

## APPENDIX G

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## Acronyms

ADARIO	Analog/Digital Adaptable Recorder Input/Output
BCD	binary coded decimal
BM	block marker
BMD	block marker divisor
BW	bandwidth
Hz	hertz
LIFO	last-in-first-out
LSB	least significant bit
Mbps	megabits per second
MHz	megahertz
MSB	most significant bit
MC	master clock
PW	partial word
TBD	to be defined

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## APPENDIX G

### ADARIO Data Block Field Definitions

#### 1.0 Data Block Format and Timing

The details of the Analog/Digital Adaptable Recorder Input/Output (ADARIO) data block format are provided in [Figure G-1](#) and in the ADARIO data format field summary. As shown in [Figure G-1](#), the eight session header words are the first eight words of the block. The channel packet for the highest priority (priority 1) channel is next, followed by the next lower priority channel packet (priority 2). Following the lowest priority channel, fill data consisting of all ones are inserted as required completing the 2048-word data block.

Within the channel packet, the first five words are the channel header words including the partial word (PW). Following the channel header is the variable size channel data field. The channel data are organized in a last-in-first-out (LIFO) fashion. The first samples acquired in the block time interval appear in the last data word of the channel packet. The sample data are formatted into the 24-bit data word such that the first sample occupies the most significant bits (MSBs) of the word. The next sample is formatted into the next available MSBs and so on until the word is full. As an example, data formatted into 8-bit samples is shown in [Figure G-2](#).

In cases where the 24-bit data word is not a multiple of the sample size, the sample boundaries do not align with the data words. In these cases, the samples at the word boundaries are divided into two words. The MSBs of the sample appear in least significant bits (LSBs) of the first buffered word and the LSBs of the sample appear in the MSBs of the next buffered word. Since the channel data appears in a LIFO fashion in the ADARIO data block, the MSBs of the divided sample will occur in the data word following the word containing LSBs of the sample. [Figure G-3](#) depicts ADARIO timings.

