure 2. iModem Configuration Profile. Data can be entered into any of the dialog boxes.

Step 5: Access the CGI interface. Double click on the **Configure iModem** item. This will display the current iModem Configuration profile. See the example in Figure 2.

Enter **Double click on the Configure iModem item at the bottom right of the Cermetek web page**
 Result: **The iModem Configuration profile will be displayed (see Figure 2)**

Adjust the parameters in the dialog boxes as necessary. Click on SUBMIT to store the parameters in cache RAM. Click on RESET to return to the original parameter values.

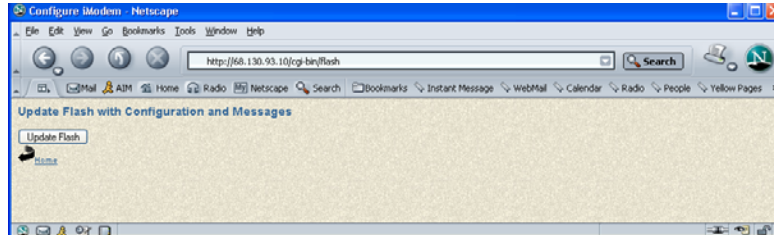


Figure 3. Update Flash window. Stores iModem Configuration Profile to Cache RAM.

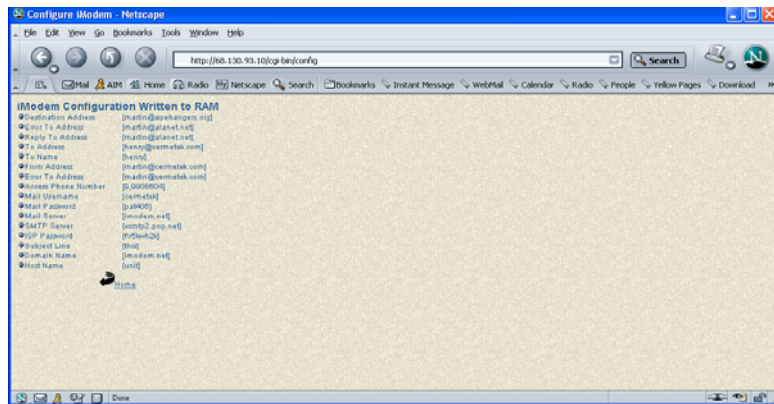


Figure 4. iModem Configuration Profile as updated and stored in Cache RAM. Cache RAM is considered temporary memory and all data will be lost if power is removed.

Step 6: Save the Configuration Profile changes to Cache RAM. Single click on the **UPDATE FLASH** item to store the parameter values in Cache RAM PRIOR to writing the parameters to Flash memory. See the example in Figure 3.

Enter **Single click on UPDATE FLASH**
 Result: **The iModem Configuration profile is stored in Cache RAM and the new values are displayed (see Figure 4)**

Cache RAM memory is considered temporary memory and all data will be lost if power is removed.

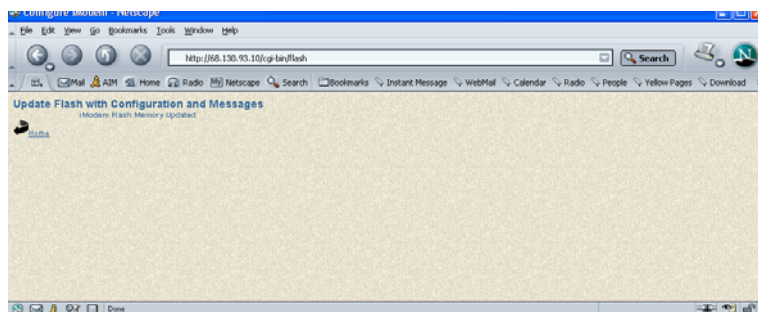


Figure 5. Flash Memory updated with iModem Configuration Profile and all email messages temporarily stored in Cache RAM.

Step 7: Save Cache RAM to Flash Memory. Single click on HOME to Return to the Cermetek web page. See

Figure 1A and 1B. Double click on WRITE FLASH to save all data in Cache RAM to Flash memory. Window in Figure 5 will be displayed when Flash memory has been updated.

Enter **Single click on HOME**
 Result: **Returns to Cermetek web page (see Figure 1A and 1B)**
 Enter **Double click on WRITE FLASH**
 Result: **The iModem Configuration profile and all email messages stored in Cache RAM will be written to Flash memory. The window in Figure 5 will be displayed when all data has been saved in Flash memory.**

Flash memory is considered permanent and data will not be lost if power is removed.

DISCUSSION OF IMODEM CONFIGURATION PROFILE

iModem User Modifiable Configuration Profile. The CH2165 iModem is delivered from the factory with a configuration profile that will allow internet connectivity and email deletion/retrieval/transmission “right out of the box.” Application Note # 327, [CH2165 iModem Default Configuration Profile](#), explains in detail each of the configuration parameters. This configuration profile can be viewed using the **@TW?** Command. In addition, the factory supplied profile utilizes the Cermetek **iModem Network** ISP.

