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06/30/2003	1.0	Initial Release	KD

AIR/GROUND COMMUNICATIONS
ACB-560

Voice Channel Module 2 (VCM2)
Module Manual

CIE Engineering, Inc.

The VCM2 has been funded by:

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William J. Hughes Technical Center
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Originator:	J CHEN	06/30/2003
Approved:		
Checked:		
Checked:		

CIE ENGINEERING INC.
6001 Woodlake Lane, Alexandria, VA 22310 (703) 922-7061

Title: **Voice Channel Module 2 (VCM2)** Module Manual

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1.0 INTRODUCTION

This Module Manual provides detailed information about the Voice Channel Module (VCM2)

The VCM2 module is part of the NEXCOM Real Time Platform (RTP). The RTP handles the real-time functions of the Prototype Radio Interface Unit (PRIU) and/or the Prototype Ground Network Interface (PGNI). The VCM2 module interfaces to RCE providing audio and radio control signals to the RIU. The VCM2 optionally can be the source of audio by use of the headset and microphone jacks. The VCM2 can also be the source of radio control signals by use of the front panel switches.

The VCM2 has been developed for the **NEXCOM Group (ACB-560)** of the Federal Aviation Administration's William J. Hughes Technical Center. The NEXCOM Group supports the following NEXCOM programs:

Next Generation A/G Communications System (NEXCOM)

Rapid Prototype Development Effort (RPDE)

NEXCOM System Demonstrations

1.1 PURPOSE

The purpose of this document is to present Voice Channel Module 2 (VCM2) specifications and operating instructions.

The VCM2 and associated documentation are intended solely to facilitate development of NEXCOM avionics. The VCM2 and associated documentation neither implies nor imposes functional, performance, design or other requirements, nor in any way alters the existing industry agreements.

1.2 DOCUMENT CONVENTIONS

N/A.

1.3 INTENDED AUDIENCE AND READING SUGGESTIONS

This document is intended for NEXCOM contractors.

1.4 REFERENCES

Reference documentation includes:

- Analog Devices, 218x DSP Hardware Reference, Analog Devices Part Number 82-002010-01.

1.5 REVISION HISTORY

Date	Revision	Description of Changes
06/30/2003	1.0	Initial Release

2.0 GENERAL DESCRIPTION

2.1 OVERVIEW

Figure 1 provides a overview of the system

Figure 1. FAA Remote Site

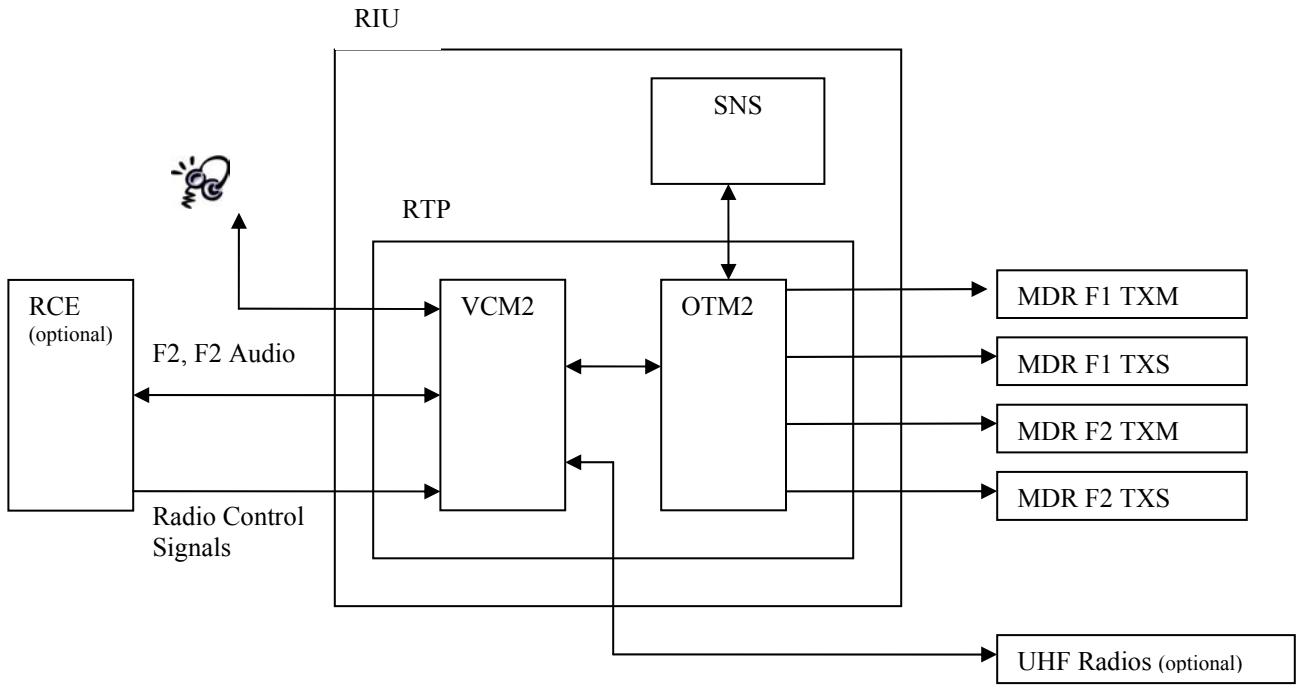
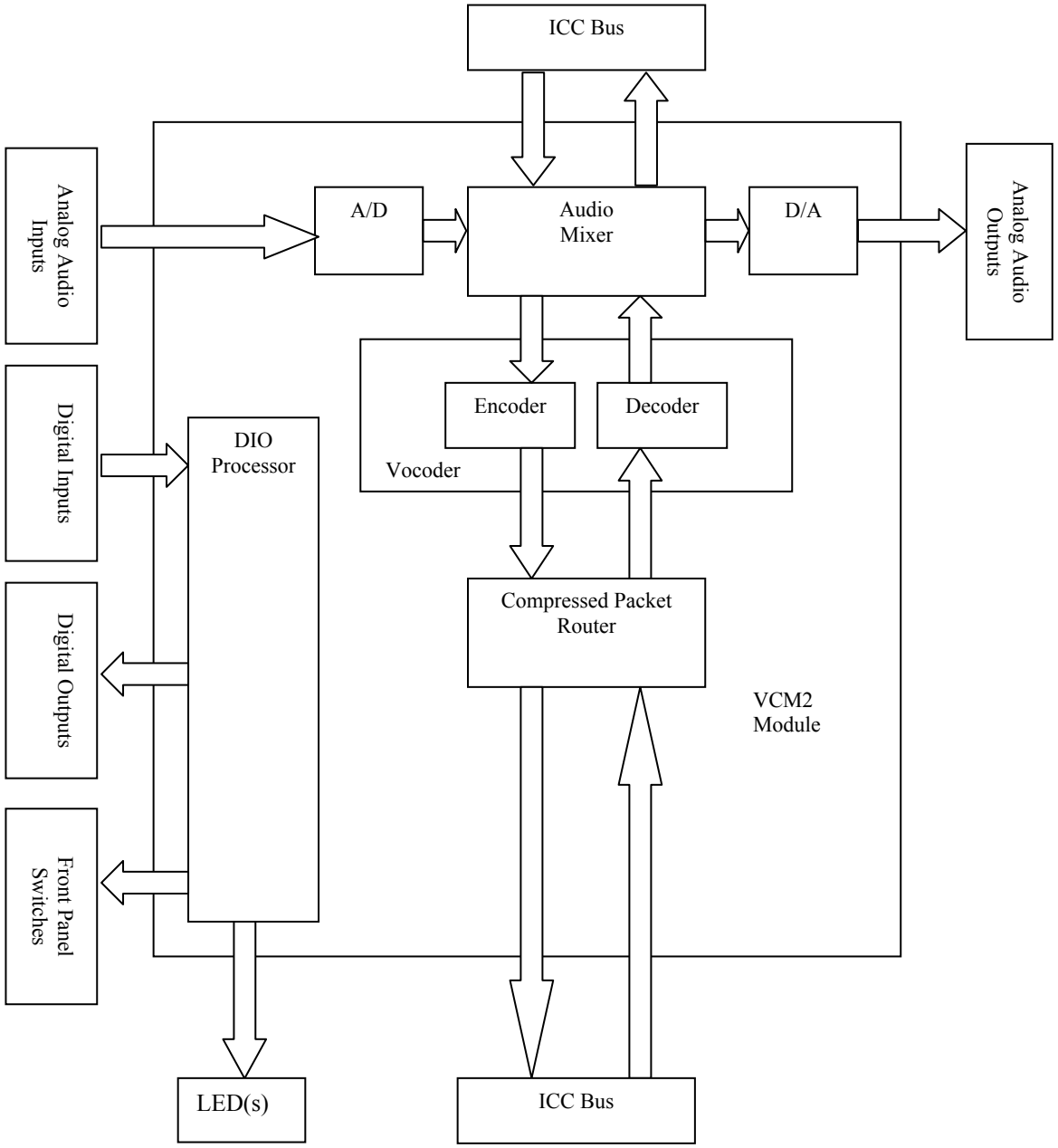


