V.3229/V.3229L
Manual

Compliments of
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Bit Mapped S84

Bit	Value	Command	Description
0	*0 1		Any key abort enabled Any key abort disabled
1	*0 1		Remote DCD goes low in RDL and remote configuration Remote DCD goes high in RDL and remote configuration
2	*0 1		Fallback to V.22 rates normally Reduced time to fallback to V.22 rates
3	*0 1		Answerback normally Reduced answerback time
4	*0 1		With DTR disconnects, 4 DTR transitions initiate dial backup With DTR disconnects, 1 DTR transition initiates dial backup
7-5	–	–	Reserved

** default*

S85-90 Reserved

Chapter 7
V.25 bis Autodialer

GENERAL

V.25 bis is an option that allows dialing functions to be controlled using synchronous data.

Select V.25 bis through the appropriate &M command in the AT command set (Chapter 5).

If using the LCD

- ☐ Scroll through the menu to Main Menu 5, MODIFY CONFIGURATION.
- ☐ Advance to and enter the DTE PARAMETERS submenu.
- ☐ Select SYNC DATA.
- ☐ Advance to DIAL METHOD.
- ☐ Select either V.25 BISYNC DIALER or V.25 SDLC DIALER or V.25 ASYNC DIALER and then select either ASCII or EBCDIC character format.

Note: The modem must be configured as V.25 SDLC ASCII NRZ for use with an AS400 IBM computer.

Autodialer Command Strings and Parameters

Most command strings for the autodialer include two parts: the command itself and the parameter(s) that follow. For the purposes of this chapter, parameters can be telephone numbers or anything appropriate to V.25 bis as described in the following text. Parameters are separated by semicolons.

For example:

PRN *a; nnn . . . n* where *a*=the phone number address in memory and *nnn . . . n* = the phone number

The *a* and the *nnn . . . n* are both parameters.

Not all commands have parameters. For example the CIC command has no parameter.

GUIDELINES

Use the following guidelines when working with V.25 bis software:

- An indicator enclosed in less than / greater than signs < > represents a specific character in the appropriate character set, ASCII or EBCDIC.

  <sp> - space

- Each response below is considered an individual message per V.25 bis conventions. A dial command with intermediate call progress enabled (sync mode ASCII/EBCDIC character set) is illustrated:

From DTE — To DTE

<sy><sy><stx>CRN<sp>(205)555-0124<etx> — <sy><sy><stx>VAL<etb>
<sy><sy><stx>CNX<sp>@9600BPS<etx>

- Spaces in a command from the DTE are optional and ignored.
- Command strings can be upper or lower case. Responses are always upper case.
- Only synchronous data formats are implemented. They include Bisync and SDLC (NRZ format) in ASCII or EBCDIC.

Invalid Responses Explanations

Except when stated otherwise, the following explanations for invalid INV responses apply:

INVC Any transmission error (parity, framing, etc.).

INVMS Receiving too many characters for any command.

INVMS Any command followed by a semicolon ;

INVPS This message has one of three possible meanings:

- Any parameter set ending with a semicolon ;
- Any parameter set containing too many or not enough parameters; this includes

  --any command entered without parameters that requires parameters

  --any command entered with parameters that does not require parameters.

- Any parameter containing too many characters.

INVPV This message has one of three possible meanings:

- Any parameter set containing invalid characters
- Any parameter or parameter set containing no valid (only ignored) characters
- Any parameter set containing an out-of-range parameter

DIAL PARAMETERS

Table 7-1 lists and describes the parameters used in autodialing. The memory available for dialing can hold up to 40 characters. Parameters inserted for readability are not counted.

Table 7-1
V.25 bis Dial Parameters

Character	Function
0 thru 9	DTMF and pulse digit
* and #	DTMF digit
:	Wait for dial tone
W	Wait for 2nd type of dial tone
>	Pause for 1 second
=	Pause for 3 seconds
<	Pause for programmed delay time
P	Pulse dialing
T	Tone dialing*
&	Flash (go on hook) for ½ ms
;	Return to command mode after dialing
Space, dash, parenthesis, period	Parameters inserted for readability

V.25 bis COMMAND AND RESPONSE DEFINITIONS

The following sections describe the commands used with the V.25 bis autodialer and explain the responses received when each command is executed.

Dial Command CRN *nn...n*

The dial command is a CRN followed by the number to be dialed *nn...n*. The modem accepts up to 40 dial parameters, excluding the CRN command and any leading spaces.

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TRN (205)-555-0124

INVMS Invalid command - message syntax error.

Examples: CRN;(205)-555-0124
CRN; *(semicolon invalid)*

INVPS Invalid command - parameter syntax error.