The factory installed configuration can be modified by the user as desired. For those not familiar with the CH2165 iModem, however, Cermetek recommends a phased strategy starting with simple tasks and building to more elaborate personalized/customized emails.

iModem Default Configuration. The CH2165 iModem is also delivered with a default configuration profile. This profile is initially set by the factory to mirror the standard user modifiable configuration profile. This profile can be viewed using the **@TZ?** command.

The default configuration profile is provided as a failsafe or fall back profile. It can not be modified by the user but can be invoked at any time using the **@TZ** command. The **@TZ** command will over write all current iModem parameters with the original factory set configuration profile parameters. To save these profile parameters in Flash as the new User Modifiable Configuration Profile, the user must execute the **@T[W]=[flash]** command.

ISP And User Configuration Profile Parameters. The following ISP and User configuration profile parameters are preprogrammed into the CH2165 iModem. For a more detailed discussion of the associated **@T[®]** command, refer to Attachment I of this application note.

<u>Parameter</u>	<u>Command</u>	<u>Parameter Description</u>
Login Username:	@TUI	ISP User/Account Login Name.
Login Password:	@TPI	ISP User/Account Login Password.
POP3 Login ID:	@TUM	POP3 (i.e., retrieve email) User Login ID.
POP3 Password:	@TPM	POP3 (i.e., retrieve email) User Login Password.
SMTP Symbolic Name:	@TSS	SMTP (i.e., send email) Server Name.
POP3 Symbolic Name:	@TSM	POP3 (i.e., retrieve email) Server Name.
Destination Address:	@TAD	Email Destination Address for TCP/IP Header.
Error:	@TAE	Email Address for email redirection if email transmission errors occur while attempting to deliver to Destination Address.
FROM:	@TAF	Address that appears on email message FROM: line.
Reply TO:	@TAR	Email Address for email replies to retrieved email.
TO:	@TAT	Address that appears on email message TO: line.
Subject Line:	@TAS	Email message subject line.
Display Sample Message	@TMC?=myMsg	Display sample email message myMsg .
iModem Name	@TT	iModem device name. This name appears on the email TO: line in front of the TO: address.
POP Phone Number	@TN	Local Access POP dial-up phone number.
Serial Number	-----	Unique device Serial Number. NOT USER MODIFIABLE.

The ISP and User customized configuration profile parameters resident on the CH2165 iModem may be viewed by issuing the **@TW?** command to the iModem.

DISCUSSION OF TEMPORARY AND PERMANENT STORAGE OF IMODEM CONFIGURATION PROFILES

Changing the Default Internet Configuration Profile. The iModem automatically saves all configuration profile modifications invoked by the **@T[®]** commands to Cache RAM when the command is executed. These modifications are considered temporary and will be lost when power is removed.

Saving the Configuration Profile Changes to Flash Memory. All configuration profile parameters are stored in Flash memory by executing the **@T[W]=[flash]** command. Configuration profile information saved to Flash is considered permanent and will not be lost when power is removed.

DISCUSSION OF TEMPORARY AND PERMANENT STORAGE OF IMODEM EMAIL MESSAGES

Temporary RAM Memory Storage of Created Email Messages. The iModem saves all emails created with the **@T[MC]=[name]** command to RAM memory when the command is executed. RAM storage is considered temporary and will be lost when power is removed.

Saving Created Email Messages to Cache RAM Memory. All email messages intended to be stored in Flash memory must first be 'moved' to Cache RAM prior to executing the flash storage command, **@T[W]=[flash]**. The **@T[MS]=[name]** command moves the message **name** into Cache RAM and deletes it from RAM memory. Email messages moved to Cache RAM are considered temporary and will be lost when power is removed and must be stored in Flash memory to be saved permanently.

Saving Cached Email Messages to Flash Memory. Executing the **@T[W]=[flash]** command will cause the iModem to transfer all email messages placed in Cache RAM to Flash memory. The contents of Cache RAM will be deleted after successful transfer of files to Flash memory. Flash memory is considered permanent and email messages stored in Flash memory will not be lost when power is removed.

Displaying Email Message Memory Contents. Executing the **@T[ML][=?]** command will cause the iModem to display the names and file lengths (in bytes) of all email messages currently stored in both temporary (i.e., RAM memory) and static (i.e., FLASH memory) email messages placed in Cache RAM to Flash memory. The file names (and lengths) contained in RAM memory only are displayed by executing the **@T[ML][?=t]** command. The file names (and lengths) contained in FLASH memory only are displayed by executing the **@T[ML][?=s]** command.

@T[®] EXAMPLES

The first example displays the iModem's HELP Topic repertoire.