Figure 2 provides an interface diagram for the Voice Channel Module 2 (VCM2).

Figure 2. Voice Channel Module 2 (VCM2) Block Diagram



3.0 CONNECTORS, CONTROLS & INDICATORS

The VCM2includes the following connecters and LED displays

- Control I/O connecter (1 each) –
- Audio I/O connecter (1 each) – Analog audio input and output
- Headphone connecter (1 each) – Output for headset monitor audio
- Microphone/Push to Talk connecter (1 each) – Input for microphone and push to talk local override
- LED Indicators (12) – Unit mode and status information
- Front Panel Switches (5) – Radio Signal Override

Figure 3 contains illustrations of the VCM2interface panel showing the location of connectors and LEDs. The following sections contain connector/pin out and LED display information. See 6.0 for functional information.

3.1 PHONE CONNECTOR

The VCM2 provides both a 3.5mm and .250" standard monaural headset jacks. The connector signals are internally wired together, so use only one jack at a time. The large jack is compatible with Sigtronics Model S-20 Headset. The front panel PHONE connector is the default user voice interface.

Table 1. PHONE Connector Pin Out

Pin	LARGE Jack	SMALL Jack
Tip	Headphone (positive)	Headphone (negative)
Ring	Not Appliable	Not connected
Sleeve	Headphone (negative)/GND	Headphone (positive)