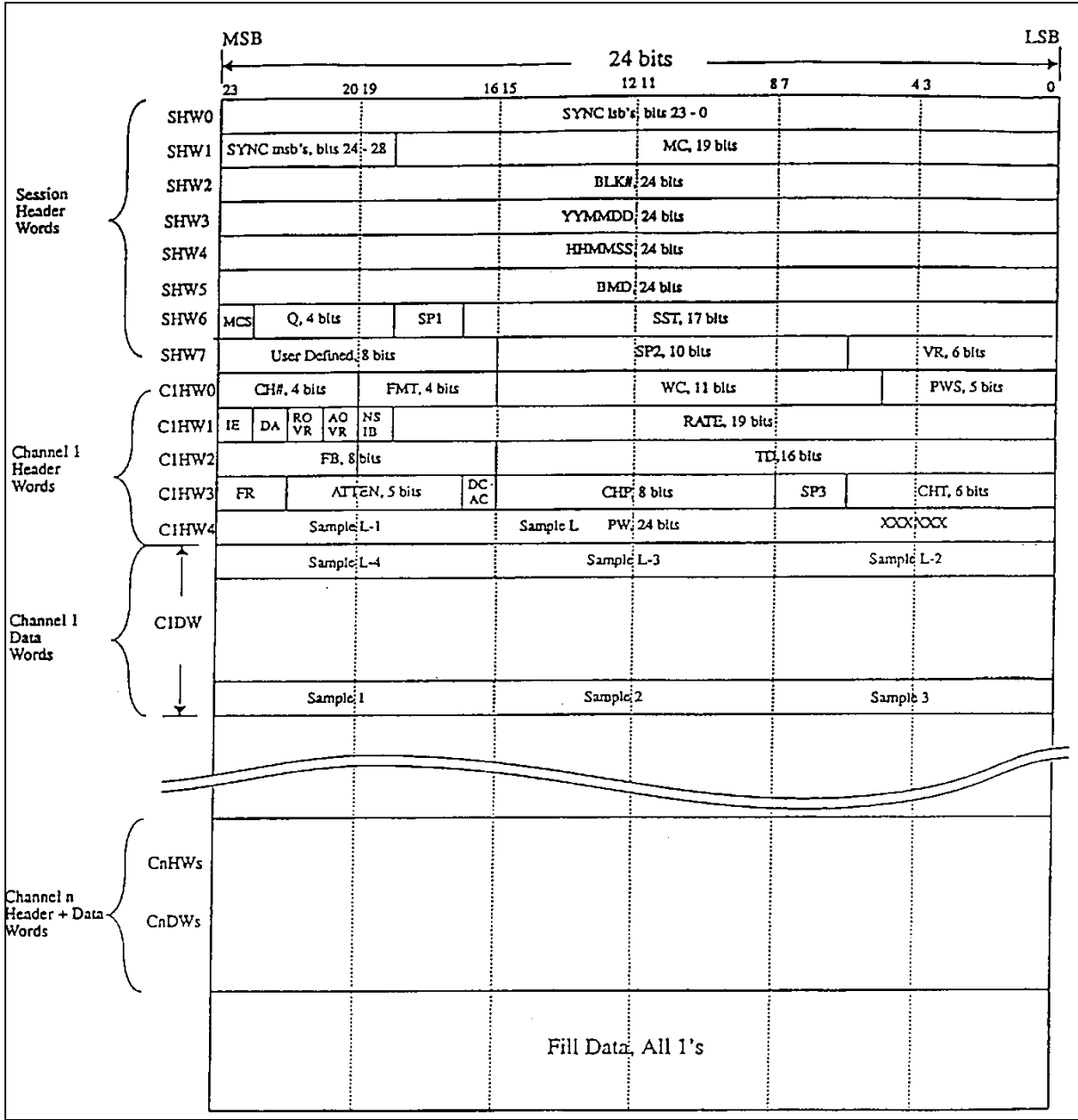


Figure G-1. ADARIO Data Format

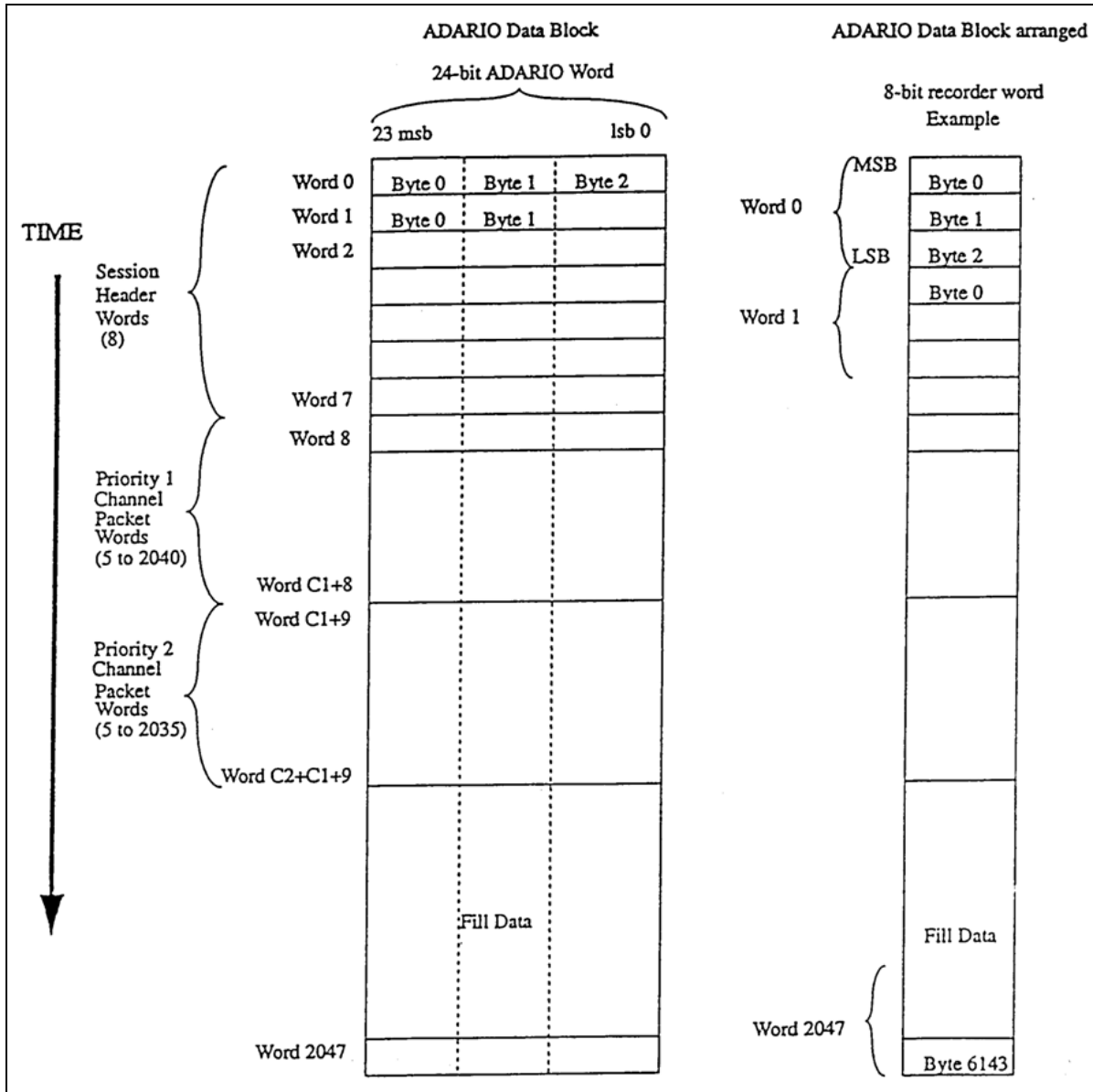


Figure G-2. ADARIO Data Blocks

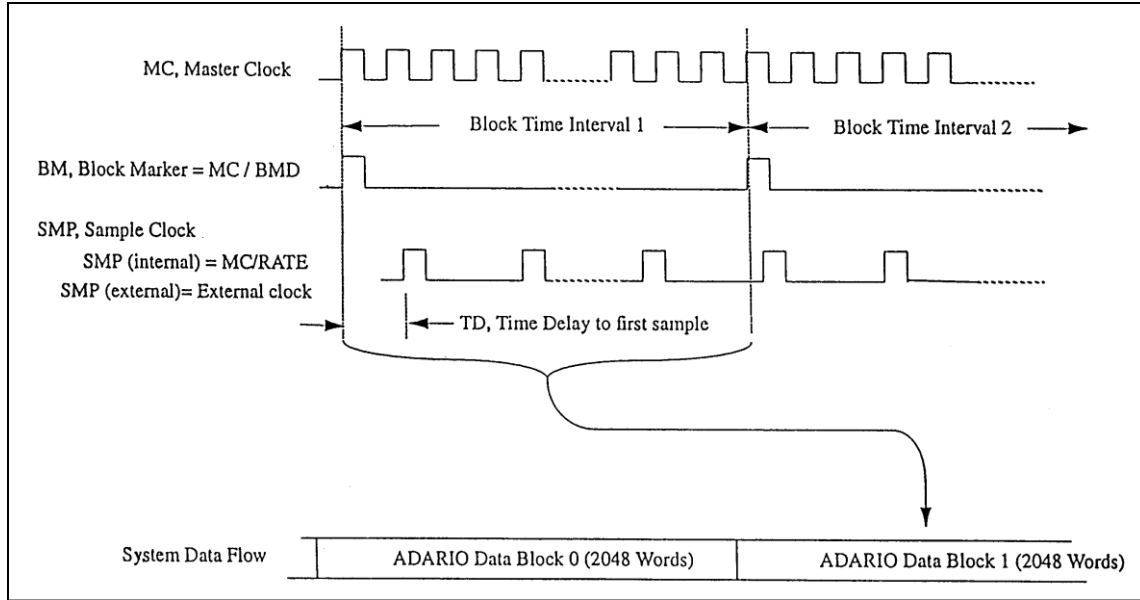


Figure G-3. ADARIO Timing

## 2.0 ADARIO Data Format Field Definitions Summary

### 2.1 Block Length

Block length is defined with 2048 24-bit words, fixed length

### 2.2 Session Header

Session header information is provided by 8 words in a fixed format

SHW0	(bits 23 to 0)	SYNC Field, bits 0-23 of the 29-bit block sync. The LSBs of the block sync are 36E19C and are contained here.
SHW1	(bits 23 to 19)	SYNC Field, bits 24-28 of the 29-bit block sync. The MSBs of the block sync are 01001 and are contained here. The 29-bit block sync is fixed for all ADARIO configurations and chosen for minimal data cross correlation.
	(bits 18 to 0)	MC - Master clock, a 19-bit binary value in units of 250 hertz (Hz). MC is the clock frequency used to derive session and per channel parameters.
SHW2	(bits 23 to 0)	BLK# - ADARIO data block number, a 24-bit binary value. BLK# is to zero at the start of each session and counts up consecutively. Rollover is allowed.