Examples: CRN (205)-555-0124
CRN (205)-555;0124
CRN

INVPV Invalid command - parameter value error.

Examples: CRN (205)-555-012Q
CRN - - - -

CFIET Call failure - reorder or busy.

CFIRT Call failure - timeout occurred.

CFIDT Call failure - no dial tone.

INC Incoming ring detected.

Program Number Command PRN *a; nn...n*

The program number command is PRN followed by the one digit decimal address *a* and the number to be stored *nn . . . n*. Each address can store up to 32 dial parameters. Ignored characters in the dial number are not stored. Nine stored numbers are available at addresses 1-9.

Responses:

Same as for the CRN command.

Intermediate Call Progress Responses

The following responses are given only if enabled. Refer to the OPTIONS section later in this chapter.

CNX<sp>@*nnnnn*BPS<sp>*ccccc* - where *nnnnn* is the line speed and *ccccc* is an identifier with a maximum of five characters, such as V.29. This connect response appears after handshake completed, but before DSR is activated. This response is required if the intermediate call progress option is enabled.

Dial Stored Number CRS *a*

The command for dialing a stored number is CRS followed by the one digit address *a* for the stored number to be dialed.

Responses:

Same as for the CRN command plus

CFINS Call failure - number not stored.

If the number is linked with other numbers, via a PRL command, failure responses are returned as

{sep}*a;*{call progress messages} . . .

where *a* is the address dialed, followed by the separator field <etb><sy><sy><stx> and call progress messages (CFI, etc.).

If the call fails to connect and the number is linked with other numbers, the autodialer tries to call the next number in the list of linked numbers.

Request List of Stored Numbers RLN

The request list of stored numbers command is an RLN.

Responses:

INVCU Invalid command - command unknown.

Example: TLN

INVMS Invalid command - message syntax error.

Example: RLN;

If no number is stored at the specified address nothing is returned for that address. The separator {sep} is a

<etb><sy><sy><stx>LSN <sp>

sequence for BISYNC format (the last LSN string terminates with <etx> per V.25 bis). For synchronous bit-oriented operation, each LSN string is treated as an individual message per V.25 bis.

All stored numbers are sent to the DTE as

LSN<sp>*a;nn...n*{sep}*a;nn...n...*

where *a* is the stored number address and *nn....n* is the number stored.

Disregard Incoming Call DIC

The command for disregarding an incoming call does not require parameters. If no call is incoming, the command is ignored.

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TIC

INVMS Invalid command - message syntax error.

Example: SIC;

Connect Incoming Call
CIC

No parameters are required. If there is an incoming call, the modem immediately answers the call. If no call is incoming, the command is ignored.

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TIC

INVMS Invalid command - message syntax error.

Example: SIC;

Redial Last Number
CRR *n*

The CRR *n* command redials the last number a maximum of *n* times. If no parameters are present, the modem redials once. Also, the maximum number of redials, the amount of time between redials, and other parameters may vary depending on application and national requirements if outside the U. S.

Responses:

Same as for the CRS command.

Failure response is

{sep}*r*;{call progress messages}...

where *r* is the recall count (1 <= *r* <= *n*; 1,2...,etc.), followed by a separator field

<etb><sy><sy><stx>

and call progress messages (CFI XX, etc.). If the call fails to connect, this is repeated for the specified number of times.

Link Number by Address
PRL *a;b*

This command links the number at address *a* with the number at address *b*. The addresses are one digit decimal values. Linking numbers enables different numbers to be dialed if a call failure occurs.

Only forward linking to one other number is allowed, so address 1 can be linked to 4 to 8 to 9 etc.; however (using this example), if address 4 is dialed by a CRS command without connection it links forward to 8 then to 9.

If all these fail to connect, the autodialer will not back-link to address 1 unless circular linking is used. Numbers may be linked as 4 to 5 to 3; however, if address 3 is dialed, back-linking to 5 is not allowed.

If circular linking (1 to 8 to 7 to 1) is used, dialing is discontinued after the addressed number in the dial command has been dialed twice. If only one parameter follows the PRL command, the number at address a is unlinked from its forward link.

For example, if the link list 4 to 8 to 3 to 7 to 9 to 1 exists and PRL 7 is received, 7 would be unlinked from 9, but not from 3. This would result in two link lists: 4 to 8 to 3 to 7 and 9 to 1.

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TRL 1;5

INVMS Invalid command - message syntax error.

Examples: PRL;1;5
PRL;

INVPS Invalid command - parameter syntax error.

Examples: PRL 1;5;
PRL 1;0;0
PRL 1;
PRL
PRL 001;5

INVPV Invalid command - parameter value error.