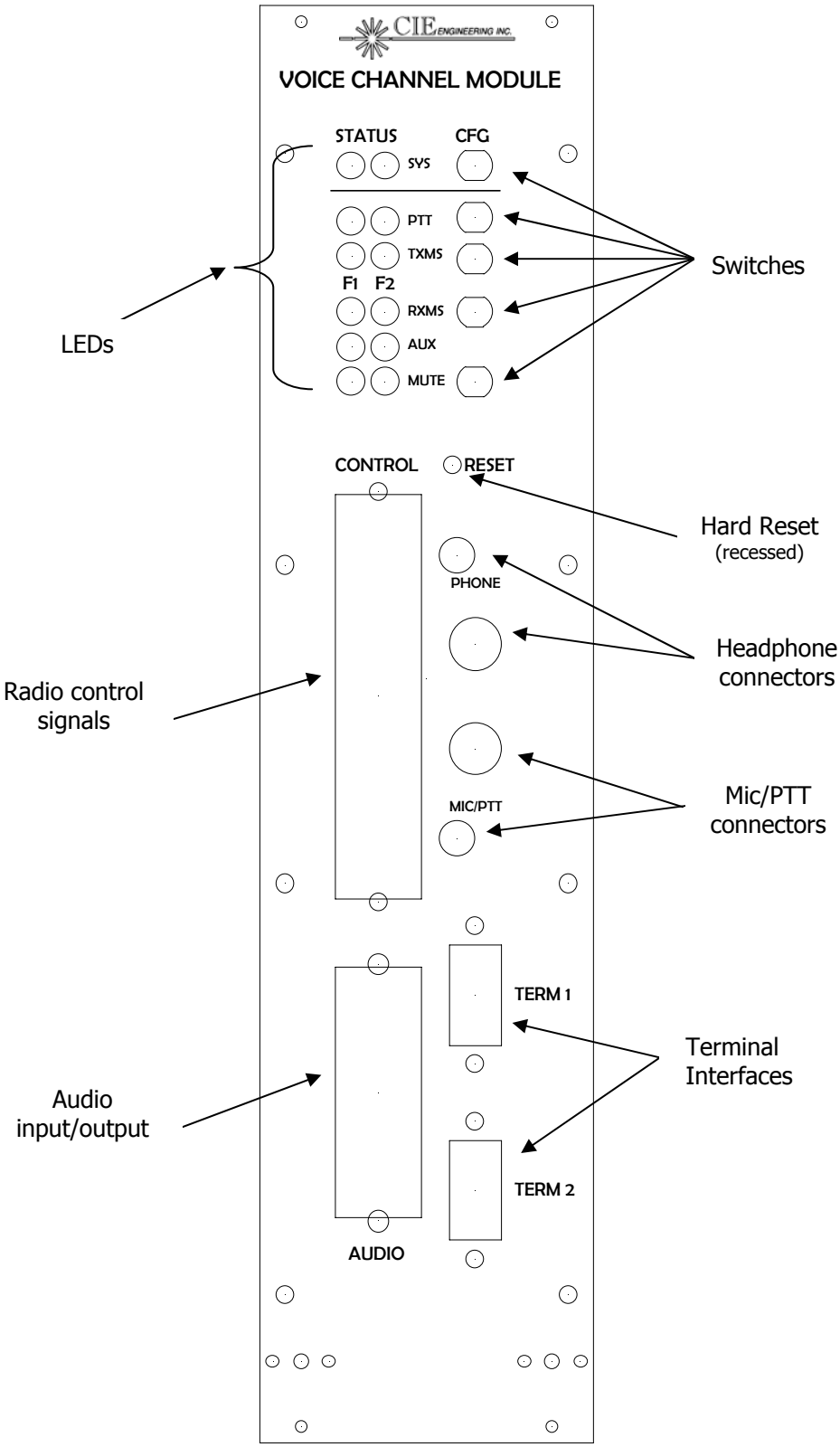
3.2 MIC/PTT CONNECTOR

The VCM2 provides both a 3.5mm and .206" standard microphone/PTT connectors. The connector signals are internally wired together, so use only one jack at a time. The large jack is compatible with Sigtronics Model S-20 Headset with separate PTT adapter. The front panel MIC/PTT connector is the default user voice interface.

Table 2. MIC/PTT Connector Pin Out

Pin	LARGE Jack	SMALL Jack
Tip	Microphone	Push To Talk
Ring	Push To Talk	Microphone
Sleeve	Ground	Ground

Figure 3. VCM2 Front Panel Illustration



3.3 AUDIO CONNECTOR

The 24 pin AUDIO connector provides the interface for transferring analog audio to the VCM2 module. Table 3 provides connector pin and signal information.

Table 3. Analog Audio Input Output Signal Description			
Symbol	**Pin**	**Pin Type**	**Name/Function**
A1-	24	Input	FMTX1M – Frequency 1 main transmit
A1+	12		
A2-	23	Input	FMTX1S – Frequency 1 standby transmit
A2+	11		
A3-	21	Input	FMTX2M – Frequency 2 main transmit
A3+	10		
A4-	21	Input	FMTX2S – Frequency 2 standby transmit
A4+	9		
A5-	20	Input	UHFRXM – UHF main receive
A5+	8		
A6-	19	Input	UHFRXS – UHF standby receive
A6+	7		
B1-	6	Output	FMRX1M – Frequency 1 main receive
B1+	18		
B2-	5	Output	FMRX1S – Frequency 1 standby receive
B2+	17		
B3-	4	Output	FMRX2M – Frequency 2 main receive
B3+	16		
B4-	3	Output	FMRX2S – Frequency 2 standby receive
B4+	15		
B5-	2	Output	UHFTXM – UHF transmit main
B5+	14		
B6-	1	Output	UHFTXS – UHF transmit standby
B6+	13		

3.4 CONTROL CONNECTOR

The 50 pin CONTROL connector provides digital input output (DIO) control signals that can be used by the RCE to alter the state of the VCM. Controls includes signals such as push to talk (PTT), and main/standby radio selection,

Table 4. Digital Input Output Signal Description			
Symbol	**Pin**	**Pin Type**	**Name/Function**
DIN00	16	Input	F1 Push to Talk Main (PTTM) +12 VDC, Push to Talk Selected 0 VDC, Push to Talk *not* Selected
DIN01	17	Input	F1 Push to Talk Standby (PTTS) +12 VDC, Push to Talk Selected 0 VDC, Push to Talk *not* Selected
DIN02	18	Input	F1 Transmitter Main/Standby Select (TXMS) +12 VDC, Standby Selected 0 VDC, Main Selected
DIN03	19	Input	F1 Receive Main/Standby Select (RXMS) +12 VDC, Standby Selected 0 VDC, Main Selected

Table 4. Digital Input Output Signal Description			
Symbol	**Pin**	**Pin Type**	**Name/Function**
DIN04	20	Input	F1 Mute Select +12 VDC, Mute Selected 0 VDC, Mute *not* Selected
DIN06	22	Input	F2 Push to Talk Main (PTTM) +12 VDC, Push to Talk Selected 0 VDC, Push to Talk *not* Selected
DIN07	23	Input	F2 Push to Talk Standby (PTTS) +12 VDC, Push to Talk Selected 0 VDC, Push to Talk *not* Selected
DIN08	24	Input	F2 Transmitter Main/Standby Select (TXMS) +12 VDC, Standby Selected 0 VDC, Main Selected
GND	25		Ground
GND	41		Ground
+24	42	Output	Provides +24V
+12	43	Output	Provides +12V
DIN10	48		F2 Mute Select +12 VDC, Mute Selected 0 VDC, Mute *not* Selected
DIN9	49		F2 Receive Main/Standby Select (RXMS) +12 VDC, Standby Selected 0 VDC, Main Selected
GND	50		Ground
Unused	1-15, 21 26-40, 44-47		These pins are unused and should be left unconnected

3.5 FRONT PANEL SWITCHES

The VCM2 contains 5 three 3 position front panel switches and 1 push to talk switch attachment point. The front panel switches can be used to override the radio control states received over the DIO interface. The switches are designated SYS, PTT, TXMS, RXMS, MUTE (see Figure 4).

The SYS switch is a front panel control switch. When placed in the left position the front panel overrides the F1 control signals, center overrides both F1 and F2, right only F2 is overridden. The switch functions are described in Table 5

Note: To enable the MIC/PTT switch, ensure the PTT switch is placed in the RIGHT position.