SHW3	(bits 23 to 0)	YYMMDD - Time code field, a binary coded decimal (BCD) representation of the year (YY), month (MM), and day (DD). YYMMDD time code field is updated during the record process once per second.



SHW4	(bits 23 to 0)	HHMMSS - Time code field, a BCD representation of the hour (HH), minute (MM), and second (SS). The HHMMSS Time Code Field is updated during the record process once per second.
SHW5	(bits 23 to 0)	BMD - Block marker divisor, a 24-bit binary value. BMD is established so that the block marker (BM) frequency may be derived from MC by $BM = MC/BMD$
SHW6	(bit 23)	MCS - Master clock source, a 1-bit flag. 1 = MC was generated internally. 0 = MC was provided from an external source.
	(bits 22 to 19)	Q - Number of active channels minus one, a 4-bit binary value. For example, 0 indicates that one channel is active.
	(bits 17 to 18)	SP1 - Spare field 1, a 2-bit field. It is set to zero.
	(bits 16 to 0)	SST - Session start time, a 17-bit binary value in units of seconds. The integer number of seconds represents the session start time of day in seconds, where midnight starts with zero.
SHW7	(bits 23 to 16)	User defined, an 8-bit field. May be input by the user at any time during a recording session. The interpretation of this bit field is left to the user.
	(bits 15 to 6)	SP2 - Spare field 2, a 10-bit field. It is set to zero.
	(bits 5 to 0)	VR - Version number, a 6-bit binary value. Each update of the ADARIO format will be identified by a unique version number.

### 2.3 Channel 'n' Header

All channel headers contain five 24-bit ADARIO words with the following fixed format. The first logical channel, n=1, has the highest priority and its channel packet starts in the ninth word of the data block. Each active channel is represented by a channel packet that is present in the data block. The logical channel number, n, represents the relative priority of the channel and the order in which it appears in the data block.

CnHW0	(bits 23 to 20)	CH# - Physical channel number, a 4-bit binary value. 0 to 15 represents the physical location of the channel electronics in the ADARIO hardware. The user sees those locations labeled from 1 to 16.
	(bits 19 to 16)	FMT - Format code for the channel data word, a 4-bit binary value. The format code is used to define the size of the user data word by means of <a href="#">Table G-1</a> .

