



## Voice Command Set Technical Reference

*Revision information*

V 1.0	Initial Release for Sportster Vi modem
V 2.0	Amended and updated version. Now covers following Sportster's : Vi, Voice, Flash and MessagePlus

# 1. Global Commands

The AT commands in the following sections are global, meaning that they can be issued in any appropriate mode (i.e., any #CLS setting). For consistency, the command set is divided into action commands and parameters (non-action commands). Those commands, which are action commands (i.e., those that cause some change in the current operating behavior of the modem) are identified as such, and the remaining commands are parameters.

## 1.1 ATA - Answering in Voice

The answer action command works analogously to the way it works in Data and Fax Modes except for the following:

1. When configured for Voice Mode (#CLS=8), the modem enters Online Voice Command Mode immediately after going off-hook. When the #CLS=8 command is issued, the modem can be programmed to look for 1100 and 1300 Hz calling tones (see #VTD), thus eliminating the need to do so as part of A command processing. After the VCON message is issued, the modem re-enters Online Voice Command Mode while sending any incoming DTMF or Calling Tone indications to the DTE.

After answering in Voice Mode (#CLS=8), the DTE, as part of its call discrimination processing, can decide to change the #CLS setting to attempt receiving a fax in Class 1, or to make a data connection. In such a case, the DTE commands the modem to proceed with the data or fax handshake via the A command even though the modem is already off-hook.

### 1.1.1 Parameters:

Same as Data and Fax modes.

### 1.1.2 Result Codes:

VCON Issued in Voice Mode (#CLS=8) immediately after going off-hook.

## 1.2 ATD - Dial Command in Voice

The dial action command works analogously to the way it works in Data or Fax modes. When in Voice Mode (#CLS=8):

The modem attempts to determine when the remote has picked up the telephone line and once this determination has been made, the VCON message is sent to the DTE. This determination is initially made based upon ringback detection and disappearance. (See #VRA and #VRN commands.) Once connected in Voice Mode, the modem immediately enters the command state and switches to Online Voice Command Mode that enables unsolicited reporting of DTMF and answer tones to the DTE.

### 1.2.1 Parameters:

Same as Data and Fax modes.

### 1.2.2 Result Codes:

VCON Issued in Voice Mode (#CLS=8) when the modem determines that the remote modem or handset has gone off-hook, or when returning to the Online Voice Command Mode. (See #VRA and #VRN.)

NO ANSWER Issued in Voice Mode (#CLS=8) when the modem determines that the remote has not picked up the line before the S7 timer expires.

### 1.3 ATH - Hang Up in Voice

This command works the same as in Data and Fax modes by hanging up (disconnecting) the telephone line. There are, however, some specific considerations when in Voice Mode:

1. The H command forces #CLS=0, but does not destroy any of the voice parameter settings such as #VBS, #VSP, etc. Therefore, if the DTE wishes to issue an H command and then pursue another voice call, it must issue a subsequent #CLS=8 command, but it needn't reestablish the voice parameter settings again unless a change in the settings is desired.
2. The #BDR setting is forced back to 0, re-enabling autobaud.
3. If the #VLS setting is set to select a device which is not, or does not include the telephone line (such as a local handset or microphone), the H command deselects this device and reselects the normal default setting (#VLS =0). Normally, the DTE should not issue the H command while connected to a local device such as a handset, because merely selecting this device results in VCON. The normal sequence of terminating a session with such a device is to use the #VLS command to select the telephone line, which by definition makes sure it is on-hook.

#### 1.3.1 Parameters:

Same as Data and Fax modes.

#### 1.3.2 Result Codes:

Same as Data and Fax modes.

### 1.4 ATZ - Reset from Voice Mode

This command works the same as in Data and Fax modes. In addition, the Z command resets all voice related parameters to default states, forces the #BDR=0 condition (autobaud enabled), and forces the telephone line to be selected with the handset on-hook. No voice parameters are stored in NVRAM so the profile loaded does not affect the voice aspects of this command.

#### 1.4.1 Parameters:

Same as Data and Fax modes.

#### 1.4.2 Result Codes:

Same as Data and Fax modes.

### 1.5 #BDR - Select Baud Rate (Turn off Autobaud)

This command forces the modem to select a specific DTE/modem baud rate without further speed sensing on the interface. When a valid #BDR=n command is entered, the OK result code is sent at the current assumed speed. After the OK has been sent, the modem switches to the speed indicated by the #BDR=n command it has just received. When in Online Voice Command Mode and the #BDR setting is nonzero (no autobaud selected), the modem supports a full duplex DTE interface. This means that the DTE can enter commands at any time, even if the modem is in the process of sending a shielded code indicating DTMF detection to the DTE. When in Online Voice Command Mode and the #BDR setting is zero (autobaud selected), shielded code reporting to the DTE is disabled. [Note that when #BDR has been set nonzero, the modem employs the S30 Deadman Timer, and this timer starts at the point where #BDR is set nonzero. If this period

expires (nominally 60 seconds) with no activity on the DTE interface, the modem reverts to #BDR=0 and #CLS=0.]