Figure 4. VCM2 Switch Designations

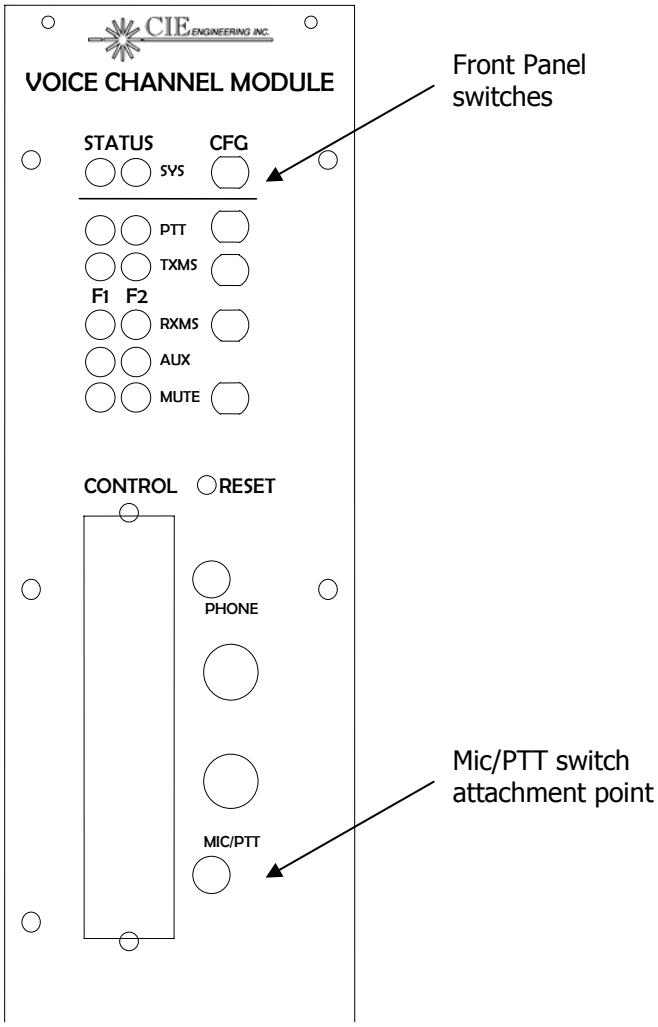


Table 5. Switch Functions

Switch	Position		
	Left	**Middle**	**Right**
SYS	F1 control	F1, F2 Control	F2 Control
PTT	Assert push to talk	No Override	Push to talk not asserted
TXMS	Select TX Main Radio	No Override	Select TX Standby Radio
RXMS	Select RX Main Radio	No Override	Select RX Standby Radio
MUTE	Mute Selected	No Override	No Mute Selected

Switch	Position	
	Pressed	**Released**
MIC/PTT	Assert push to talk	push to talk not asserted

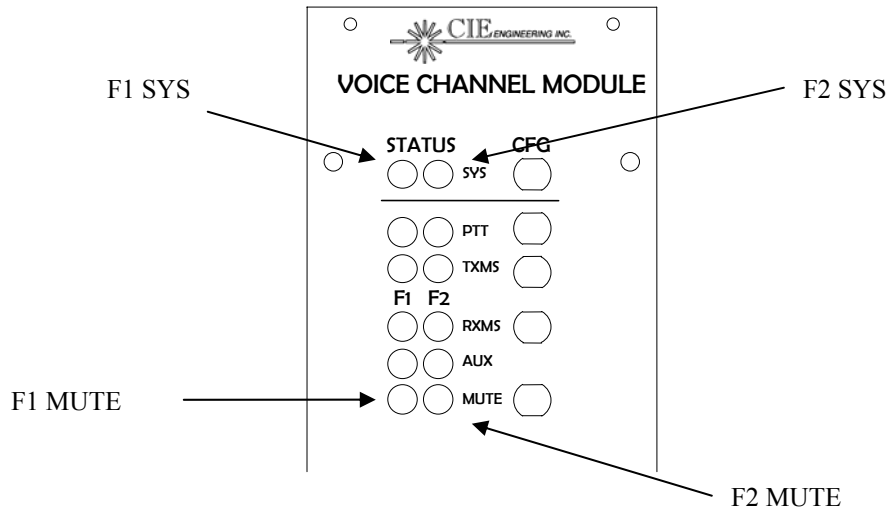
3.6 FRONT PANEL LEDS

3.6.1 LED Locations

The VCM2 module contains 12 external LEDs used to indicate system status. The LEDs have two modes of operation. During POST the LEDs indicate POST status. After POST has completed the LEDs indicate the transmitter and receiver selected for the different frequencies.

The front panel LEDs are designated by its column followed by its row see Figure 5.

Figure 5. VSS LED Designations



3.6.2 Runtime LED(s)

The LEDs will be used to display the current PTT and main/standby radio selections. See Table 6.

Table 6. LED Functions

LED	Led States				
	Off	**Green**	**Blink Green**	**Red**	**Blink Red**
F1 SYS	Unused	Unused	System operating normally	System error detected	Unused
F1 PTT	No PTT asserted	PTT Main selected	Error, Main PTT selected, standby transmitter selected	PTT Standby selected	Error, Standby PTT selected, Main Transmitter selected
F1 TXMS	Unused	TX main selected	Unused	TX standby selected	Unused
F1 RXMS	Unused	RX main selected	Unused	RX standby selected	Unused
F1 AUX	Unused	Normal Audio	Unused	Peak audio detected	Unused
F1 MUTE	No mute selected	Mute selected	Unused	Unused	Unused
F2 SYS	No ICC Bus activity	Unused	ICC Bus activity	ICC Bus error	Unused
F2 PTT	No PTT asserted	PTT Main selected	Error, Main PTT selected, standby transmitter selected	PTT Standby selected	Error, Standby PTT selected, Main Transmitter selected
F2 TXMS	Unused	TX main selected	Unused	TX standby selected	Unused
F2 RXMS	Unused	RX main selected	Unused	RX standby selected	Unused
F2 AUX	Unused	Normal Audio	Unused	Peak audio detected	Unused
F2 MUTE	No mute selected	Mute selected	Unused	Unused	Unused

3.6.3 POST

During POST the external LEDs are used to indicate POST status. If a POST test should fail the LEDs will not transition to runtime behavior but will instead hold the last POST status state. The LEDs in the following discussion will be referred to according to Table 7

Table 7. External LED labels

F1	F2	Label
11	10	Status
9	8	PTT
7	6	TXM/S
5	4	RXM/S
3	2	MUTE
1	0	SQBRK

Led Meaning:

LEDs 2-5 are used to indicate the numeric identification of the VCM2 module.

	LED State			
VCM2 id	**LED 8**	**9**	**6**	**7**
0	Green	Off	Off	Off
1	Off	Green	Off	Off
2	Off	Off	Green	Off
3	Off	Off	Off	Green

LEDs 6-7 are used to indicate the clocking of the sport 0 bus

	LED State	
Sport 0 Clocking	**LED 4**	**5**
Local	Green	Off
Remote	Off	Green
Incorrect Rate	Red	Red

LED 0 is used to indicate the status of the A/D

	Led State
A/D State	**LED 10**
Good	Green
Bad	Red

LEDs 8-9 are used to indicate the number of vocoders present on the VCM

	LED State	
Number Vocoder	**LED 2**	**3**
0	Red	Red
1	Green	Off
2	Off	Green

3.7 TERMINAL (TERM) INTERFACE

The VCM2 provides two standard computer RS-232 serial ports for communicating with the system. The terminal interface is used for configuration of the system and status retrieval.

The VCM2 terminal connectors are a standard DB-9F (socket type pins). Both TERM interfaces use the standard asynchronous ASCII communication protocol with the following communication parameters:

- 115200 bps, 8 data bits, 1 stop bit, no parity, hardware handshaking.