<b>Table G-1. User Data Word Size</b>	
15=24 bits	7=8 bits
14=22 bits	6=7 bits
13=20 bits	5=6 bits
12=18 bits	4=5 bits

11=16 bits	3=4 bits
10=14 bits	2=3 bits
9=12 bits	1=2 bits
8=10 bits	0=1 bit

- (bits 15 to 5) WC - Word count, an 11-bit binary value. WC is the number of full channel data words that should be in the nth channel packet. WC may range from 0 to 2040. A WC greater than the number of actual words in channel packet indicates a data rate overflow, which would occur when a low-priority channel is not provided sufficient space in the fixed length data block as a result of an uncontrolled data rate in a higher priority channel.
- (bits 4 to 0) PWS - Partial word status, a 5-bit binary value. PWS is related to the number of samples in the partial word and may range from 0 to 23. PWS shall be computed as follows:
- If the number of full samples in the partial word equals zero, then PWS = 0.  
If the number of full samples in the partial word does not equal zero, then PWS = Round Up [Unused bits In PW/Channel Sample Size].
- CnHW1 (bit 23) IE - Channel clock source, a 1-bit flag.
- 1 = The channel clock was generated internally.  
0 = The channel clock was provided from an external source.
- (bit 22) DA - Data type, a 1-bit flag.
- 1 = The channel is operated as a digital channel.  
0 = The channel is operated as an analog channel.
- (bit 21) ROVR - Rate overrun in previous block, a 1-bit flag.
- 1 = The nth channel packet in the previous data block experienced an overrun.  
0 = The nth channel packet in the previous data block did not experience an overrun.
- (bit 20) AOVR - Analog A/D overrange in current block a 1-bit flag.
- 1 = The nth channel in the current data block experienced an analog-to-digital conversion overrange condition.  
0 = The nth channel in the current data block did not experience an analog-to-digital conversion overrange condition.
- (bit 19) NSIB - No samples in current block, a 1-bit flag.


1 = TRUE, there are no samples for the nth channel in the current block.

0 = False, there are samples for the nth channel in the current block.

(bits 18 to 0) RATE - Channel sample rate indicator, 19-bit binary value. The interpretation of the rate value depends on the condition of IE, the channel clock source flag.

If IE = 1, then the value of rate is carried by the 16 LSBs of the rate field. Using rate, the frequency of the internal channel clock can be found by internal sample clock =  $(MC/RATE) - 1$ .

If IE = 0, then rate is a 19-bit binary value in units of 250 Hz, which equals the frequency of the external channel clock as provided by the user at the time of the setup.

 <p><b>NOTE</b></p>	<p>The definitions that are marked with an asterisk apply to analog channels and to particular hardware implementations of ADARIO. For the purposes of this standard, these fields are not used.</p>
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\*CnWD2 (bits 23 to 16) FB - Filter bandwidth (BW), an 8-bit binary value. The formula for the BW of the anti-aliasing filter used in an analog channel incorporates FB as  $BW = (FB/2) \cdot 10^{3+FR}$

(bits 15 to 0) TD - Time Delay to first sample, a 16-bit binary value. TD is a measure of the time delay from the block marker, BM, to the first sample arriving at the nth channel during the current data block interval. TD is expressed as the number of master clock, MC, periods minus one.

\*CnWD3 (bits 23 to 22) FR - Filter Range, a 2-bit binary value. The formula for the BW of the anti-aliasing filter used in an analog channel incorporates FR as  $BW = (FB/2) \cdot 10^{3+FR}$

(bits 21 to 17) ATTEN - Attenuation, a 5-bit binary value. ATTEN represents the setting of the input attenuator (or gain) on the nth channel at the time that the record was formed 0 = -15dB and 31 = +16dB with intermediate settings expressed in one dB steps.

(bit 16) DCAC - Analog signal coupling, a 1-bit flag.

1 = The channel is operated with dc coupling at the input.

0 = The channel is operated with ac coupling at the input.

(bits 15 to 8) CHP - Channel parameter field, an 8-bit field. The interpretation of the CHP field depends upon the card type with which it is associated, as defined by the CHT field. Each card type established by the CHT field, as part of its definition, shall specify the form and interpretation of the CHP field. To date, four input

card types have been established. The CHP fields are defined as follows:

\* For CHT=0

(bits 15 to 8) remain undefined for the present analog single channel implementation except that the present hardware implementation expects an all zero field. Would be subject to future definition as long as all the zero fill is set aside.

\* For CHT=1

(bits 15 to 8) remain unused for the present digital single channel implementations except that the present hardware implementation expects an all zero field. Would be subject to future definition as long as the all zero fill is set aside.