Example 1A: Demonstrate the HELP Topics display feature.

```
iModem> @th?          Display current HELP Topics.
Result:  get help on command "c" by typing
         @th?=c
         help on the following commands are available
         a address(es) and subject
         c ppp connection
         d send email
         e retrieve email
         i imap and pop3 email
         m create or view messages
         n local access phone no.
         o mail server(s)
         p passwords
         s mail/smtp server(s)
         u usernames
         v verbose
         z restore factory settings
```

iModem> The CH2165 iModem is ready for the next command.

The CH2165 provides the user with 'advice and direction' by indicating the required syntax to access the help topics.

Example 1B: Demonstrate the HELP command syntax display feature.

```
iModem> @th?=p            Display HELP command syntax for passwords.
Result:  @tpi?
         show isp dialup password
         @tpi=secret
         set isp dialup password to "secret"
         @tprm?
         show email retrieval password
         @tprm=secret
         set email retrieval password to "secret"
```

iModem> The CH2165 iModem is ready for the next command.

The CH2165 provides the user with 'advice and direction' by indicating the required command syntax and lists several examples.

Example 2: Display the currently active iModem parameters.

```
iModem> @tw?                Display current iModem parameters.
Result:  dest_addr           cermetek@imodem.net
         err_addr            itest@imodem.net
         reply_addr          itest@imodem.net
         to_addr             cermetek@imodem.net
         to_name             Device01
         from_addr           itest@imodem.net
         access_phone_no    555,1212
         mail_uname         cermetek
         mail_passwd        abcdef01
         mailserver         pop3.mail.net
         smtpserver         vsmtmp2.pop.net
         isp_uname          useraccount01
         isp_passwd         userpswd01
         subject            This is test message 1
         domainname         modem.net
         hostname           unit
         speed               38400
         baud                19200
         sn                  2164A-Bde0359-gt3e-utv-90wq-013
```

iModem> The CH2165 iModem is ready for the next command.

All current CH2165 parameters are displayed.

Example 3: Change the dialup password. Display the password value before and after the parameter change.

```
iModem> @tprm?             Display the current password.
Result:  password
```

```
iModem> @tmp=secret        Attempt to change password BUT misspell command.
Result:  @tmp=secret not implemented    CH2165 refused to execute the command.
```

```
iModem> @tprm=secret       Execute the proper password change command.
iModem>                    The iModem displays the iModem> prompt after successful command execution.
```

```
iModem> @tprm?             Display the new password.
```

Result: **secret**

iModem> The CH2165 iModem is ready for the next command.

Example 4: Establish an internet connection.

iModem> **@tcp** Go Off-Hook, Dial the POP, establish PPP and TCP connection to ISP.
Result: **Dial tone, DTMF tone dialing, ISP negotiation.**

iModem> The CH2165 iModem displays the prompt before execution of the command and is now ready for the next command.

Example 5A: Establish an internet connection. Verify that the TCP connection has been made by executing the PING command. Because the iModem can queue commands, it is not obvious when the internet connection has been established. The PING command allows the user to verify that the internet connection has been properly established.

iModem> **@tcp** Go Off-Hook, Dial the POP, establish PPP and TCP connection to ISP.
iModem> **@tcs=ping** Issue PING command to verify ISP connection.
Result: **ping: unknown host imodem.net** The CH2165 has not completed the ISP connection.

iModem> **@tcs=ping** Re-issue the PING command to verify ISP connection.
Result: **ping: unknown host imodem.net** The CH2165 has not completed the ISP connection.

iModem> **@tcs=ping** Re-issue the PING command to verify ISP connection.
Result: **ping: unknown host imodem.net** The CH2165 has not completed the ISP connection.

iModem> **@tcs=ping** Re-issue the PING command to verify ISP connection.
Result: **PING imodem.net (65.241.163.3): 56 data bytes** The CH2165 has completed the ISP connection.
64 bytes from 65.241.163.3: icmp_seq=0 ttl=55 time=218.0 ms
64 bytes from 65.241.163.3: icmp_seq=1 ttl=55 time=200.3 ms
64 bytes from 65.241.163.3: icmp_seq=2 ttl=55 time=190.3 ms
64 bytes from 65.241.163.3: icmp_seq=3 ttl=55 time=200.2 ms

--- imodem.net ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 190.3/202.2/218.0 ms

iModem> The CH2165 iModem is ready for the next command.

Note that the ping command displays the iModem.net ISP IP address. In this example, the iModem.net ISP IP address is **65.241.163.3**.