### 1.5.1 Parameters:

n = 0 - 48 (New baud rate is n\*2400 bps)

Default: 0

### 1.5.2 Result Codes:

OK     If n = 0 - 48.

ERROR   Otherwise.

### 1.5.3 Command options:

#BDR?

Returns the current setting of the #BDR command as an ASCII decimal value in result code format.

#BDR=?

Returns a message indicating the speeds that are supported.

#BDR=0

Enables autobaud detection on the DTE interface.

#BDR=n

Where  $1 < n < 48$ . Sends OK message at current speed, then switches to the new speed defined by  $n * 2400$  bps unless and until another #BDR=n command is received. Autobaud is disabled, and the character format is maintained at the format most recently detected.

## 1.6 #CID - Enable Caller ID Detection and Select Reporting Format *Future Support*

This command selects or disables Caller ID recognition and reporting in any mode.

### 1.6.1 Parameters:

n = 0, 1, or 2

Default: 0

### 1.6.2 Result Codes:

OK   n = 0, 1, or 2.

ERROR   Otherwise.

### 1.6.3 Command options:

#CID?

Returns the current setting (0,1 or 2) of the #CID command as an ASCII decimal value in result code format.

#CID=?

Returns the message, "0,1,2".

#CID=0

Disables Caller ID.

#CID=1

Enables formatted Caller ID reporting of ICLID SDM (Single Data Message) and MDM (Multiple Data Message) packets.

#CID=2

Enables unformatted Caller ID reporting of any ICLID packet received after the first RING cycle including SDM, MDM, or call waiting packets.

## 1.7 #CLS - Select Data, Fax, or Voice

This command selects Data, Fax, or Voice Mode from operation.

### 1.7.1 Parameters:

n = 0, 1, 2, or 8

Default: 0

### 1.7.2 Result Codes:

OK

If n = 0, 1, 2, or 8. ERROR Otherwise.

### 1.7.3 Command options:

#CLS? -

Returns the current setting (0,1,2, or 8) of the #CLS command as an ASCII decimal value in result code format.

#CLS=?

Returns the message, "0,1,2,8".

#CLS=0

Data. This is similar to setting +FCLASS=0, and instructs the modem to act like a data modem on subsequent answer or originate operations. When a disconnect or inactivity time out in the non-autobaud mode is detected, the modem automatically sets the #CLS setting to 0 and hangs up. This ensures that the modem is always in a known state despite disorderly DTE behavior.

#CLS=1

Class 1 fax. This is similar to setting +FCLASS=1, and instructs the modem to be a Class 1 fax modem. Once this is set, either the +FAA command can be used to force subsequent answers to be Class 1 adaptive answers.

#CLS=2

Class 2.0 fax. This is similar to setting +FCLASS=2.0, and instructs the modem to be a Class 2 fax modem. Once this is set, the +FAA command can be used to force subsequent answers to be Class 2.0 adaptive answers.

#CLS=8

Voice Mode. This is the main setting the DTE uses to effect directed or adaptive answer or originate sequences involving voice modes. All telephone calls initialized by #CLS=8 result (after answer or successful call progress) in the modem in Online Voice Command Mode.

## 1.8 #MDL? - Identify Model.

This command requests the model number or name of the modem.

### 1.8.1 Command option:

#MDL? - USRobotics144FX

## 1.9 #MFR? - Identify Manufacturer

This command requests the modem manufacturer.

### 1.9.1 Command option:

#MFR? - USRobotics

## 1.10 #REV? - Identify Revision Level

This command requests the revision level of the modem.

### 1.10.1 Command option:

#REV? - XXXX-XXXX-XXX YYY (Those places occupied by "X"'s represent the part number, while those places occupied by 'Y"'s represent the revision number. The values are determined at time of production.)

## 2. AT#V Commands Enabled Only in Voice Mode (#CLS=8)

The commands described in the following subsection are extensions to the command set which the modem recognizes only when configured for Voice Mode with the #CLS=8 command.

### 2.1 #VBQ? - Query Buffer Size

This query-only command returns the size of the modem's voice transmit and voice receive buffers in ASCII decimal, followed by the OK result code.

#### 2.1.1 Parameters:

None

#### 2.1.2 Command option:

#VBQ?

Returns the size of the modem voice transmit and voice receive buffers.

### 2.2 #VBS - Bits Per Sample (Compression Factor)

This command selects the degree of ADPCM voice compression to be used.

#### 2.2.1 Parameters:

n = 2, 3, or 4 (Voice compression bits per sample)

Default: 4

#### 2.2.2 Result Codes:

OK If n = 2, 3, or 4.