\* For CHT=2

(bits 15 to 8) remain unused for the present dual-purpose channel implementations except that the present hardware implementation expects an all zero field. Would be subject to future definition as long as the all zero fill is set aside.

For CHT=3

(bits 15 to 12) establish the number of subchannels that are multiplexed into the multichannel data carried by the nth channel.

(bits 11 to 8) identify the subchannel number of the first sample contained in the nth channel packet of the data block.

(bits 7 to 6) SP3 - Spare field 3, a 2-bit field. It is set to zero.

(bits 5 to 0) CHT - Channel type, a 6-bit field. Defines the type of channel through which input data was acquired. Additional channel types to be defined (TBD) by future users and developers.

\* CHT=0 Single channel analog input

\* CHT=1 Single channel digital input

\* CHT=2 Single channel, dual-purpose, analog or digital input

\* CHT=3 Multichannel analog input capable of multiplexing up to 16 analog inputs

\* CHT=4 Single channel digital input, dual channel analog input (stereo)

“L” channel on bits 15 to 8 of the sample word

“R” channel on bits 7 to 0 of the sample word

CHT=5 Single channel, triple-purpose, analog, digital, submux, formatted input

CnWD4	(bits 23 to 0)	PW - Partial word, A 24-bit field. PW contains the last samples of the data block. The most significant bits of word contain the first sample, followed by the next sample in the next most significant bits. The number of samples in the PW is defined in the PWS field. The unused bits are not intentionally set and so contain random data.
Fill	(bits 23 to 0)	Fill - Fill Words consisting of all ones binary, used for fixed rate aggregate. Fill words may be omitted when variable rate aggregate can be accommodated resulting in variable length blocks of up to 2048, 24-bit words.

### 3.0 Submux Data Format Field Definitions

The details of the submux data format are shown in [Table G-2](#) and [Table G-3](#) and defined in Section [4.0](#). [Figure G-4](#) shows a typical primary channel aggregate data content for fixed and variable rate channel. Submux data format is based on the sequential collection of the individual channel data blocks. Each channel data block is the sequential collection of presented input samples in a fixed period of time. This sequential collection results in a variable length, fixed rate, and channel data blocks. To accommodate fixed rate channels, fill is also defined. The aggregate data stream is composed of a block sync timing channel, followed by sequential channel data blocks, if enabled, followed by fill, if required, at fixed block rate.

**Table G-2. Submux Data Format**

General Form																								
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0								
HW1	CHN ID					CHT			FMT				ST1	ST2	ST3	ST4								
HW2																								
HW3	I/E	Time Delay or Sample Period																						
Frame Sync																								
HW1	CHN ID = 1F					CHT = 0			Sync 1 = F8C7 hex (full word)															
HW2	Sync 2 = BF1E hex																							
HW3	BRC			Fill									AOE	PCRE	ST3	ST4								
Time Tag																								
HW1	CHN ID = 0 to 30					CHT = 0			MSB Days (BCD)															
HW2	Days LSB		Hours (BCD) LSB					Minutes (BCD) LSB																
HW3	Seconds (BCD) LSB								Fractional Seconds LSB															
Annotation Text																								
HW1	CHN ID = 0 to 30					CHT = 1			FMT = 7				NC	OVR	PE	OE								
HW2	Bit_Count																							
HW3	Block Count																							
DW1	MSB				1 <sup>st</sup> Character				LSB				MSB				2 <sup>nd</sup> Character				LSB			
:																								
DWn	MSB				Last Character				LSB				Undefined if not last											
Digital Serial External Clock																								
Digital Serial External Clock																								
HW1	CHN ID = 0 to 30					CHT = 2			FMT = 0				NSIB	OVR	ST3	ST4								
HW2	Bit_Count = L																							
HW3	I/E=0	Time Delay																						
DW1	DS <sub>1</sub>	DS <sub>2</sub>	DS <sub>3</sub>	DS <sub>4</sub>	DS <sub>5</sub>	DS <sub>6</sub>	DS <sub>7</sub>	DS <sub>8</sub>	DS <sub>9</sub>	DS <sub>1</sub>	DS <sub>1</sub>	DS <sub>1</sub>	DS <sub>1</sub>	DS <sub>1</sub>	DS <sub>1</sub>	DS <sub>1</sub>								
:																								
DWn							DS <sub>L-1</sub>	DS <sub>L</sub>	Undefined if not last															