Example 5B: Establish an internet connection. Verify that the TCP connection has been made by executing the PPP command. Because the iModem can queue commands, it is not obvious when the internet connection has been established. The PPP command allows the user to verify that the internet connection has been properly established and allows the user to determine the iModem's IP address.

iModem> **@tcp** Go Off-Hook, Dial the POP, establish PPP and TCP connection to ISP.
iModem> **@tcs=ppp** Issue the PPP command to verify ISP connection.
Result: **ppp0: error fetching interface information: Device not found**
The CH2165 has not completed the ISP connection.

iModem> **@tcs=ppp** Re-issue the PPP command to verify ISP connection.
Result: **ppp0: error fetching interface information: Device not found**
The CH2165 has not completed the ISP connection.

iModem> **@tcs=ppp** Re-issue PPP command to verify ISP connection.
Result: **ppp0 Link encap:Point-to-Point Protocol.**
inet addr:68.130.93.109 P-t-P:68.130.64.14 Mask:255.255.255.255
UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1524 Metric:1
RX packets:3 errors:1 dropped:0 overruns:0 frame:0

**TX packets:3 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:3**

Note that the PPP command displays all PPP connectivity information. In this example, the iModem's IP address is **68.130.93.109**.

Example 6A: Create a pre-defined email message in temporary RAM memory.

iModem> **@tmc=msg1** Create message with filename=**msg1**.
Result: The imodem does not return a prompt and is ready for data input.

**This message is a test of the @TMC=msg1 command.<CR><LF>
<cntrl d>**

Data input was terminated with the **<cntrl d>** ASCII character. The **<cntrl d>** ASCII character must be on a separate line.

iModem> The imodem is ready for another command.

Example 6B: Display the Pre-defined email message created in Example 6A above.

iModem> **@tmc?=msg1** Display email message **msg1**.
Result: **This message is a test of the @TMC=msg1 command.**
Note that the **<cntrl d>** ASCII character is NOT displayed and in NOT part of the email message.

iModem> The imodem is ready for another command.

Example 7: Send the email message created in Example 5.

iModem> **@tcp** Go Off-Hook, Dial the POP, establish PPP and TCP connections to ISP.

iModem> **@td=msg1** Send email message **msg1**.
Result: **Dial tone, DTMF tone dialing, ISP negotiation.**
smtp.pop.net <-- HELO unit.imodem.net
smtp.pop.net --> 250 mr2.ash.ops.us.uu.net Hello 1Cust79.tnt14.sjc4.da.uu.net
[68.130.95.79], pleased to meet you
smtp.pop.net <-- MAIL FROM: <username@cermetek.com>
smtp.pop.net --> 250 <username@cermetek.com>... Sender ok
smtp.pop.net <-- RCPT TO: <itest@cermetek.com>
smtp.pop.net --> 250 <itest@cermetek.com >... Recipient ok
smtp.pop.net <-- DATA
smtp.pop.net --> 354 Enter mail, end with "." on a line by itself
smtp.pop.net <-- This message is a test of the @TMC=msg1 command.
smtp.pop.net --> 250 QQpvjy10304 Message accepted for delivery
smtp.pop.net --> 221 mr2.ash.ops.us.uu.net closing connection

In Example 7, the address information + the subject line information is taken from the current parameter settings. The message body was taken from file **msg1**. Note that the message was echoed back by the SMTP server. The SMTP echoes each line sent by the CH2165. No termination sequence is required in this case. The CH2165 automatically provides the required termination sequence. The SMTP server then terminated the message and closed the SMTP connection.

Example 8A: Prepare to save email message **msg1** created in Example 6A above in FLASH memory.

iModem> **@tms=msg1** Display email message **msg1**.
Result: **message "msg1" marked to be saved in flash** Message ready to be saved in FLASH.

Example 8B: Save email message **msg1** created in Example 6A above in FLASH memory.

iModem> **@tw=flash** Display email message **msg1**.
Result: Email message **msg1** stored in FLASH.
iModem> The CH2165 iModem is ready for the next command.

In Example 8A and 8B, message **msg1** was stored in FLASH memory.

Example 8C: Create another pre-defined email message in temporary RAM memory.

iModem> **@tmc=msg2** Create message with filename=**msg2**.
Result: The iModem does not return a prompt and is ready for data input.

**This message is another test of the @TMC=msg2 command.<CR><LF>
<cntrl d>**

Data input was terminated with the **<cntrl d>** ASCII character. The **<cntrl d>** ASCII character must be on a separate line.

iModem> The iModem is ready for another command.

Example 8D: Display the email message filenames and lengths (in bytes) contained in the CH2165.

iModem> **@tmi?** Display all email messages contained in the CH2165.
Result: **saved messages**
size (bytes) name
49 msg1
49 bytes in 1 messages
temp messages
size (bytes) name
55 msg2
55 bytes in 1 messages

In Example 8D, the CH2165 is indicating that one permanent email message, **msg1** (49 bytes), is saved in FLASH memory and that one temporary email message, **msg2** (55 bytes) resides in RAM memory.

iModem> The CH2165 iModem is ready for the next command.