ERROR Otherwise.

#### 2.2.3 Command options:

#VBS?

Returns the current setting of the #VBS command as an ASCII decimal value in result code format.

#VBS=?

Returns "2,3,4", which are the ADPCM compression bits/sample rates available. These bits/sample rates are correlated with the #VCI? query command response that provides the single compression method available.

#VBS=2

Selects 2 bits per sample.

#VBS=3

Selects 3 bits per sample.

#VBS=4

Selects 4 bits per sample.

## 2.3 #VBT - Beep Tone Timer

This command defines the time period, in 10ths of a second up to 4 seconds (40) which is used by the modem as the DTMF or fixed tone duration for generating tones via the D command while in Online Voice Command Mode.

### 2.3.1 Parameters:

n = 0 - 40 (0 - 4 seconds)

Default: 10

### 2.3.2 Result Codes:

OK If n = 0 - 40.

ERROR Otherwise.

### 2.3.3 Command options:

#VBT?

Returns the current setting of the #VBT command as an ASCII decimal value in result code format.

#VBT=?

Returns the message, "0-40".

#VBT=0

Disables the tone generation capability.

#VBT=1 to 40

Sets tone duration time.

## 2.4 #VCI? - Identify Compression Method

This command queries the modem as to its compression method and raw bits-per-sample capability. . The response is in the form of "<author;method;bits per sample>".

### 2.4.1 Parameters:

None

### 2.4.2 Command option:

#VCI?

USRobotics;GSM;8".

USRobotics;ADPCM;4

## 2.5 #VGR - Voice Receive Gain

*Not available in the Sportster Vi!*

This command sets the speaker volume in speakerphone mode. Based on this parameter, the threshold for the Automatic Gain Control (AGC) is set inside the DCE. The number otherwise has no meaning. The value of zero mutes the speaker. Values larger than 128 indicate a larger gain than nominal and values less than 128 indicate smaller gain than nominal.

### 2.5.1 Parameters:

n = 0 - 255  
Default: 128

### 2.5.2 Result Code:

OK If n = 0 - 255.

ERROR Otherwise.

## 2.6 #VGT - Voice Transmit Gain

*Not available in the Sportster Vi!*

This command sets the sensitivity of the microphone in speakerphone mode. Based on this parameter, the threshold for the Automatic Gain Control (AGC) is set inside the DCE. The number otherwise has no meaning. The value of zero mutes the microphone. Values larger than 128 indicate a larger gain than nominal and values less than 128 indicate smaller gain than nominal.

### 2.6.1 Parameters:

n = 0 - 255  
Default: 128

### 2.6.2 Result Code:

OK If n = 0 - 255.

ERROR Otherwise.

## 2.7 #VLS - Voice Line Select

This action command can be used to select which devices are routed through the modem.

### 2.7.1 Parameters:

n = 0, 1, 2, 3, or 4  
[This is the device position number (not device number) as reflected in response to #VLS=?]

Default: 0

### 2.7.2 Result Codes:

OK If n = 0, 1, 2, 3, or 4.

OK or VCON If n = 6 (see section 4.2.2).

VCON If device selected does not connect to the telephone line. (A speaker is such a device, but a telephone line with speaker ON is not such a device, and generates OK.)

ERROR If n does not equal 0, 1, 2, 3, 4 or 6.

### 2.7.3 Command options:

#VLS?

This query returns the current setting of the #VLS command as an ASCII decimal value in result code format.

#VLS=?

This query requests a report of the device types available for selection. The response is a series of numbers separated by commas, and each number indicates a device position number. Currently, device position numbers do happen to correspond to device type numbers, but this correlation is not required (i.e., 0's could be placed in the first few device position number locations to correspond to multiple telephone line connections).

#VLS=0

The default option on the modem. This command instructs the modem that when entering any of the three voice operating submodes (Online Command, Transmit, or Receive), that the telephone line interface should be routed through the modem. The OK response is sent to the DTE, and any previous connection is lost (i.e., the modem ends up on-hook as a result of issuing this command to connect to the telephone line).

#VLS=1

This command instructs the modem to route only the handset through the modem. This setting can be chosen before recording a greeting message.

#VLS=2

This command instructs the modem to route only the speaker through the modem. This setting can be chosen before playing back any message. The modem immediately switches to Online Voice Command Mode, and the VCON response is generated for completeness. However, since this is an output only device, nothing of consequence can happen until the DTE sends the #VTX command.

#VLS=3

This command instructs the modem that only the auxiliary input device (microphone) should be routed through the modem. This setting can be chosen before recording a greeting message.

#VLS=4

This command is the same as #VLS =0, except that the modem enables the internal speaker as well as the telephone line/handset circuit.