Table 8. Host Interface (HOST) – Signal Descriptions (J5)			
Symbol	**Pin**	**Pin Type**	**Name/Function**
HOST_CD	1	O	Carrier Detect: Not used.
HOST_RD	2	O	Receive Data:
HOST_TD	3	I	Transmit Data:
HOST_DTR	4	I	Data Terminal Ready: Not used.
HOST_DSR	6	O	Data Send Ready: Not used.
HOST_RTS	7	I	Request to Send: Not used.
HOST_CTS	8	O	Clear to Send: Not used.
HOST_RI	9	O	Ring Indicator: Not used.
GND	5	GND	Signal Ground

4.0 INSTALLATION

By default the front panel headset and microphone connectors are used for F1, F2, TX and RX. The recommended headset for the systems is Sigtronics Model S-20 with PTT switch adapter.

If UHF audio is desired it should be input over the 24 pin audio connector (see Table 3).

If external radio control signals are to be used they should be connected the 50 pin DIO connector (see Table 4).

A terminal can be connected to either the TERM1 or TERM2 connector to monitor module status. See Section 3.7.

5.0 OPERATION

5.1 STANDALONE RIU OPERATION

The default voice routing and control configuration for the VCM2 supports standalone RIU operation with a local ground voice interface. The VCM2 must be connected to an OTM2 and SNS to operate properly in this configuration. By default the source of the audio for F1, F2 TX is the front panel microphone and the headset is monitoring F1, F2 RX audio.

Before operating the VCM2:

1. Insure a headset is connected to the front panel voice jacks (PHONE and MIC/PTT).
2. Insure the front panel SYS switch is in the CENTER position.
3. Insure the front panel PTT switch is in the RIGHT position. The push to talk switch on the MIC/PTT jack is only enabled when the front panel PTT switch is in the left most position.
4. Insure the rest of the RIU system is powered up and operational.
5. Review the notes below.

   Note: The main standby radio selection switches should only be used if main and standby radios are present.

   Note: When the RCE interface is connected to the 50-pin CONTROL interface, the front panel switches on the VCM2 override the state of the radio selection signals received on the CONTROL interface.. When the front panel switches are in the middle position the system behaves according to the signals received over the CONTROL interface. When the front panel switches are in the left or right position the signals will be overridden.

To use the VCM2 ground interface:

1. Key the headset PTT switch and speak into the headset microphone to transmit.

   The front panel PTT LED lights. The F1 AUX LED lights when audio energy is detected. If VDL3 mode is enabled by the OTM2/SNS equipment, the F2 SYS LED blinks GREEN during transmission.

2. Release the headset PTT switch and listen at the headset speakers to monitor downlink traffic.

   The F1 AUX LED lights when audio energy is detected. If VDL3 mode is enabled by the OTM2/SNS equipment, the F2 SYS LED blinks GREEN during reception.

5.2 UPGRADING VCM2 SOFTWARE

The Firmware program contained in the VCM2 is field upgradeable via the serial port on TERM1. Please contact CIE Engineering regarding the availability of upgrade programs.

The procedure to upgrade the software is as follows:

1. Connect a terminal to TERM1. Make sure that the terminal has hardware handshaking disable for this procedure.
2. Apply power to the module or perform a hardware reset with the recessed button on the front panel.

   "Booting …" and a spinning cursor will appear on the terminal for a few seconds
3. Press the escape key during the spinning cursor, before the startup sequence begins printing to the screen.

   This will stop the boot sequence and provide a DSP Debugger prompt, which is a "!".
4. Type "DL" and then <ENTER> on the terminal.

   The flash memory will be erased and the user will be asked to pick a file.
5. Select "Transfer File" from the terminal program. In HyperTerminal go to the "Transfer" menu and click on "Send File"
6. Select the s-record file that has been supplied for upgrade and use the Xmodem transfer protocol.
7. Send the file.

   The file will be transferred and validated. It may take several minutes to transfer the file, do not remove power or reset during the transfer.
8. Cycle power or perform a reset.

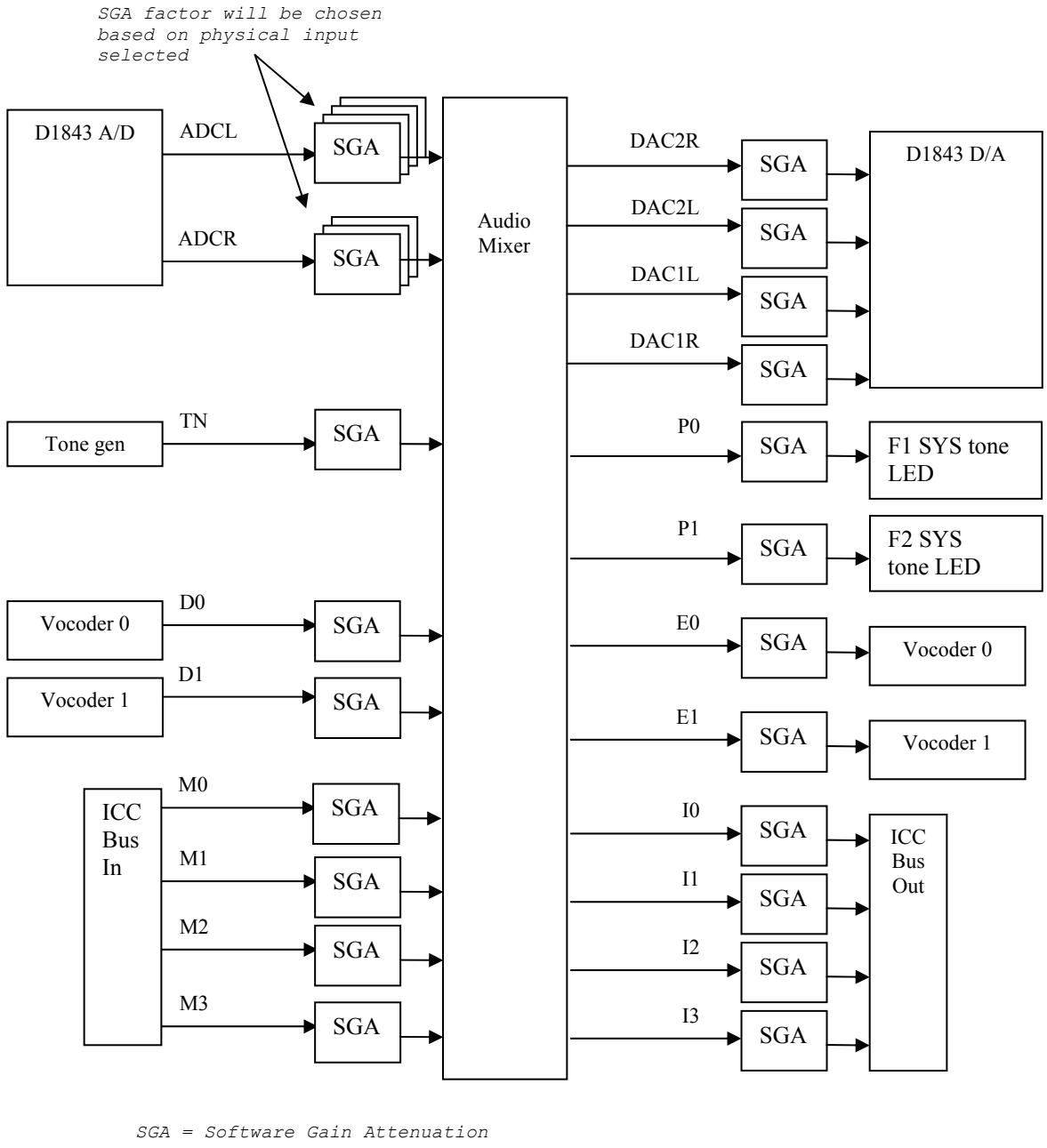
   After normal booting, the new software version will be displayed at startup or with the **VERSION** command.