Example 9: Send a streaming email message.

iModem> **@tcp** Go Off-Hook, Dial the POP, establish PPP and TCP connection to ISP.
Result: **Dial tone, DTMF tone dialing, ISP negotiation.**
iModem> The iModem displays the prompt before execution of the command.

iModem> **@td=0** Send a streaming email message.
Result: **smtp.pop.net <-- HELO unit.imodem.net**
smtp.pop.net --> 250 mr2.ash.ops.us.uu.net Hello 1Cust79.tnt14.sjc4.da.uu.net
[68.130.95.79], pleased to meet you
smtp.pop.net <-- MAIL FROM: <username@cermetek.com>
smtp.pop.net --> 250 <username@cermetek.com>... Sender ok
smtp.pop.net <-- RCPT TO: <itest@cermetek.com>
smtp.pop.net --> 250 <itest@cermetek.com >... Recipient ok
smtp.pop.net <-- DATA
smtp.pop.net --> 354 Enter mail, end with "." on a line by itself
Enter: **This is a test.** This data is supplied by user as the test message
Result: **smtp.pop.net <-- This is a test.** Data echoed back by SMTP server.

Enter: **<cntrl d>** This **<cntrl d>** supplied by user indicating message entry completed.
Result: **smtp.pop.net <--.**
smtp.pop.net --> 250 QQpvjy10304 Message accepted for delivery
smtp.pop.net --> 221 mr2.ash.ops.us.uu.net closing connection

In Example 9, the address information + the subject line information is taken from the current iModem parameter settings. Note that the CH2165 waits for the user to enter the message body. If no activity is detected within 90 seconds (approximately), the CH2165 automatically terminates data entry and sends the message with NO message body. During data entry, each line of the message submitted by the user is echoed back by the SMTP server. The

<cntrl d> is used to indicate to the SMTP when data entry is completed. Upon receipt of the **<cntrl d>** ASCII character, the SMTP server terminates data entry, sends the email message and closes the SMTP connection.

Example 10A: Establish an internet connection. Open a POP3 server socket connection.

```
iModem> @tcp          Go Off-Hook, Dial the POP, establish PPP and TCP connection to ISP.
Result:  Dial tone, DTMF tone dialing, ISP negotiation.
iModem>              The iModem displays the prompt before execution of the command.
```

```
iModem> @teo          Open a POP3 server connection.
Result:  looking up imodem.net
        .
        imodem.net --> +OK POP3 mail.imodem.net v2003.83 server ready

        imodem.net <-- USER cermetek
        imodem.net --> +OK User name accepted, password please

        imodem.net <-- PASS abcdefg
        imodem.net --> +OK Mailbox open, 3 messages

        imodem.net-->+OK 3 2187

        3 messages
```

iModem> POP3 server connection open. The CH2165 is ready for the next command.

In Example 10A, the CH2165 displayed the message status information “as received” from the POP3 server. Details concerning cached emails are not revealed.

Example 10B: Using the POP3 connection established in Example 10A, query the POP3 server and display message subject lines and associated message numbers for all messages currently cached on the POP3 server.

```
iModem> @tes          Display the email message inventory on the POP3 server.
Result:  imodem.net --> Subject: Powerline Monitor Init Params

        1 Powerline Monitor Init Params
        imodem.net --> Subject: This is test message 2

        2 This is test message 2
        imodem.net --> Subject: This is test message 3

        3 This is test message 3
```

iModem> POP3 server connection open. The CH2165 is ready for the next command.

In Example 10B, the CH2165 displayed the message status information “as received” from the POP3 server. Note that the message number and subject line are re-formatted on a separate line beneath the imodem.net (i.e., POP3 sever) response line. This is done for clarity and allows the user to easily associate the message number with the appropriate message subject line.

Example 10C: Using the POP3 connection established in Example 10A, display email message 2.

```
iModem> @ter=2        Display email message 2.
Result:  imodem.net <-- RETR 2
        +OK 770 octets
        Return-Path: <itest@cermetek.com>
        Received: from mr2.ash.ops.us.uu.net (mr2.ash.ops.us.uu.net [198.5.241.87])
        by mail.imodem.net (8.12.8/8.12.8) with ESMTP id i0L6IPdQ016257
        for <cermetek@imodem.net>; Tue, 20 Jan 2004 22:18:26 -0800
```

Received: from unit.imodem.net by mr2.ash.ops.us.uu.net with SMTP
(peer crosschecked as: 1Cust133.tnt14.sjc4.da.uu.net [68.130.95.133])
id QQpyjj12103
for <cermetek@imodem.net>; Wed, 21 Jan 2004 02:46:20 GMT
Date: Wed, 21 Jan 2004 02:46:20 GMT
From: itest@cermetek.com
Message-Id: <QQpyjj12103.200401210246@mr2.ash.ops.us.uu.net>
Subject: This is test message 2
Reply-To: itest@cermetek.com
SN: 2164A-Bde0359-gt3e-utv-90wq-013
Errors-To: itest@cermetek.com
To: Device01 <itest@cermetek.com>
Status: RO

This is data for test message 2.
Bye.

iModem> POP3 server connection open. The CH2165 is ready for the next command.