#VLS=6

*Not available in the Sportster Vi modems !*

This command instructs the modem that both the microphone and speaker should be routed through the modem. This setting is required for full duplex AEC speakerphone operation.

## 2.8 #VRA - Ringback Goes Away Timer (Originate)

This command can be used, when originating a voice call (#CLS=8) to set the “Ringback Goes Away” timer value, i.e., an amount of time (in units of 100 ms) measured from when the ringback cadence stops once detected. If ringback is not detected within this period, the modem assumes that the remote has picked up the line and switches to Online Voice Command Mode. Every time a ringback cycle is detected, this timer is reset.

If in SpeakerPhone mode (#VLS=6), the modem will detect ringback, busy and dial tone.

### 2.8.1 Parameters:

n = 0 - 255 (0 - 2.55 seconds)

Default: 70

### 2.8.2 Result Code:

OK If n = 0 - 255.

ERROR Otherwise.

### 2.8.3 Command options:

#VRA?

Returns the current setting of the #VRA command as an ASCII decimal value in result code format.

#VRA=?

Returns the message, “0-255”.

#VRA=0

Turns off the “ringback goes away timer.” After one ringback, the dialing modem sends VCON and enters Online Voice Command Mode immediately.

#VRA=n

Where n defines the period without ringback (after at least one ringback has been detected) in 100 ms units.

## 2.9 #VRN - Ringback Never Came Timer (Originate)

This command can be used when originating a voice call (#CLS=8) to set the “Ringback Never Came” timer value, i.e., an amount of time (in units of 100 ms) measured from completion of dialing. If ringback is not detected within this period, the modem assumes the remote has picked up the line and switches to Online Voice Command Mode.

If in SpeakerPhone mode (#VLS=6), the modem will detect ringback, busy, and dial tone.

### 2.9.1 Parameters:

n = 0 - 255 (0 - 2.55 seconds)

Default: 100

### 2.9.2 Result Code:

OK If n = 0 - 255.

ERROR Otherwise.

### 2.9.3 Command options:

#VRN?

Returns the current setting of the #VRN command as an ASCII decimal value in result code format. #VRN=? Returns the message, "0-255".

#VRN=0

Turns off the "ringback never came timer." After dialing, the modem sends VCON and immediately enters Online Voice Command Mode.

#VRN=n

Where n defines the period without ringback after dialing in 100 ms units.

## 2.10 #VRX - Voice Receive

This action command is only valid if the modem is in the Online Voice Command Mode (indicated previously with the VCON message), and is the switch to the Voice Receive Mode. This command is used when a voice file is to be received from the line, microphone, or handset. The #VLS command should have been previously issued to select the input source.

### 2.10.1 Parameters:

None

### 2.10.2 Result Codes:

CONNECT When voice transfer from modem to DTE can begin.

ERROR If #VLS=0 and not connected to any input device and #VLS=6.

## 2.11 #VSD - Enable Silence Deletion (Voice Receive)

This command is used to enable or disable Voice Receive Mode silence deletion.

### 2.11.1 Parameters:

n = 0 or 1

Default: 0 or 1

### 2.11.2 Result Code:

OK If n = 1.

ERROR Otherwise.

### 2.11.3 Command options:

#VSD?

Returns the current setting of the #VSD command as an ASCII decimal value in result code format.

#VSD=?

Returns the message, "1".

#VSD=0

Turns off the silence deletion.

#VSD=1

Turns on the silence deletion if the silence sensitivity setting #VSS is nonzero. The aggressiveness of the silence deletion is controlled by #VSS.

## 2.12 #VSM - Compression method selection

*Not available in the Sportster Vi!*

This command selects the method of compression and the sampling rate. The format of the command is #VSM=<cml>,<vsr>.

<cml> :

DTE uses this parameter to select the compression method. This subparameter is the means to select the compression method, and has the form of a numerical constant. The DTE can obtain the label and an identifier using the #VSM=? command.

<vsr> :

The DTE selects the DCE Voice sampling rate from among those supported; listed in the response of the #VSM=? command. The units are samples for second. This value overwrites the #VSR command.

#VSM=?

The response for this command will be <cml>,<cmid>,<vsr><cr><lf><cml><cr><lf>

<cml> : this sub parameter is a numerical label of the compression method.

<cmid> : This sub parameter is a string describing the Compression method.

<vsr> : This sub parameter is a range of values that contains the DCE supported range of voice samples per second of the analog signal. e.g. :

128,"GSM/USR",8000

129,"ADPCM/USR",8000

#VSM?

The response for this command should be the current compression method and the sampling rate. e.g., 128,8000

## 2.13 #VSK - Buffer Skid Setting

No action. Supported for compatibility issues.

