
# VC-20™ Serial Speech Data Interface Application Note

**Version 1.2**
**Nov, 2002**

DIGITAL VOICE SYSTEMS, INC.
The Speech Compression Specialists

# VC-20™ Serial Speech Data Interface Application Note


Digital Voice Systems, Inc
234 Littleton Road
Westford MA 01886



### Trademarks

# VC-20™ Vocoder Board END USER License Agreement

## 1.0 Preliminary Statements and Definitions

1.1 "Voice Codec" shall mean the hardware, software and associated documentation referred to in the invoice or shipping papers accompanying this agreement for which END USER has requested a license, and any derivative works thereof, including modifications, enhancements and extensions made by or for Digital Voice Systems, Inc. (DVSI) and including circuit diagrams, timing diagrams, programmable logic software, logic diagrams, layouts, operating instructions and user manuals.

1.2 "AMBE™ Software" shall mean the speech coding software and/or firmware provided as part of the Voice Codec. This software is contained in the Read Only Memories (ROMS, EPROMS, EEPROMS, etc...) which are included as part of the Voice Codec. This software includes any derivative works which have as their source the software contained in the Read Only Memories, and it includes the software contained in any future Read Only Memories which DVSI may provide END USER for use in the Voice Codec.

1.3 "Designated Site" shall mean the location of the Voice Codec.

1.4 "Proprietary Information" shall mean the information which DVSI desires to protect against unrestricted disclosure or competitive use and which is designated as such in writing by DVSI or is disclosed orally and within thirty (30) days thereafter is reduced to tangible form pursuant to this License.

1.5 DVSI represents that it owns certain “Proprietary Rights” in the Technology and the AMBE® Voice Compression Software, including patent rights in the Technology, and patent rights, copyrights, and trade secrets in the AMBE® Voice Compression Software.

## 2.0 License Granted

2.1 Subject to the conditions herein and upon initial use of the AMBE™ Software within the VC-20™ - Vocoder Board, DVSI hereby grants to END USER a non-exclusive, limited license to use the AMBE® Voice Compression Software in machine readable form solely on the VC-20™ - Vocoder Board. Title to the AMBE® Voice Compression Software remains with DVSI. No license is granted for use of the AMBE® Voice Compression Software on other than the VC-20™ - Vocoder Board. No license, right or interest in any trademark, trade name or service mark of DVSI is granted under this Agreement.

2.2 END USER shall not copy, extract, de-compile, reverse engineer or disassemble the AMBE® Voice Compression Software contained in the VC-20™ - Vocoder Board.

2.3 Transfer of License

(a) END USER may transfer the AMBE™ Software and all rights under this agreement to a third party together with a copy of this Agreement provided that END USER provides DVSI with a written notification of the transfer and provided that the third party agrees in writing to accept all the terms and conditions of this agreement. Upon any such transfer, END USER's rights under this Agreement shall terminate pursuant to Section 3.0.

(b) END USER may relocate the Voice Codec, and the subsequent location shall then be considered the Designated Site.

(c) Except as provided in this Section 2.2, this Agreement, the AMBE™ Software and any other information provided by DVSI to END USER and any licenses and rights granted hereunder, may not be sold, leased, assigned, sublicensed or otherwise transferred, in whole or in part, by END USER.

2.4 END USER shall not de-compile, reverse engineer or disassemble the AMBE™ Software.

## 3.0 Term and Termination

3.1 This Agreement is effective upon initial use of the AMBE™ Software on the Voice Codec and shall remain in effect until terminated in accordance with this agreement.

3.2 This Agreement shall terminate automatically without notice from DVSI if END USER fails to comply with any of the material terms and conditions herein. END USER may terminate this Agreement at any time upon written notice to DVSI certifying that END USER has complied with the provisions of Section 3.3.

3.3 Upon termination of this Agreement for any reason, END USER shall: (i) have no further rights to the AMBE™ Software; (ii) discontinue all use of the AMBE™ Software; and (iii) destroy or, at DVSI's option, return all copies of the AMBE™ Software.

## 4.0 Payments

4.1 In consideration of the hardware, software, and associated materials provided as part of the VC-20™ - Vocoder Board, and in consideration of the license and rights in the AMBE™ Software granted by DVSI, and in consideration of DVSI's performance of its obligations hereunder, END USER agrees to pay to DVSI the fee specified in DVSI's invoice.