Examples: PRL 1;Q
PRL Q;1
PRL 1;45 where only addresses 01 - 09 are defined

Request List of Linked Numbers RLL

The request list of linked numbers command is an RLL with no parameters.

Responses:

INVCU Invalid command - command unknown.

Example: TLL

INVMS Invalid command - message syntax error.

Example: RLL;

LSL List linked numbers.

In all LSL examples, if no number is stored at the specified address no response is sent. The separator field is an

<etb><sp><sp><stx>LSL<sp>

The last LSL string ends with <etx> per V.25 bis. For synchronous bit oriented operation, each LSL string is treated as an individual message per V.25 bis. All linked numbers are sent to the DTE as

LSL<sp>*a;l*{sep}*a;l*

where *a* = stored address and *l* = link address.

Request List of Version RLV

The request list of version information command is an RLV with no parameters.

Responses:

INVCU Invalid command - command unknown.

Example: TLV

INVMS Invalid command - message syntax error.

Example: RLV;

LSV List version

The version information is sent to the DTE as

LSV<sp>S362700*xxx*01*yyyddr*<sp>

where *xxx* is the code revision of the microcontroller PROM and *yyy* is the code revision. The *dd* is the model dash number and the *r* is the printed circuit board revision.

MODEM OPTIONS COMMAND PRO *xxx;yy;0;0..*

The program options command is PRO followed by the starting register address (1 to 3 decimal digits), option count (1 or 2 decimal digits) and the data for each option (1 to 3 decimal digits per option). Refer

to the OPTIONS section for available options with definitions, possible settings, and default values.

The modem must be able to accept 40 non-ignored characters besides the PRO command (leading zeros and semicolons are not considered ignored characters).

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TRO 0;1;1

INVMS Invalid command - message syntax error.

Examples: PRO;0;1;1
PRO;

INVPS Invalid command - parameter syntax error.

Examples: PRO 0;1;0;
PRO 0;1;1;1
PRO
PRO 0;001;1

INVPV Invalid command - parameter value error.

Examples: PRO 0;1;Q
PRO Q;1;1
PRO 0;0;0
PRO 68;1;0

when option 68 is undefined for the modem.

INVPV<sp>xxx Invalid command - parameter value error.

Examples: PRO 10;5;0;0;0;2;1

This invalid message can be returned when a block of options is being changed. The conditions for this invalid response are as follows:

- An undefined option number is specified. In the above example, if option 12 is undefined for a certain modem (and no other error conditions apply) options 10 and 11 would be changed as specified in the command message. The next option to be changed would be option 12. The modem would detect that this is an undefined option, stop execution of the command, and return an INVPV<sp>012 message. Options 10 and 11 would still be changed as commanded, options 13 and 14 would be unchanged.

- An out-of-range value for a particular option is specified. In the above example, if the fourth value in the option string is undefined or out-of-range for option 13 in a certain modem (and no other error conditions apply) options 10 through 12 would be changed as specified in the command message. The next option to be changed would be option 13. The modem would then detect that the value is undefined or out-of-range for that option, stop execution of the command, and return an INVPV<sp>013 message. Options 10 through 12 would still be changed as commanded; options 13 and 14 would be unchanged.

Save Current Settings
PRK

PRK saves option settings current.

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TRK

INVMS Invalid command - message syntax error.

Examples: PRK;0
PRK Q

Restore Factory Settings
PRP *n*

PRP *n* restores current option settings to factory option set *n* where *n* is a 1 digit decimal number.

Note: Restoring a factory option set other than factory option 9 disables the V.25 synchronous dialer.

If no parameter follows the command, the modem automatically selects factory option set 1.

Responses:

VAL Valid command received. Transmitted on receiving an error-free command with no transmission error such as a parity error. This confirmation is sent before the command is executed.

INVCU Invalid command - command unknown.

Example: TRP

INVMS Invalid command - message syntax error.

Examples: PRP;1
PRP Q

INVPS Invalid command - parameter syntax error.

Examples: PRP 1;
PRP 1;1
PRP 001

INVPV Invalid command - parameter value error.

Example: PRP 5

where factory default 5 is not defined for the modem. Current modem factory options are 1 - 9.

Request List of Stored Options
RLO *xxx;yy*

The request list of stored options command is RLO followed by an optional 1 to 3 digit decimal address and a 1 or 2 digit decimal count. The OPTIONS section lists all available options with definitions, possible settings, and default values.

Responses:

INVCU Invalid command - command unknown.

Example: TLO 0;1

INVMS Invalid command - message syntax error.