In Example 10C, the CH2165 displays ALL data received from the POP3 server pertaining to email message number 2. This includes TCP/IP header and tracking information as well as the message itself.

Example 10D: Using the POP3 connection established in Example 10A, attempt to display an email message that does NOT exist.

iModem> **@ter=4** Display email message 4.
Result: **imodem.net <-- RETR 4**
-ERR No such message

iModem> POP3 server connection open. The CH2165 is ready for the next command.

In Example 10D, the CH2165 responds to the request to retrieve a non-existent message with the standard error message received from the POP3 server.

Example 10E: Using the POP3 connection established in Example 10A, delete email message 2.

iModem> **@ter=2** Delete email message 2 on POP3 server.
Result: **imodem.net <-- DELE 2**
imodem.net --> +OK Message deleted

iModem> POP3 server connection open. The CH2165 is ready for the next command.

In Example 10E, the CH2165 deleted email message number 2. Note that the governing internet RFCs require the POP3 cache memory to be updated only after the current POP3 session is closed. Consequently, messages deleted from the POP3 cache memory will not be removed from cache memory until the POP3 session is terminated. By convention, emails marked for deletion are not directly viewable but technically still reside in POP3 cache memory until the POP3 session is closed.

Example 10F: Using the POP3 connection from Example 10E, query the POP3 server and display all message subject lines and associated message numbers. Note that the deleted email message number 2 (see Example 10E) does not appear in the inventory listing of email messages.

iModem> **@tes** Display email message inventory on POP3 server.
Result: **imodem.net --> Subject: Powerline Monitor Init Params**

1 Powerline Monitor Init Params
imodem.net --> Subject: This is test message 3

3 This is test message 3

iModem> POP3 server connection open. The CH2165 is ready for the next command.

In Example 10F, the CH2165 did NOT display email information for deleted email message 2. However, email message number 2 was not yet assigned to the subsequent email message, indicating the email message 2 still resided in POP3 cache memory.

Example 10G: Close the POP3 connection established used in Example 10F. Open a “new” POP3 session, query the POP3 server and display all message subject lines and associated message numbers. Note that email message number 2 has now been re-assigned to the subsequent email message indicating the “previous” email message number 2 has been deleted from the POP3 cache memory.

```
iModem> @teq          Close the POP3 server connection.
Result:  imodem.net <-- QUIT
        imodem.net --> +OK Sayonara

iModem> @teo          Open a POP3 server connection.
Result:  looking up imodem.net
        .
        imodem.net --> +OK POP3 mail.imodem.net v2003.83 server ready

        imodem.net <-- USER cermetek
        imodem.net --> +OK User name accepted, password please

        imodem.net <-- PASS abcdefg
        imodem.net --> +OK Mailbox open, 2 messages

        imodem.net-->+OK 2 1435

        2 messages

iModem> @tes          Display email message inventory on POP3 server.
Result:  imodem.net --> Subject: Powerline Monitor Init Params

        1 Powerline Monitor Init Params
        imodem.net --> Subject: This is test message 3

        2 This is test message 3

iModem>              POP3 server connection open. The CH2165 is ready for the next command.
```

In Example 10G, the CH2165 displayed the POP3 cache memory indicating that the “previous” email message number 2 had been deleted and the “previous” email message number 3 has been re-assigned email message number 2. This is consistent with the governing internet RFCs.

Example 11: Operate CH2165 as a standard analog. Use standard AT commands to connect CH2165 to a remote modem. Disconnect modem connection. Return CH2165 to iModem mode.

```
iModem> ~.<CR><LF>    Place CH2165 in modem mode.
Result:  entering MODEM command mode. CH2165 s now in modem mode. No prompts will be displayed.

Enter:   AT          Verify CH2165 in modem mode.
Result:  OK

Enter:   ATDT5551212  DTMF tone dial remote modem using 555-1212 as the phone number.
Result:  Dial tone, DTMF tone dialing, ISP negotiation.
        +MCR: V34      Remote modem response: V.34 carrier modulation.
        <CR><LF>
        +MRR: 28800,26400 Remote modem response: DCE tx speed = 28.8K baud, rx speed = 26.4K
        baud.

        <CR><LF>
        +ER: LAPM      Remote modem response: LAP-M error correction protocol.
        <CR><LF>
        CONNECT 19200  Remote modem response: Connection made, CH2165 in DATA MODE (i.e.,
        transmit/receive) and DTE speed is 19.2K baud.
```

Enter: **12345** Enter data, as desired, for transmission to remote modem.
Result: No response from remote modem: data characters are NOT echoed.

Enter: **+++** Direct CH2165 to go into COMMAND MODE. **+++** must be on a line by themselves to activate COMMAND MODE
Result: **OK** CH2165 in COMMAND MODE.

Enter: **ATH** Direct CH2165 to terminate connection and hang-up.
Result: **OK**
CH2165 terminates remote modem connection and goes back on-hook.