## 2.14 #VSP - Silence Detection Period (Voice Receive)

This command sets the Voice Receive Mode silence detection period (inactivity timer) value. The parameter, in units of 100 ms, can be used when receiving voice data. This is an amount of time, which if elapsed without receiving any ADPCM data, causes the modem to send the <DLE>s or <DLE>q codes after insuring that the buffer is empty. There are two cases:

1. With the modem's silence deletion feature enabled, the #VSP setting is in effect an inactivity timer. The modem must reset this timer on every byte of voice data received.
2. With the modem's silence deletion feature disabled, the modem determines what constitutes silence. This involves monitoring and debouncing the modem value for average energy. If this debounced value is less than an arbitrary threshold constituting the modem's definition of silence for a period greater than that defined by the #VSP setting, the modem sends the <DLE>q or <DLE>s shielded code to the DTE.

### 2.14.1 Parameters:

n = 0 - 255 (0 - 25.5 seconds)

Default: 55

### 2.14.2 Result Code:

OK If n = 0 - 255.

ERROR Otherwise.

### 2.14.3 Command options:

#VSP?

Returns the current setting of the #VSP command as an ASCII decimal value in result code format.

#VSP=?

Returns the message, "0-255".

#VSP=0

Turns off the silence period detection timer.

#VSP=n

Where n defines the period without received voice data in 100 ms units.

## 2.15 #VSR - Sampling Rate Selection

This parameter, along with the bits per sample (#VBS) command, determines the necessary DTE interface speed to transmit and receive in the Voice Mode.

### 2.15.1 Parameter:

n = 8000 (8000 Hz sampling rate)

Default: 8000

### 2.15.2 Result Codes:

OK If n = 8000.

ERROR Otherwise.

### 2.15.3 Command options:

#VSR?

Returns the current setting of the #VSR command as an ASCII decimal value in result code format.

#VSR=?

Returns the message, "8000".

#VSR=8000

Default.

## 2.16 #VSS - Silence Detection Tuner (Voice Receive)

This command enables or disables the Voice Receive mode silence detection, and controls the sensitivity employed by the modem in compressing periods of silence.

### 2.16.1 Parameters:

n = 0 - 3

Default: 2

### 2.16.2 Result Codes:

OK If n = 0 - 3.

ERROR Otherwise.

### 2.16.3 Command options:

#VSS?

Returns the current setting of the #VSS command as an ASCII decimal value in result code format.

#VSS=?

Returns the message, "0-3".

#VSS=0

Disables silence detection by the modem when in Voice Receive Mode.

#VSS=1

Least sensitive setting. When this command is received by the modem, the system is configured to a state which is least likely to detect and compress periods of silence, but still able to do so if the line is really quiet.

#VSS=2

Midrange setting (default). When this command is received by the modem, the system is configured to a state that is likely to be the best overall compromise on normal telephone lines.

#VSS=3

Most sensitive setting. When this command is received by the modem, the system is configured to a state that is most likely to detect and compress periods of silence.

## 2.17 #VTD - DTMF Tone Reporting

This command queries and controls which types of tones can be detected and reported to the DTE via shielded codes in Voice Transmit, Voice Receive, and Online Voice Command Modes.

### 2.17.1 Parameters:

i,j,k (three ASCII hexadecimal bit maps)

Default: 3F,3F,3F

### 2.17.2 Result Codes:

OK If bits supported with #VTD=? are selected.

ERROR Otherwise.

### 2.17.3 Command options:

VTD?

Returns the current setting of the #VTD command as an ASCII decimal value in result code format.

#VTD=?

Returns the tone reporting capabilities of the modem.

#VTD=i,j,k

Where i,j,k corresponds (in ASCII hexadecimal) to the desired capabilities, as shown in Table 2-1, for Voice Transmit, Voice Receive, and Online Voice Command Modes, respectively.

*Table 2-1. #VTD Tone Detection/Reporting Bit Settings*

Bit	Description
0	0 = Disable DTMF tone capability; 1 = Enable DTMF tone capability
1	0 = Disable V.25 1300 Hz Calling tone capability 1 = Enable V.25 1300 Hz Calling tone capability
2	0 = Disable T.30 1100 Hz Facsimile Calling tone capability 1 = Enable T.30 1100 Hz Facsimile Calling tone capability
3	Reserved
4	Reserved

5	0 = Disable call progress tone and cadence (e.g., busy and dial tone) capability 1 = Enable call progress tone and cadence (e.g., busy and dial tone) capability
6	Reserved
7	Reserved

## 2.18 #VTS - Generate Tone Signals (Online Voice Command)

This action command can be issued to play one or more DTMF or other tones (such as a “beep”) if and only if the modem is in the Online Voice Command Mode. The modem parses and plays the tones defined in the parameter in the order listed, and no key abort is accepted. The parameter can have three types of elements separated by commas: Dual or Single Tones: These are represented by a substring enclosed in square brackets (“[ ]”) within the parameter. Each such substring consists of three sub-elements corresponding to 2 frequencies in Hz (0, or 200-3000) and a duration (ASCII decimal in units of 100 ms).