Examples: RLO;0;1
RLO Q;1

INVPS Invalid command - parameter syntax error.

Examples: RLO 0;1;
RLO 0;1;4
RLO 0;001

INVPV Invalid command - parameter value error.

Examples: RLO 0;Q
RLO 0;0
RLO999;45

LSO List stored options.

The separator {sep} is a

<etb><sp><sp><stx>LSO<sp>

sequence for the sync format (the last LSO string terminates with <etx> per V.25 bis). For synchronous bit oriented operation, each LSO string is treated as an individual message per V.25 bis.

If no parameters follow, all stored options are sent to the DTE as

LSO<sp>*xxx;ooo*{sep}*xxx;ooo*...

Each value must be padded with leading zeros so that each field has three characters. Option zero would be sent as

LSO<sp>000;000

If only an address follows the command, the single requested option is sent to the DTE as

LSO<sp>*xxx;ooo*

If address and count follow the command, the requested count of options starting with the specified address are sent to the DTE as

LSO<sp>*xxx;ooo*{sep}*xxx;ooo*...

OPTIONS

The V.25 bis autodialer options can be changed using the PRO or the RLO command. The options are:

000 - 001: Not applicable

002: Intermediate call progress messages
0 - Disable
1 - Enable
Default value = 0

003: Blind dial
0 - Disable
1 - Enable
Default value = 0

004-006: Not applicable

007: Long space disconnect
0 - Disable
1 - Enable
Default value = 1

008-019: Not applicable

020: Programmable / permissive operation
0 - Permissive
1 - Programmable
Default value = 0

021-022: Not applicable

023-049: Reserved for future use

050: Mode
0 - 2--wire dial-up operation (PSTN)
1 - 4--wire leased line operation
2 - 2--wire leased line operation
Default value = 0

051: Primary transmit / receive rate
(See Rate Select section below.)
Default value = 36 (9600 bps)

052-054: Not applicable

055: Transmit clock
0 - Internal
1 - External
2 - Receive (slave)
Default value = 0

056: Leased line transmit level -
Transmit level
(- {decimal} dBm)
Default value = 0

057-062: Not applicable

063: Autoanswer
0 - Disable
1 - Enable (answer after 1 to 255 rings)
Default value = 1

064: Line current disconnect
0 - Off
1 - Short (8 ms)
2 - Long (90 ms)
Default value = 2

065-075: Not applicable

076: Speaker control
0 - Off
1 - On
2 - N/A
3 - N/A
4 - On until CD
5 - N/A
6 - Off while dialing
Default value = 4

077: Speaker volume
0 - Low
1 - Medium
2 - High
Default value = 1

078-084: Not applicable

085: Constant carrier RTS/CTS delay
0 to 250 ms
Must be set in increments of 10 ms:
10, 20, 30 . . . 250
Default value = 0

086: Not applicable

087: DTR dropout timer
0 to 255 in 10 ms increments
DTR must turn off for this length of time to be recognized.
Default value = 5 (50 ms)

088: Not applicable

089: Pause for comma in dial string
0 - invalid
1 to 255 seconds
Default value = 2

090: Carriage return character
(13 decimal is ASCII and EBCDIC default)

091: Line feed character
(10 decimal is ASCII default;
37 decimal is EBCDIC default)

092: Guard tone
0 = None
1 = 550 Hz
2 = 1800 Hz
Default value = 0

093: Carrier detect delay
0 - Off 1 to 255 in increments of 10 ms
Default value = 6 (60 ms)

094: Loss of carrier disconnect
0 - Off 1 to 255 in 100 ms increments
Default value = 14 (1.4 sec)

095: DTR dial address
Stored telephone number address to dial on DTR off-to-on transition
Default value = 1

096: DTR dial
0 - Disable
1 - Enable
2 - N/A
Default value = 0

097: Not applicable

098: Call timeout
0 - Off
1-255 sec
Default value = 30 sec

099-102: Not applicable

103: Signal quality retrain
0 - Disable
1 - Send training sequence on poor quality
Default value = 1

104-106: Not applicable

107-899: Reserved for future use

900-902: Not applicable

903: Bilateral loop
0 - Disable
1 - Enable
Default value = 0

During a test bilateral loop is defined as follows:

Test Commanded	Bilateral Loop
Loop 1	Loop 2
Loop 2	Loop 1
Loop 3	Loop 4
Loop 4	Loop 3

Loop definitions are per CCITT V.54.