Enter: **~..** Direct CH2165 to operate as an iModem.
Result: **le** Spurious characters. OK to ignore.
iModem command shell (version 0.0.1.1)
iModem> iModem> prompt. CH2165 in iModem configuration.

In Example 11, the CH2165 iModem's ability to operate as an analog modem has been demonstrated.

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Table 1. Summary of Available @T[®] Commands By Category for CH2165.

Command	Query	Description
Email Message Management		
@T[MC][=n]	@T[MC][?=n]	Enter email message where n is the email message name. Message name must not exceed 8 alphanumeric characters and cannot begin with a number or contain any non-alphanumeric characters. Message length is limited to 100K bytes per message. All valid ASCII characters allowed within the message. Use the <ctrl d> ASCII character to terminate message entry. Message is maintained in dynamic RAM until stored in Static memory using the @TW command.
@T[MD][=n]	----	Delete filename, n , from Cache RAM and Static memory.
@T[MS][=n]	----	Store filename, n , in Cache RAM memory. Files stored in Cache RAM memory will be lost when power is removed. Delete filename, n , from RAM memory.
----	@T[ML][?=n]	Displays file name and size of all temporary (i.e., RAM memory) files and all static (i.e., FLASH memory) files stored on the CH2165. Allowable values: s. Only STATIC memory files displayed. t. Only RAM memory files displayed. null (i.e., not specified). All file types displayed.
Password		
@T[PI][=n]	@T[PI][?]	Set ISP Login password, n .
@T[PM][=n]	@T[PM][?]	Set POP3 email retrieve password, n .
Username		
@T[UI][=n]	@T[UI][?]	Set ISP Login username, n .
@T[UM][=n]	@T[UM][?]	Set POP3 email retrieve username, n .
POP3 Retrieval		
@T[ED][=n]	----	Delete email message(s). Allowable values: n. Message number n deleted. n-m. Message numbers n-m (inclusive) deleted.
@T[EO][]	----	Open POP3 mailbox.
@T[EQ][]	----	Quit POP3 mailbox activity and close POP3 server.
@T[ER][=n]	----	Retrieve message number, n .
@T[ES][]	----	Inventory all messages currently on POP3 server and list message number and subject line.
CH2165 Firmware Revision		
----	@T[I][?]	Display firmware revision
Send Email Message		
@T[D][=n]	----	Send email message, n . Use internet TO, FROM, REPLY, and ERROR TO addresses contained within message n . Use the POP dialup phone number currently active.
@T[D][=0]	----	Send streaming email message. Use specified SMTP server address and open server socket connection. Use current internet TO, FROM, REPLY, and ERROR TO addresses for message and TCP/IP headers. Enter Streaming Email data entry mode. Each line of data entered is echoed back. Terminate data entry using the <ctrl d> ASCII character. Message completed and sent and the SMTP socket closed upon receipt of the <ctrl d> ASCII character.
POP Access Dialup Phone Number		
@T[N][=n]	@T[N][?]	Set POP dialup access dial-up phone number string, n . Special characters supported: Each comma will cause a 2 second delay. Use a dash as a delimiter. Dashes are ignored.

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Table 1. Summary of Available @T[®] Commands By Category for CH2165.

Command	Query	Description
DCE and DTE Attributes		
@T[BC]=[n]	@T[BC][?]	Select DCE Baud rate, n. Allowable values: n=57600. n=38400. n=19200. n=9600. n=4800. n=2400. By default, if no value is specified, the CH2165 will automatically determine the maximum baud rate supported by the PSTN connection. This is referred to as auto-bauding. The @TBC command is currently NOT ENABLED. The CH2165 will autobaud.
@T[BT]=[n]	@T[BT][?]	Select DTE Baud rate, n. Allowable values: n=57600. n=38400. n=19200. (Default). n=9600. n=4800. n=2400. The @TBT command currently NOT ENABLED.
@T[BE]=[n]	@T[BE][?]	Toggle DTE echo. n=on Enable DTE echo (default). n=off Disable DTE echo. The @TBE command is currently ENABLED by the query function, @TBE?, is currently DISABLED.
Email Addresses, Device Name and Email Subject Line		
@T[AD]=[n]	@T[A][?]	Set email DESTINATION address, n. This is the address to which the email will be sent. This is the address that appears in the TCP/IP header.
@T[AE]=[n]	@T[A][?]	Set email ERROR address, n. This is the address to which reply emails will be sent when an email delivery error is encountered by the SMTP server. This address becomes the DESTINATION address of the Error Email and appears in the TCP/IP header.
@T[AF]=[n]	@T[A][?]	Set email FROM: address, n. This is the address that follows the FROM: located in the body of the email message. The FROM address is the address used by the POP3 server to retrieve email. By convention, the FROM: address matches the email sender's address. However, this is not required for proper delivery of the email message. This address appears in the TCP/IP header.
@T[AR]=[n]	@T[A][?]	Set email REPLY address, n. This is the address to which reply emails will be sent when the Email Reply button is selected. This address becomes the DESTINATION address and appears in the TCP/IP header.
@T[AS]=[n]	@T[A][?]	Set email SUBJECT LINE, n. This is the subject line that appears in the email message.
@T[AT]=[n]	@T[A][?]	Set email TO: address, n. This is the address that follows the TO: located in the body of the email message. By convention, the TO: address matches the DESTINATION. However, this is not required for proper delivery of the email message.
@T[T]=[n]	@T[T][?]	Set Device or Unit Name. This is the name that appears on the email TO: line before the email TO: address. The iModem.net ISP uses the Device Name in combination with the device Serial number to verify identity.