Varying DTMF Digits: This is represented by a substring enclosed in curly braces (“{ }”) within the parameter. Each such substring consists of two sub-elements corresponding to a DTMF digit (0-9,A-D,\*,#), and alternate durations in units of 100 ms.

### 2.18.1 Parameters:

The tone generation consists of elements in a list with each element separated by commas.

### 2.18.2 Result Codes:

OK Command to play tones on currently selected device is accepted.

ERROR Command was not issued during Online Voice Command Mode or string is grammatically incorrect.

## 2.19 #VTX - Voice Transmit

This action command can be issued if and only if the modem is in the Online Voice Command Mode (indicated previously with the VCON message), and is the switch to Voice Transmit Mode. #VTX is used when a voice file is to be transmitted to the line, speaker, or handset. The #VLS command should have been previously issued to select the output source.

### 2.19.1 Parameters:

None

### 2.19.2 Result Codes:

CONNECT When voice transmission by DTE can begin.

ERROR If #VLS =0 and output device not connected and #VLS=6.

## 3. Shielded Codes

### 3.1 Shielded <DLE> Commands from the DCE

<DLE>0 - <DLE>9, <DLE>\*, <DLE>#, <DLE>A -<DLE>D

DTMF. Digits 0 through 9, \*, #, or A through D detected by the modem, i.e., user has pressed a key on a local or remote telephone. The modem sends only one <DLE> code per DTMF button pushed.

<DLE>b

Busy. Sent in Voice Receive Mode when the busy cadence is detected, after any remaining data in the voice receive buffer. The modem sends the busy <DLE>b code every 3 seconds if busy continues to be detected or ignoring what could be a false busy detection.

<DLE>c

Calling Tone. Sent when the T.30 1100 Hz Calling Tone (Fax Modem) is detected in any of the voice operating modes. The modem assumes that the calling tone is valid and sends this code only after 3 seconds of proper cadence has been detected. If the DTE does not react to the <DLE>c, and calling tone continues, the code is sent again as often as once every 3 seconds.

<DLE>d

Dialtone. Sent in Voice Receive Mode when dial tone is detected after any remaining data in the voice receive buffer. The modem sends the <DLE>d code every 3 seconds if dial tone continues to be detected and the DTE does not react. This allows the DTE the flexibility of ignoring what could be a false dial tone detection.

<DLE>e

Data Modem Calling Tone. Sent when the V.25 1300 Hz Calling Tone (Data Modem) is detected in a voice submode. The modem assumes that the calling tone is valid, and sends this code only after 4 seconds of proper cadence has been detected. If the DTE does not react to the <DLE>e and calling tone continues, the code is sent again as often as once every 4 seconds.

<DLE>q

Quiet. Sent in Voice Receive Mode following any remaining data in the receive voice buffer when the silence detection timer (#VSP) expires and there has been voice data passed to the DTE. Note that with #VSS=0, the Quiet message never occurs. But with silence deletion turned on, #VSS may not in itself be sufficient since "cracks and pops" for a short duration directly after a connection should not be considered voice. In general, <DLE>q is sent if first there was sound, and now there is no sound, and means that somebody has stopped talking, and according to the criteria selected in the #VSP and #VSS settings, is probably not going to start again. If the DTE ignores the <DLE>q code, the modem automatically resets its timer and sends the code again if the #VSP time period again expires. This allows the DTE time to react to what may be a false silence detection.

<DLE>s

Silence. Sent in Voice Receive Mode after the silence detection timer (#VSP) expires and if valid voice has not been detected (#VSS).

In general, <DLE>s is sent if no sound was detected at all. This differs slightly from Quiet (<DLE>q) in that it can be used by the DTE in its discrimination algorithms as a means of determining if anything at all is coming from the remote station. If the DTE ignores the <DLE>s

code, the modem automatically resets its timer and sends the code again if the #VSP time period a gain expires. This allows the DTE time to react to what may be a false detection of silence.

#### **<DLE><ETX>**

End of Stream. <DLE><ETX> is sent to denote the end of a voice data stream, similar to fax Class 1 and 2. This occurs in Voice Receive Mode only after the DTE issues the key abort.

### **3.2 Shielded <DLE> Commands from the DTE**

Most commands issued for voice are implemented as extensions to the AT command set, and are accepted only if the modem is in a valid command mode, such as Online Voice Command Mode. However, there are some operations that are available to the DTE without necessitating a switch to Online Voice Command Mode. The most obvious of these is the <DLE><ETX> which the DTE issues during Voice Transmit Mode to terminate an output message.