6.0 FUNCTIONAL DESCRIPTION

6.1 VOICE FLOWS

Figure 6 details the flow of audio through the system.

Figure 6. Audio Flow in System



6.1.1 Analog to Digital, Digital to Analog Converter

An Analog Devices AD1843 codec provides A/D and D/A functionality for the VCM2 module. The codec contains two analog to digital converters, four digital to analog converters and several audio selectors.

The codec is configured to sample the audio at an 8 KHz rate. The codec outputs 16-bit signed values.

The A/D channels are labeled ADCL, ADCR. The analog audio (A1 – A6) input passes through a selector before being passed through to the A/D this provides the ability to have more audio input channels than A/D converters.

The D/A channels are labeled DAC2R, DAC2L and DAC1R, DAC1L. The output for each D/A converter is driven on all of its outputs simultaneously. For example the same audio is heard on outputs B1 – B2.

The audio inputs and outputs are grouped by function for each channel. Inputs A1-A4 is collectively known as F1F2TX, A5-A6 UHFRX. The outputs B1-B2 is known as F1RX, B3-B4 F2RX, B5-B6 UHFTX, DAC1L headset.

The microphone input has the ability to override the input audio on either of the A/D converters. The headset has its own dedicated D/A converter, by utilizing the mixer it is possible for the headset to monitor any combination of inputs and outputs to/from the codec. Several "canned" audio routing modes are provided.

6.1.2 Audio Selector Control

The audio selector is controlled as a side affect of the radio selection commands. F1 and F2 TX are used to modify the selector for ADCL. F2 RX is used to modify the selector for input ADCR.

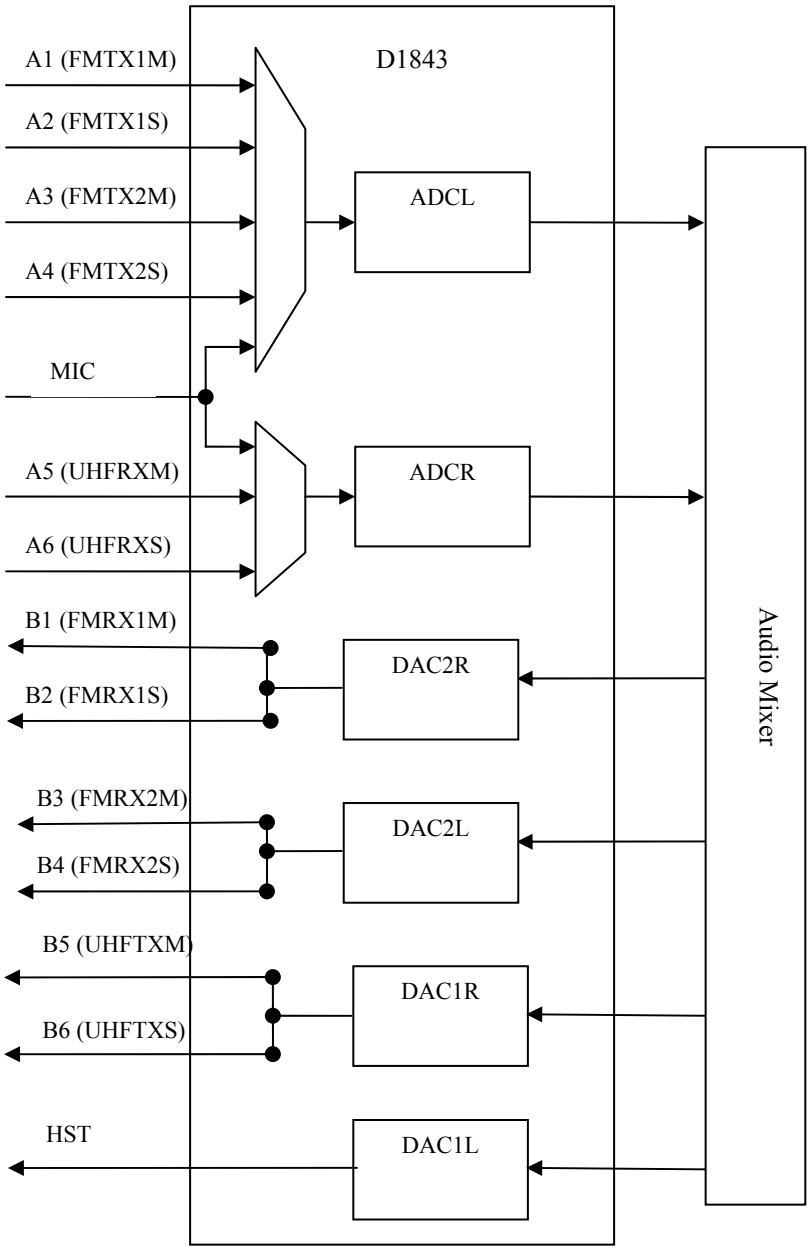
For example if F1 TX Main is selected audio for ADCL will come from the A1 audio input. If F2 RX Standby is selected audio for ADCR will come from the A6 audio connector.

The ADCL input has 4 audio input sources and two control sources, this results in interesting behavior. The ADCL connector will always use the **last input source selected** as source of audio.

For example: If F1 TX Main is selected the audio input will be A1. If F2 TX Main is subsequently selected the input for ADCL will be A3.

Figure 7 is a logical diagram of the codec as configured by the VCM.