4.2 In consideration of the materials provided as part of VC-20™ - Vocoder Board, and in consideration of the license and rights in the AMBE® Voice Compression Software granted by DVSI, and in consideration of DVSI's performance of its obligations hereunder, END USER agrees to pay to DVSI the fee specified in DVSI's invoice.

## 5.0 Proprietary Notices

5.1 END USER shall not remove any copyright or proprietary notice on the on the AMBE® Voice Compression Software or VC-20™ - Vocoder Board.

## 6.0 Proprietary Information

6.1 The parties agree that the AMBE® Voice Compression Software shall be considered Proprietary Information.

6.2 Except as otherwise provided in this Agreement, END USER shall not use, disclose, make, or have made any copies of the Proprietary Information, in whole or in part, without the prior written consent of DVSI.

6.3 END USER shall make reasonable efforts to notify and inform its employees having access to the Proprietary Information of END USER's limitations, duties and obligations regarding nondisclosure and

copying of the AMBE™ Software. Proprietary Information shall be used only by employees of END USER and only at the Designated Site, except as provided under this agreement.

6.4 END USER shall have no obligations for disclosure or use of Proprietary Information which: (i) is already known to END USER, at time of disclosure by DVSI; (ii) is or becomes publicly known through publication, inspection of product or otherwise through no wrongful act of END USER; (iii) is received from a third party without restriction and without breach of this Agreement; (iv) is independently developed by END USER; (v) is disclosed to a third party by or on behalf of DVSI without restriction; or (vi) is approved for release or use by written authorization of DVSI.

6.5 Notwithstanding any termination pursuant to Section 3.0, the obligations set forth in this Section 6.0 shall survive termination of this Agreement.

### 7.0 Limited Warranty

7.1 DVSI warrants the VC-20™ - Vocoder Board and the AMBE™ Software to be free from defects in materials and workmanship under normal use for a period of ninety (90) days from the date of delivery. DVSI further warrants that the VC-20™ - Vocoder Board and the AMBE™ Software operate in accordance with the written specifications delivered to END USER with the Voice Codec.

7.2 Except as stated in Section 7.1, the VC-20™ - Vocoder Board and AMBE™ Software are provided "as is" without warranty of any kind. DVSI does not warrant, guarantee or make any representations regarding the use, or the results of the use, of the Voice Codec or AMBE™ Software with respect to its correctness, accuracy, reliability, currentness or otherwise. The entire risk as to the results and performance of the VC-20™ - Vocoder Board or AMBE™ Software is assumed by the END USER. After expiration of the warranty period, END USER, and not DVSI or its employees, assumes the entire cost of any servicing, repair or correction of the Voice Codec or the AMBE™ Software.

7.3 DVSI warrants that it has the right to enter into this Agreement and to grant a license to use the AMBE™ Software to END USER.

7.4 Except as specifically set forth in this Section 7.0, DVSI makes no express or implied warranties including, without limitation, the warranties of merchantability or fitness for a particular purpose or arising from a course of dealing, usage or trade practice, with respect to the Voice Codec or AMBE™ Software. Some states do not allow the exclusion of implied warranties, so the above exclusion may not apply to END USER. No oral or written information or advice given by DVSI or its employees shall create a warranty or in any way increase the scope of this warranty, and END USER may not rely on any such information or advice. The limited warranties under this section 7.0 give END USER specific legal rights, and END USER may have other rights which vary from state to state.

### 8.0 Limitation of Liability

8.1 In no event shall DVSI be liable for any special, incidental, indirect or consequential damages resulting from the use or performance of the Voice Codec or VC-20™ - Vocoder Board whether based on an action in contract, tort (including negligence) or otherwise (including, without limitation, damages for loss of business profits, business interruption, and loss of business information), even if DVSI or any DVSI representative has been advised of the possibility of such damages.

8.2 Because some states do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitations may not apply to END USER.

8.3 DVSI's maximum liability for damages arising under this Agreement shall be limited to 20% (twenty percent) of the fees paid by END USER for the particular Voice Codec or VC-20™ - Vocoder Board which caused the damages or that is the subject matter of, or is directly related to, the cause of action.