#### **<DLE><ETX>**

Terminate. Sent during Voice Transmit Mode to indicate that the DTE has finished transmitting a voice message. The modem completes transmission of any remaining data in the voice transmit buffer before responding with the VCON message and entering Online Voice Command Mode. (This command is ignored by the modem when not in Voice Transmit Mode.)

#### **<DLE><CAN>**

Cancel. Sent during Voice Transmit Mode to indicate that the DTE has finished transmitting a voice message and wants the modem to discard any remaining data in the voice transmit buffer. The modem immediately purges its buffer and then responds with the VCON message entering Online Voice Command Mode. (This command is ignored by the modem when not in Voice Transmit Mode.)

## 4. S-Registers

The following S-register is global, meaning that it can be set in any appropriate mode (i.e., any #CLS setting).

### 4.1 S30 - Deadman (Inactivity) Timer

#### 4.1.1 Parameters:

n = 0 - 255

Default: 0 (OFF, which means DTE should usually set it to some value for Voice)

#### 4.1.2 Command options:

S30=0 Deadman timer off. No matter how long it might continue, the modem never spontaneously hangs up the telephone line or switches to autobaud mode as a result of inactivity.

S30=1 to 255 This is the period of time (in seconds), which if expired causes the modem to hang up the telephone line if it is off-hook and no data has passed during the period. The timer is also active whenever the #BDR setting is non-zero. In order to avoid a state where speed sense is disabled (even though the PC can crash, come back up, and try to issue commands at what should be a supported speed), the inactivity time-out occurs if there is no data passed on the DTE interface within the S30 period, even if the modem is on-hook. The software must not select a nonzero setting for #BDR until it is ready to establish a telephone call or virtual connection to a speaker or microphone. When there is an inactivity time out with #CLS=8, the modem always forces #CLS=0 and #BDR=0.

### 4.2 S41 - Voice Options Bitmap

*Available only in x2 Sporsters!*

#### 4.2.1 Parameters:

n = 0 - 255 (bitmapped options)

Default: 4 (0 on USA versions)

#### 4.2.2 Command Options:

Bit	Decimal	Option
0	1	<b>Distinctive Ring functionality (USA versions only)</b> 0= Disabled 1= Enabled
1	2	<b>#VLS=6 result code</b> 0= VCON 1= OK.
2	4	<b>GSM Framing selection</b> 0= Encapsulated 1= Un-encapsulated

### 4.3 S46 - TAD Volume Command

This S-register is global, meaning that it can be set in any appropriate mode (i.e., any #CLS setting).

**4.3.1 Parameters:**

n = 50, 0 - 255

**4.3.2 Command options:**

Linear scale determining the volume output from the modem to the world.

## 5. Result Codes for Voice Operation

### 5.1 VCON

VCON is sent when the modem is configured for voice (#CLS=8), or when after answering or originating a call, the modem enters the Online Voice Command Mode for the first time.

Typically, this is immediately after an off-hook in answer mode, and after ringback ceases in originate mode. VCON is also sent when the DTE requests a switch from Voice Transmit Mode to Online Voice Command Mode by issuing a <DLE><ETX> to the modem, or when the DTE requests a switch from Voice Receive Mode to Online Voice Command Mode via the key abort.

See section 4.2.2 for #VLS=6 particularities.

### 5.2 CONNECT

CONNECT is sent when switching from the Online Voice Command Mode to either Voice Receive Mode via the #VRX command, or to Voice Transmit Mode via the #VTX command. This message is sent to the DTE to inform it that it may begin receiving or sending ADPCM data.

## 6. GSM audio format for voice products

### 6.1 Introduction

This document covers the GSM audio format used in USRobotics voice products. It includes detailed information of the GSM bit stream format. On the Web site **Error! Bookmark not defined.** there are some info and examples.

The GSM specs can be purchased at :

ETSI (European Telecommunications Standards Institute)  
ETSI Secretariat  
B.P.152  
F-06561 Valbonne Cedex  
France

Phone: +33 92 94 42 00  
Fax: +33 93 65 47 16  
Telex: 47 00 40 F

Ask for specification : prI-ETS 300 036

The ETSI home page on the World Wide Web can be found at **Error! Bookmark not defined..**

### 6.2 GSM data format

A GSM frame consists of 260 bits which contains 20ms of audio information. The 260 bits GSM frame is made up of 36 bits for filter parameters and four sub frames of 56 bits each as shown in table 1. Details of the filter parameters and the sub frames can be found in the GSM recommendation ESTI 06.10.

Currently, there is no official definition for the arrangement of the bits in a GSM frame. There is, however, an adopted arrangement as shown in table 2. Publicly available GSM players and audio format conversion utilities use the arrangement as the standard GSM format.

The 260 bit GSM frame divides into 32.5 bytes. For byte alignment, the GSM frame is extended to 264 bits for 33 bytes as in the standard GSM frame format. The 4 bits extension is labeled as the "Head" of a GSM frame as shown in table 2. To ID the type of GSM data stream, the 4 bits head is used store a "magic key". For GSM recommendation 06.10 the head is set with the value 13 for 13kbs rate.