904: DTE commanded remote digital loopback
0 - Disable
1 - Enable
Default value = 0

905: DTE commanded local analog loopback
0 - Disable
1 - Enable
Default value = 0

906: Remote commanded test
0 - Disable
1 - Enable
Default value = 1

907: Test timer
0 - Until DTR drops
TTT - 1 to 255 sec
Default value = 0

908: Not applicable

909-999: Reserved for future use

Rate Select

000-006: Not applicable

007: V.22 1200 bps

008: V.22 bis 2400 bps

009-033: Not applicable

034: V.32 4800 bps echo canceling

035: V.32 9600 bps echo canceling

036: V.32 9600 bps trellis echo canceling

037 - 045: Not applicable

046: V.32 bis 7200 bps trellis echo canceling

047: V.32 bis 12,000 bps trellis echo canceling

048: V.32 bis 14,400 bps trellis echo canceling

049-999: Reserved for future use

Chapter 8
Protocols

CCITT V.42 bis ERROR CONTROL PROTOCOL

V.42 bis is an industry standard for error control adopted by the Consultative Committee for International Telephone and Telegraph (CCITT). The CCITT V.42 bis protocol incorporates two error control algorithms, LAPM and MNP. LAPM is a CCITT Link Access Protocol family member related to LAPB and LAPD currently in use in other communications applications. MNP is Microcom Networking Protocol that has become an industry standard by the number of its users.

The use of V.42 bis requires both local and remote modems to be V.42 bis compatible. Error control protocol is transparent to the user and requires no special hardware or software. Data to be transmitted is put in a buffer so the modem can retransmit it if an error occurs. The modem also buffers data received from the remote modem in case an error occurs and the data is retransmitted. To avoid overfilling the buffer, flow control is used to control data between the modem and the terminal. V.42 bis protocol options can be set by AT commands.

RELIABLE

When a LAPM or MNP link is established the modem is in reliable mode. V.42 bis allows negotiation with a remote modem to the highest level of protocol common to both units. Both LAPM and MNP control data errors by retransmitting any block of data that was corrupted in transit. LAPM is assigned highest priority and if not supported, then an MNP connection is attempted.

AUTO-RELIABLE

In auto-reliable mode the modem negotiates to the highest protocol (LAPM or MNP) common to both modems. However, if a reliable connection cannot be established, auto-reliable allows the protocol to fallback to normal mode.

CONSTANT SPEED INTERFACE

The modem serial port adapts to the data rate of the DTE and does not change speed if the modem telephone line connects at another speed. Therefore the DTE to DCE interface speed is constant.

DATA COMPRESSION

Using MNP Class 5 data compression, the modem can achieve data throughput approaching 28800 bps. With LAPM data compression, the modem can achieve data throughput approaching 57600 bps. This increase in speed is achieved by automatically analyzing the data stream and reducing the number of bits required to represent the characters. 100% error-free transmission is assured by the application of the MNP or LAPM error control protocol on the compressed data.

Compression takes place only if the modem detects that the remote modem supports compression. If not, a reliable connection is made without compression.

Although data compression is compatible with any type of data, it is most efficient for ASCII text files. For maximum throughput when using data compression, the terminal should be set to a higher speed than the "true data link speed" with the constant speed interface on and flow control enabled. When transmitting or receiving data files in one direction, the throughput can be increased for V.42 bis by having extra buffer and more processor time with the &C2 and &C3 data compression commands.

NORMAL MODE

No error control with or without constant speed DTE interface. Data is buffered.

DIRECT MODE

The DTE speed and DCE speed are forced to be the same. No error control or buffering.

FLOW CONTROL

If the serial port speed exceeds that of the modem connection, characters may be sent by the DTE to the modem faster than it can send them to the remote modem. The modem holds characters in an internal buffer until they can be transmitted. When this buffer is full, the modem uses flow control to stop data from the DTE. As the modem continues to transmit data and the buffer empties, flow control is again used to start data from the DTE.

Chapter 9
Maintenance

> *Warning: Disconnect power before performance maintenance. Although dangerous voltage levels are not exposed, disconnecting power will ensure an electric shock hazard is not present.*

GENERAL

The modem contains no internal electronic components that can be serviced or replaced by the user. Repairs should not be attempted by the user.

FUSE

If a fuse fails, replace it with one of equal rating. Repeated failure indicates a more serious problem.

MAINTENANCE

The modem provides maintenance free service. Periodically it is necessary to remove dust that has collected on internal components. Remove dust with a soft bristle brush and low pressure air or vacuum.

Before attempting diagnostic tests, check that all connectors and plugs are firmly inserted. The test procedures will identify the faulty component in a bad communications link.

If the unit appears faulty, contact Motorola UDS at one of the numbers listed on the Toll Free Numbers page at the end of the manual. Do not return the unit without prior instructions.

only one PAGE