### 9.0 Taxes

9.1 All payments required under Section 4.0 or otherwise under this Agreement are exclusive of taxes and END USER agrees to bear and be responsible for the payment of all such taxes (except for taxes based upon DVSI's income) including, but not limited to, all sales, use, rental receipt, personal property or other taxes which may be levied or assessed in connection with this Agreement.

### 10.0 Export

10.1 United States export laws and regulations prohibit the exportation of certain products or technical data received from DVSI under this Agreement to certain countries except under a special validated license. As of May 20, 1996 the restricted countries are: Libya, Cuba, North Korea, Iraq, Serbia, Montenegro, and Iran. The END USER hereby gives its assurance to DVSI that it will not knowingly, unless prior authorization is obtained from the appropriate U.S. export authority, export or re-export, directly or indirectly to any of the restricted countries any products or technical data received from DVSI under this Agreement in violation of said United States Export Laws and Regulations. DVSI neither represents that a license is not required nor that, if required, it will be issued by the U.S. Department of Commerce. Licensee shall assume complete and sole responsibility for obtaining any licenses required for export purposes.

### 11.0 Governing Law

11.1 This Agreement is made under and shall be governed by and construed in accordance with the laws of the Commonwealth of Massachusetts, except that body of law governing conflicts of law. If any provision of this Agreement shall be held unenforceable by a court of competent jurisdiction, that provision shall be enforced to the maximum extent permissible, and the remaining provisions of this Agreement shall remain in full force and effect.

### 12.0 Notices

12.1 Any notices to DVSI which may be given hereunder shall be in writing and sent to: Digital Voice Systems Inc., One Van de Graaff Drive, Burlington, MA., 01803, U.S.A.

# 1. Introduction

The Digital Voice Systems, Inc. (DVSI) VC-20™ - - voice codec is a full-duplex real-time voice processing board. The VC-20™ - - contains proprietary software which implements the Advanced Multi-Band Excitation™ (AMBE™) voice coding algorithm. DVSI grants a license to its customers to use this software according to the terms established in the attached AMBE™ Software END USER License Agreement. Use of the VC-20™ - -, or any portion thereof, signifies acceptance of these licensing terms.

The VC-20™ - - operates by digitizing an analog speech signal using an on-board A-to-D converter. This digitized speech is then processed by the encoder and converted into a data bit stream. This bit stream is output to a modem or similar device. Simultaneously, the VC-20™ - - receives a data bit stream from a modem or similar device. This received bit stream is processed by the decoder and converted into a synthetic speech signal which is then converted into an analog signal using the on-board D-to-A converter. The encoder and decoder are fully asynchronous.

The VC-20™ vocoder board is designed to use an Analog Devices AD28msp02 codec during normal operation. This normal configuration can be modified so that the onboard codec is disabled and the 16-bit linear digital interface can be used.

# 2. Operation

Connections are made to the VC-20™ Serial Speech Data Interface using signals on ROW B and ROW C of the attached DIN 41612 connector which is described in Section 4. When using the Serial speech data interface **the onboard codec MUST be disabled by installing a JUMPER in Position 13 of JP1**.

VC-20--Connector Signals

| **Name** | **Direction** | **Description** |
|---|---|---|
| | | |
| SCLK | Input | Serial Port Shift Clock |
| DX | Output | Serial Speech Data Output (16–bit linear) |
| DR | Input | Serial Speech Data Input (16–bit linear) |
| FSX | Input | Data Output Framing Signal |
| FSR | Input | Data Input Framing Signal |
| SP_RDY | Output | Serial Port Ready Signal |
| | | |

## 3. VC-20™ Connector Signals for Serial Speech Data Interface

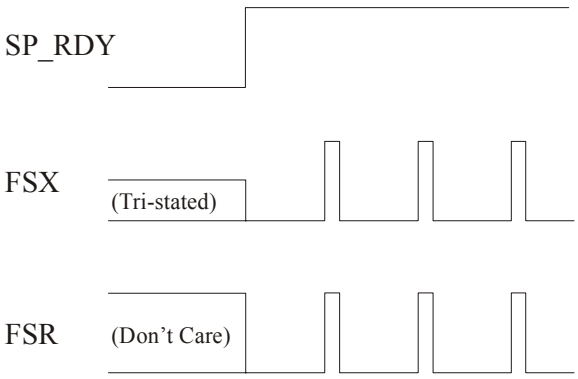
SCLK
The Serial port shift clock clocks in both the received speech data and the transmitted speech data. The frequency of this signal must be within the range 128kHz. – 5.16MHz.. Data is clocked out on the rising edge of SCLK and clocked in on the falling edge (see Section 6. Timing Diagrams).