**Table 6.1**

Parameter	Parameter number	Var name	Number of bits
Filter Parameters	1	LAR1	6
	2	LAR2	6
	3	LAR3	5
	4	LAR4	5
	5	LAR5	4
	6	LAR6	4
	7	LAR7	3
	8	LAR8	3
Sub Frame1	9	N1	7
	10	B1	2
	11	M1	2
	12	Xmax1	6
	13	X1(0)	3
	14	X1(1)	3
	..	.....	
Sub Frame2	25	X1(12)	3
	26	N2	7
	27	B2	2
	28	M2	2
	29	Xmax2	6
	30	X2(0)	3
	31	X2(1)	3
Sub Frame3	..	.....	
	42	X2(12)	3
	43	N3	7
	44	B3	2
	45	M3	2
	46	Xmax3	6
	47	X3(0)	3
48	X3(1)	3	
Sub Frame4	..	.....	
	59	X3(12)	3
	60	N4	7
	61	B4	2
	62	M4	2
	63	Xmax4	6
	64	X4(0)	3
65	X4(1)	3	
Sub Frame4	..	.....	
	76	X4(12)	3

**Table 6.2 GSM Bit Stream Format**

Index	Byte1	Byte2
1	Head(4) LAR1(4/6)	LAR1(2/6) LAR2(6)
2	LAR3(5) LAR4(3/5)	LAR4(2/5) LAR5(4) LAR6(2/4)
3	LAR6(2/4) LAR7(3) LAR8(3)	N1(7) B1(1/2)
4	B1(1) M1(2) XMAX1(5/6)	XMAX1(1/6) X10(3) X11(3) X12(1/3)
5	X12(2/3) X13(3) X14(3)	X15(3) X16(3) X17(2/3)
6	X17(1/3) X18(3) X19(3) X110(1/3)	X110(2/3) X111(3) X112(3)
7	N2(7) B2(1/2)	B2(1/2) M2(2) XMAX2(5/6)
8	XMAX2(1/5) X20(3) X21(3) X22(1/3)	X22(2/3) X23(3) X24(3)
9	X25(3) X26(3) X27(2/3)	X27(1/3) X28(3) X29(3) X210(1)
10	X210(2) X211(3) X212(3)	N3(7) B3(1/2)
11	B3(1/2) M3(2) XMAX3(5/6)	XMAX3(1/6) X30(3) X31(3) X32(1/3)
12	X32(2/3) X33(3) X34(3)	X35(3) X36(3) X37(2/3)
13	X37(1/3) X38(3) X39(3) X310(1/3)	X310(2/3) X311(3) X312(3)
14	N4(7) B4(1/2)	B4(1/2) M4(2) XMAX4(5/6)
15	XMAX4(1) X40(3) X41(3) X42(1/3)	X42(2/3) X43(3) X44(3)
16	X45(3) X46(3) X47(2/3)	X47(1/3) X48(3) X49(3) X410(1/3)
17	X410(2/3) X411(3) X412(3)	

### 6.3

## USR's GSM data format

The USR's GSM format is similar to the standard GSM format. Also, with each voice product release, the format of USR's GSM format has changed.

In the voice products based on the Sportster 28800 Vi architecture, the head of the GSM frame is set to zero and the GSM frame is encapsulated by a two bytes head and a three bytes tail. As shown in figure 1, the value of the head may either be FE FE hex for audio or B6 B6 hex for silence. The value of the tail is 00 A5 A5 hex.

This format is also supported on ALL modem sold in North America.

Whitney GSM Format

Audio Frame FE FE	Head 0	GSM frame 32.5 bytes	00 A5 A5
Silence Frame B6 B6	Head 0	GSM frame 32.5 bytes	00 A5 A5

*Figure 1*

In the International (outside North America) Sportster Voice products based, the format is compliant with the ETSI specification (except for Sportster 28800 Vi – see above). The difference is located in the head of the GSM frame. As shown in figure 2, the head of the GSM frame is set with the value 13 (or D hex) instead of zero

Rushmore and Matterhorn GSM Format

Audio Frame FE FE	Head D	GSM frame 32.5 bytes	00 A5 A5
Silence Frame B6 B6	Head D	GSM frame 32.5 bytes	00 A5 A5

*Figure 2*

The Sportster 14400 Vi product for the countries : Austria, France, Italy and Spain are with a GSM format that is compliance with the standard GSM format as shown in table 2. Its GSM format is compatible with the GSM format used by GSM players and conversion utilities. For backward compatibility, it is able to do auto-detection between USR's GSM format and the standard GSM format.

See also section 4.2 for switching between GSM formats.