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Table 1. Summary of Available @T[®] Commands By Category for CH2165.

Command	Query	Description
Display All Parameters		
@T[V][=n]	@T[V][?]	Toggle internet SMTP and POP3 command responses. n=0 Disable Verbose command response. @TV? returns off. n=1 Enable Verbose command response (default). @TV? returns on.
----	@T[W][?]	Display all iModem parameters.
Static RAM Memory Management		
@T[W][=flash]	----	Store all files and Configuration Profile changes currently in Cache RAM to Flash memory. Files stored in Flash memory will be retained when power is removed.
Help Topics		
----	@T[H][?=n]	Displays details for specified command, n, and provides an example of command usage. See supported commands below.
----	@T[H][?]	Displays all supported commands. Currently: A Display Addresses and Subject Line command description syntax. C Display PPP connectivity command syntax. D Display send email command syntax. This Help feature currently NOT IMPLEMENTED. E Display retrieve email command syntax. This Help feature currently NOT IMPLEMENTED. I Display IMAP and POP3 email command syntax. M Display create or view email message command syntax. N Display local POP access phone number command syntax. P Display password command syntax. S Display mail/SMTP server command syntax. U Display username command syntax. This Help feature currently NOT IMPLEMENTED. V Display verbose command syntax. Z Display factory default parameter restore command syntax.
Server Addresses		
@T[SS][=n]	@T[S][?]	Set SMTP server symbolic name, n. This symbolic name is used by the CH2165 to determine the SMTP server address.
@T[SM][=n]	@T[S][?]	Set POP3 server symbolic name, n. This symbolic name is used by the CH2165 to determine the POP3 server address.
Internet Connectivity Status		
@T[CS][=PPP]	----	Displays all PPP connectivity information, including iModem's dynamic IP address.
@T[CS][=PING]	----	Sends four successive ping commands to the imodem.net ISP server.
TCP Management		
@T[CP][[]]	----	Establish TCP connection. This command causes the CH2165 to perform the following tasks in the order listed: 1. Go Off-Hook and dial POP phone number specified @TN=n command. 2. Connect to internet using Login ISP Username specified by @TUI command and ISP Login Password specified by @TPI command. 3. Obtain IP address and establish TCP socket connection.
@T[CT][[]]	----	Terminate TCP connection. This command causes the CH2165 to perform the following tasks in the order listed: 1. Close TCP socket connection. 2. Disconnect from the internet. 3. Go On-Hook.

Attachment I

Page 4 of 4

Table 1. Summary of Available @T[®] Commands By Category for CH2165.

Command	Query	Description
Factory Defaults		
@T[Z][]	@T[Z][?]	Restores the factory default parameter values. Factory defaults are “as programmed by the factory” parameters and are based on customer supplied information. All parameters have factory default values EXCEPT the email message body. These parameters are not user modifiable.
Analog Modem Operation		
~..	----	Used to initiate and terminate analog modem operation. When operating as an analog modem, all supported Hayes AT commands can be executed. All @T commands are non-functional while the CH2165 is operating as an analog modem.
+++	----	When operating as an analog modem, used to change from Data Entry to Command Mode. The +++ must be on a line by itself.

Attachment II

Procedure to Determine DTE Communication Speed.

This procedure provides the user a simple method to determine the DTE communication speed.

iModem>	~..	Set the iModem to Modem mode.
Result:	<CRLF>	
Enter:	AT<CR>	Modem Attention command.
Result:	OK	
Enter:	AT"?<CR>	Query iModem for DTE Speed.
Result:	1100000	The first two (i.e., 11) digits are the code for the DTE speed.

Referring to Table 2 below, it can be seen that code 11 corresponds to a DTE speed of **38400** baud.

Table 2. Summary of Allowed iNet@T[®] Commands

DTE Baud rate Using The First To Digits, n
n=01 DTE baud rate 115000 .
n=02 DTE baud rate 57200 .
n=11 DTE baud rate 38400 .
n=12 Disabled.
n=13 DTE baud rate 9600 .
n=14 DTE baud rate 4800 .
n=15 DTE baud rate 2400 .
n=16 Disabled.

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