**Table G-3. Submux Data Format (Continuation)**

<b>Digital Serial Internal Clock</b>																		
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
HW1	CHN ID = 0 to 30					CHT = 2			FMT = 0				0	0	ST3	ST4		
HW2	BIT_COUNT = L																	
HW3	I/E=1							SAMPLE PERIOD										
DW1	DS <sub>1</sub>	DS <sub>2</sub>	DS <sub>3</sub>	DS <sub>4</sub>	DS <sub>5</sub>	DS <sub>6</sub>	DS <sub>7</sub>	DS <sub>8</sub>	CS <sub>1</sub>	CS <sub>2</sub>	CS <sub>3</sub>	CS <sub>4</sub>	CS <sub>5</sub>	CS <sub>6</sub>	CS <sub>7</sub>	CS <sub>8</sub>		
DWn	DS <sub>L-7</sub>	DS <sub>L-6</sub>	DS <sub>L-5</sub>	DS <sub>L-4</sub>	DS <sub>L-3</sub>	DS <sub>L-2</sub>	DS <sub>L-1</sub>	DS <sub>L</sub>	CS <sub>L-7</sub>	CS <sub>L-6</sub>	CS <sub>L-5</sub>	CS <sub>L-4</sub>	CS <sub>L-3</sub>	CS <sub>L-2</sub>	CS <sub>L-1</sub>	CS <sub>L</sub>		
<b>Digital Parallel External Clock</b>																		
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
HW1	CHN ID = 0 to 30					CHT = 3			FMT=0 to 15 (shown =6)				NSIB	OVR	ST3	ST4		
HW2	BIT_COUNT = L																	
HW3	I/E=0	TIME DELAY																
DW1	MSB						1 <sup>st</sup> sample			MSB			2 <sup>nd</sup> sample			3rd sample		
DWn	MSB			Last sample			LSB=bit L			UNDEFINED if not last								
<b>Analog Wide Band</b>																		
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
HW1	CHN ID = 0 to 30					CHT = 4			FMT=0 to 15 (shown =7)				AOR	ST2	ST3	ST4		
HW2	BIT_COUNT = L																	
HW3	I/E=1				SAMPLE PERIOD													
DW1	MSB						1 <sup>st</sup> sample			MSB			2 <sup>nd</sup> sample					
DWn	MSB			Last SAMPLE			LSB=bit L			UNDEFINED if not last								
<b>Analog Stereo Left and Right</b>																		
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
HW1	CHN ID = 0 to 30					CHT = 5			FMT=0 to 15 (shown =7)				LAOR	RAOR	ST3	ST4		
HW2	BIT_COUNT = L																	
HW3	I/E=1	ENL	ENR		SAMPLE PERIOD													
DW1	MSB						1 <sup>st</sup> sample "L"			MSB			1 <sup>st</sup> sample "R"					
DWn	MSB			Last sample						UNDEFINED if not last								
<b>Fill</b>																		
FW	Fill Word = FFFF hex																	