DX
The speech data from the VC-20™ is clocked serially out on DX. These 16-bit linear words are clocked out MSB first. The range of these twos complement coded words is –32768 to 32767. (see Section 6. Timing Diagrams).

DR
The Speech data to the VC-20™ is clocked in serially on DR. These 16-bit linear words are clocked in MSB first. The range of these twos complement coded words is –32768 to 32767. (see Section 6. Timing Diagrams). It is recommended that the speech input be zero-mean at an average level of 22dbm0. Note: The maximum sinusoidal input (+/-32767) corresponds to +3.17 dBm0.

FSR, FSX
The data input and output framing signals must come at a frequency of 8kHz. and have a duration of one cycle of SCLK. These two signals must come from the same source (see Section 5. Example Configuration). As outlined below FSX must be tri-stated when SP_RDY is low to avoid multiple drivers on the same line.

SP_RDY
This active High Signal indicates that the serial port is ready to deliver and receive speech data. SP_RDY is low upon reset, once it goes high it stays high until another reset condition occurs. When SP_RDY is low FSX must be tri-stated to avoid a double driving condition. To avoid a reboot, the 8kHz. framing signals must be valid once SP_RDY becomes active (see figure below). The speech input data is ignored for a period of 10-50ms. after activation of SP_RDY while initialization of the channel occurs. (see Section 5. Example Configuration)



## 4. Connection Specifications DIN 41612 Connector (male)

| Pin No. | ROW C | | ROW B | | ROW A | |
|---|---|---|---|---|---|---|
| | Function | Name | Name | Function | Function | Name |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | Output | DX | | |
| 7 | Output | SP_RDY | Input | FSX | | |
| 8 | | | | | | |
| 9 | | | Input | SCLK | | |
| 10 | | | | | | |
| 11 | | | Input | DR | | |
| 12 | | | Input | FSR | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
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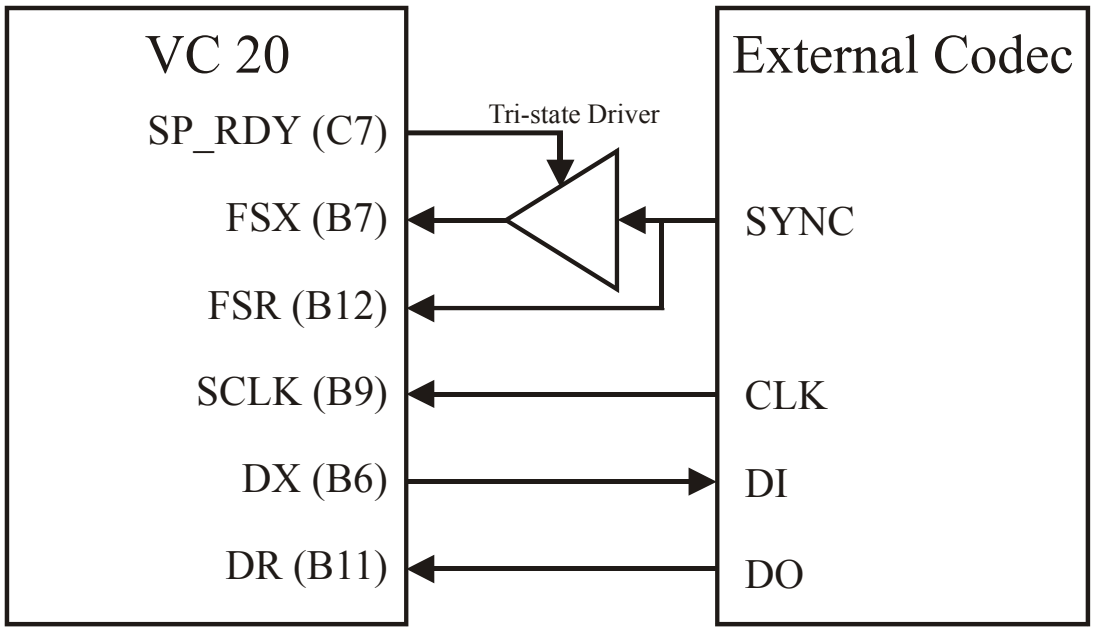
SEE VC-20™ Users Manual