Figure 7. Analog Audio Connecters



6.2 LINEAR AUDIO MIXER

The mixer provides basic audio mixing and routing capability for linear audio inputs and outputs. The mixer receives and outputs 16-bit signed audio. The mixer can combine any number of inputs on a single output. If the summed inputs were to exceed a signed 16-bit value the result would saturate.

By default the mixer outputs 0's on an output channel.

6.2.1 Software Gain Attenuation (Volume Control)

Individual volume controls are provided for each input (A1 – A6, microphone, VOC 0, VOC 1, test tone, ICC 0, ICC 1, ICC 2, ICC 3, ICC 4) and output (B1 – B6, headphone, VOC 0, VOC 1, ICC 0, ICC 1, ICC 2, ICC 3. The volume adjustment is implemented as a multiplier with a range of 0 to 63.998 in .00195 step increments. The SGA blocks are controlled with the VOL command (see Terminal Command Reference). A value of 0200 (hex) corresponds to a gain of 1.

The VCM2 supports multiple SGA blocks for the ADCL and ADCR signals. An SGA value is available for each multiplexed input. The VCM2 software automatically selects the appropriate SGA block based on the input for the codec.

6.2.2 Audio Activity / Level Indication

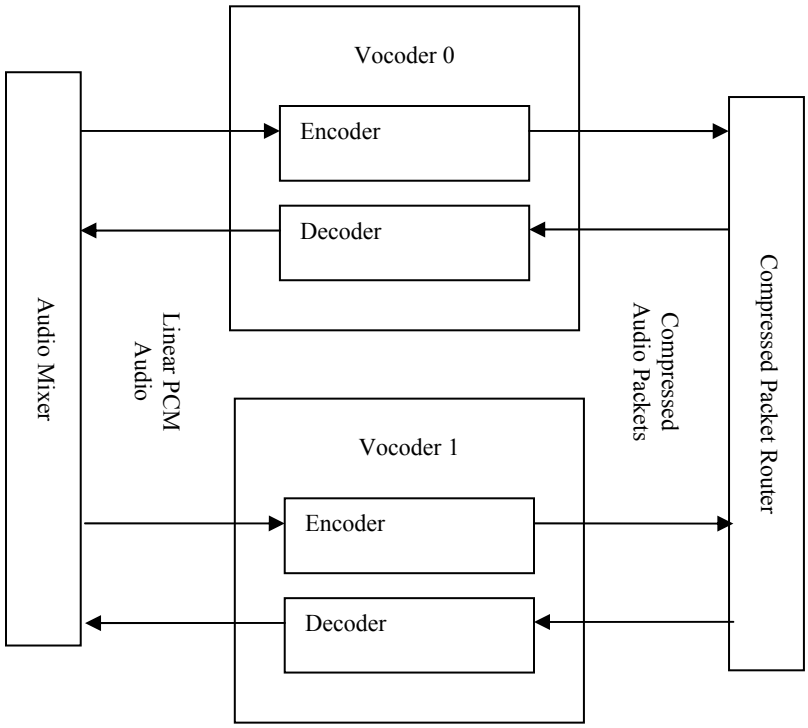
The F1, F2 Aux LEDs are used as an audio activity / level indicator. The LED is off if no audio is detected, blink green if audio is detected and blink red if peak audio is detected. If there is a constant stream of audio or peak audio the LED will not blink but will be solid green or solid. The F1 Aux LED is currently used to monitor both downlink and uplink audio.

6.3 VOCODER OPERATION

The VCM2 uses a Digital Voice Systems Inc. (DVSI) VC-20-MTC voice codec (vocoder) to compress/decompress the linear audio provided by the AD1843 codec. The vocoder converts a 128kbps linear audio stream into a 4.8kbps compressed data stream and vice versa. The compressed data stream is provided in packet format and will be referred to as "compressed voice packets" through out this document. The vocoder utilizes the ATC-10B algorithm to encode the audio.

The VCM2 can operate with one or two vocoders. The number of vocoders present in the system is automatically detected during boot. In general the VCM2 will only operate with a single vocoder.

Figure 8. Vocoder

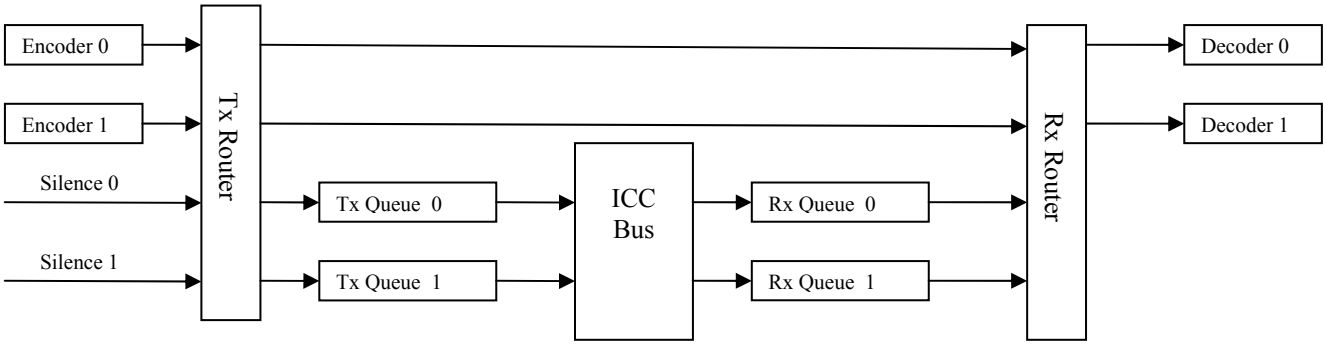


6.4 COMPRESSED PACKET ROUTER

The router is responsible for transferring the compressed voice packets to the correct location in the VCM. At its most basic the router receives compressed voice packets from the encoder section of the Vocoder and transmits compressed voice packets to the decoder section of the Vocoder. The compressed voice routers can make any 1 to 1 connection between the inputs and outputs in a router. The queues leading to and from the ICC bus have a depth of 9 packets. The queue depth of 9 packets was chosen such that the VCM2 would be able to receive an entire MAC burst (6) of compressed voice packets with room to spare. The router is capable of generating a special "silence" compressed voice packet. The silence packet ensures that the vocoder generates silence on the linear output.