SEE VC-20™ Users Manual

**See corresponding VC-20 Manual for remaining pin-out of Rows A and C**

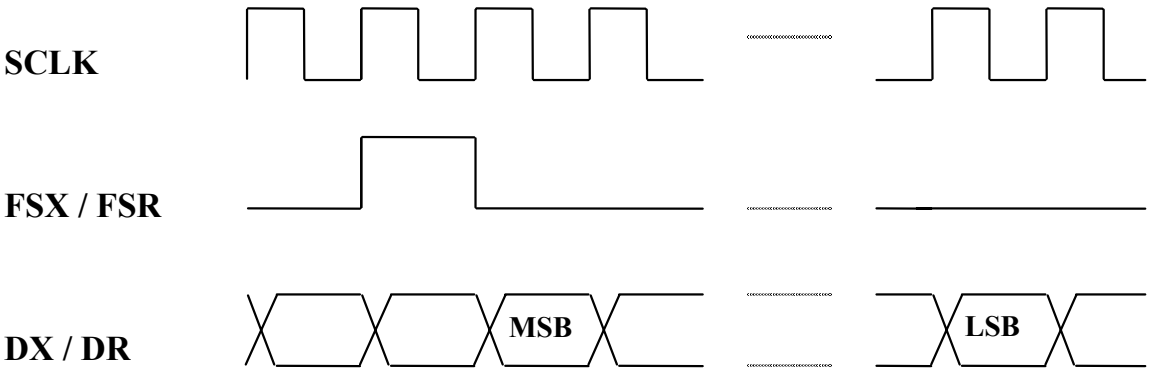
Note: Input = INPUT to the VC-20
Output = OUTPUT from the VC-20

## 5. Example Configuration



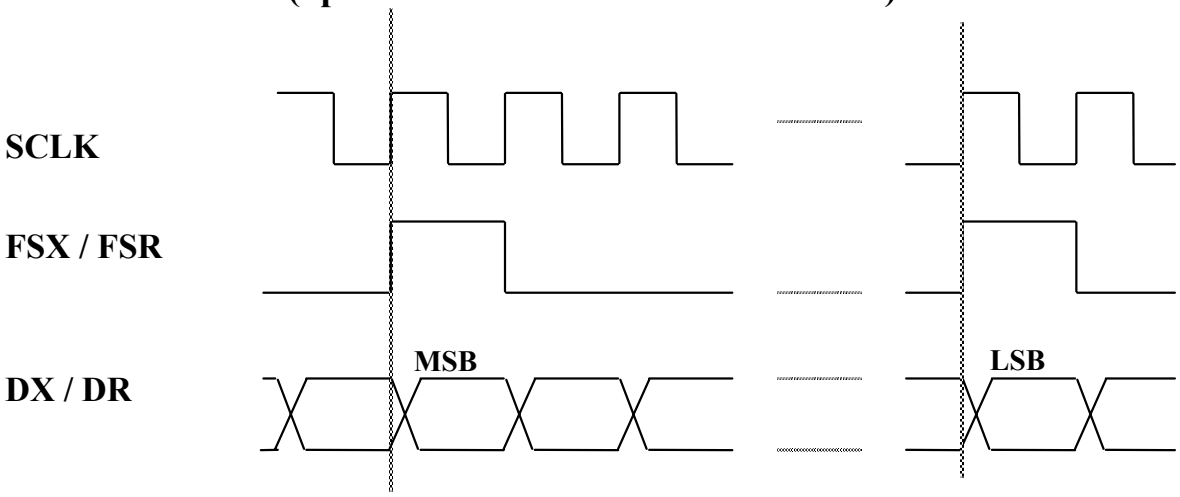

## 6. Timing Diagrams

**Burst Mode (128kHz. < SCLK < 5.16 MHz.)**



## 6. Timing Diagrams (cont'd)

### Continuous Mode (Special Case when SCLK = 128 kHz.)




## 7. DVSI Technical Support

If you have any problems with the VC-20™ - - or have questions about its operation, please contact:

**Digital Voice Systems, Inc.**
**234 Littleton Road**
**Westford, MA 01886**

**Phone: (978) 392-0002**
**Fax: (978) 270-8866**

**email: info@dvsinc.com**
**web: www.dvsinc.com**