Note: When the compressed packet router is operating in loop back mode (encoder output directly connected to decoder) the compressed packet delay will be greatly reduced

Figure 9. Compressed Packet Router



7.0 TERMINAL COMMAND REFERENCE

The VCM2provides a simple command line interface. The command line interface is case sensitive and commands must be entered as described in the command listing below

7.1 CONTROL I/O COMMANDS

7.1.1 RCSIG

Command:	RCSIG
Description:	Display or modify radio control
Syntax	RCSIG [LINE] [STATE]
Parameters:	If SIG and STATE not present displays state of all radio control signals If STATE not present displays state of SIG SIG – Signal to be displayed/modified P1 – Push to talk F1 Main Q1 – Push to talk F1 Standby P2 – Push to talk F2 Main Q2 – Push to talk F2 Standby T1 – Transmitter F1 T2 – Transmitter F2 R1 – Receiver F1 R2 – Receiver F2 M1 – Mute F1 M2 – Mute F2 STATE – Desired state of signal If signal is P1, Q1, P2, Q2, M1, M2 0 – not asserted 1 – asserted 2 – Disable override If signal is T1, T2, R1, R2 0 – Main radio is selected 1 – Standby radio is selected 2 – Disable override
Notes:	

Examples:	`DBG: rcsig` *<display all signals>*
	`P Q T R M`
	`F1 1 2 2 2 2` *<F1 PTT Main asserted, no override on other signals>*
	`F2 2 2 1 2 2` *<F2 TX Main selected, no override on other signals>*
	
	`DBG: rcsig P1`
	`1` *<P1 is asserted>*
	
	`DBG: rcsig P1 0` *<de-assert P1>*
	`0`

non-volatile:	N/A

7.2 AUDIO COMMANDS

7.2.1 MTSEL

Command:	MTSEL
Description:	Display or modifies the audio routing for the system
Syntax	MTSEL [TABLE]
Parameters:	If MODE not present displays the current audio routing mode MODE – New audio Routing mode 0 = AM (default) 1 = VDL3
Notes:	
Examples:	DBG: mtsel <1 *sets system to VDL3 routing mode*> 0001 DBG: mtsel <*displays current routing mode*> 0001
Non-volatile:	N/A

7.2.2 HST

Command:	HST
Description:	Displays or modifies the audio channel(s) that the front panel headset should monitor
Syntax	HST [CHAN]
Parameters:	If CHAN is omitted displays the current headset state CHAN – Channel the headset should monitor OF – Headset is not monitoring any channels FT – F1F2 TX FR – F1F2 RX FB – F1F2 (both TX and RX) (default) UT – UHFTX UR – UHFRX UB – UHF (both TX and RX)
Notes:	
Examples:	DBG: HST OF <*headset not monitoring any audio*> DGB: HST FB FB <*headset is monitor both F1F2 TX and RX*>
Non-volatile:	Yes

7.2.3 MIC

Command:	MIC
Description:	Displays or modifies the audio channel that the front panel microphone should override
Syntax	MIC [CHAN]
Parameters:	If CHAN is omitted displays channel being overridden CHAN – Audio channel that should be overridden N = NONE F = F1F2TX (default) U = UHFRX B = Both F1F2TX and UHFRX
Notes:	
Examples:	DBG: MIC N *<no microphone override>* DBG: MIC U *<microphone is overriding UHFRX>* U
Non-volatile:	Yes

7.2.4 VOL

Command:	VOL
Description:	Displays the current volume for selected input/output or sets a new volume for selected input/output. The VOL values are entered in hexadecimal 7.9 format where the 7-bit field is the integer multiplier and the 9-bit field is the fractional multiplier. A value of 0200h corresponds to a gain of 1.
Syntax	VOL CHAN [GAVOL]
Parameters:	CHAN – The channel whose audio needs to be modified A1 A2 A3 A4 A5 A6 MC - Mic D0 – Output from vocoder 0 decoder D1 – Output from vocoder 1 decoder M0 – ICC audio monitor 0 M1 – ICC audio monitor 1 M2 – ICC audio monitor 2 M3 – ICC audio monitor 3 B1 – Also changes B2 B2 – Also changes B1 B3 – Also changes B4 B4 – Also changes B3 B5 – Also changes B6 B6 – Also changes B5 HP – Headphone P0 – Peak detector LED 0 P1 – Peak detector LED 1 E0 – Input to vocoder 0 encoder E1 – Input to vocoder 1 encoder I0 – ICC audio output 0 I1 – ICC audio output 1 I2 – ICC audio output 2 I3 – ICC audio output 3 GAVOL – The volume for the channel 0x7fff for max, 0 for min, use 0200 (default) for gain=1.
Notes:	
Examples:	`DBG: VOL A1 7fff <The volume for A1 input is set to 7fff>` `A1 7fff`
Non-volatile:	Yes

7.2.5 STVOL

Command:	STVOL [VOL]
Description:	Display or modifies the volume of the side tone heard on the headset when using the microphone override
Syntax	STVOL [VOL]
Parameters:	VOL – 0 – 0x7fff where 0 is no side tone and 0x7fff is maximum side tone level
Notes:	STVOL with out any parameters will display the current side tone volume. STVOL [VOL] will change the volume to VOL. The default side tone level is 1800 hex.
Examples:	*DBG: STVOL 800 <set side tone to 800)* *DBG: STVOL <request display of side tone volume>* *800*
Non-volatile:	Yes

7.2.6 TESTTONE

Command:	TESTTONE
Description:	Display or modifies the current settings of the tone generator
Syntax	TESTTONE [FREQ]
Parameters:	If FREQ not present displays the current test tone frequency and level FREQ – The desired frequency of the tone 300 to 3400 decimal
Notes:	The default frequency is 1004.
Related Commands:	
Non-Volatile:	Yes

7.3 UTILITY COMMANDS

7.3.1 SAVECFG

Command:	SAVECFG
Description:	Store non-volatile configuration settings to flash
Syntax	SAVECFG
Parameters:	none
Notes:	
Examples:	
Non-Volatile:	N/A

7.3.2 DEFAULTCFG

Command:	DEFAULTCFG
Description:	Restores factory default values for all non-volatile parameters
Syntax	DEFAULTCFG
Parameters:	none
Notes:	Not all factory default values will take affect immediately. It is recommended that the system be power cycled to ensure consistency in the state of the system.
Examples:	
Non-Volatile:	N/A

7.3.3 CECHO

Command:	CECHO
Description:	Display / modifies state of command echo
Syntax	CECHO PORT [STATE]
Parameters:	PORT – Terminal to be displayed/modified 1 – term 1 2 – term 2 STATE – New state for port E – Enable D – Disable
Notes:	
Examples:	
Non-Volatile:	Yes

7.3.4 CPROMPT

Command:	CPROMPT
Description:	Display / modifies state of command prompt
Syntax	CPROMPT PORT [STATE]
Parameters:	PORT – Terminal to be displayed/modified 1 – term 1 2 – term 2 STATE – New state for port E – Enable D – Disable
Notes:	
Examples:	
Non-Volatile:	Yes

7.3.5 VERSION

Command:	VERSION
Description:	Displays software version
Syntax	VERSION
Parameters:	None
Notes:	
Examples:	
Non-Volatile:	N/A