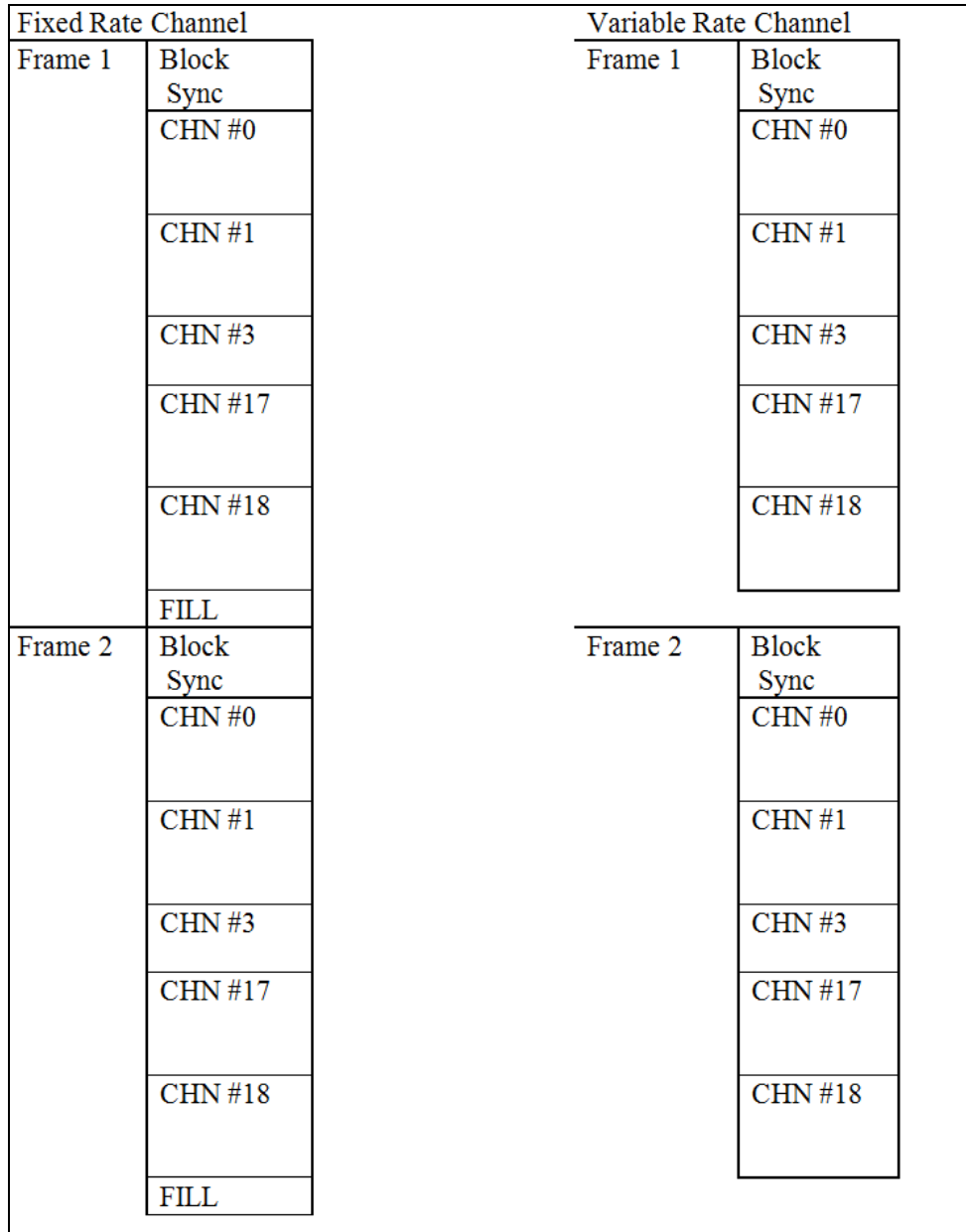


Figure G-4. Submux Aggregate Format

The channel data blocks are the sequential collection of input samples bit packed into sequential 16-bit words over the block period of time. The data block is preceded by a three-word header that identifies the source (channel ID) of data, channel type of processing, packing format in the data block, bit count length of the valid data, and the time delay between the first sample and the block period. If data were internally sampled, the sample period is defined with the first sample being coincident with the start of block period. Channel type is used to define specific types of channels that provide timing, annotation, and synchronization functions that may be required by the specific primary channel or may be redundant and not required. Specific implementation of the required channels may provide only the required channels with specific implementation constraints that limit the aggregate rate or the range of any specific field.



The submux format is based on a 16-megahertz (MHz) clock defining all timing. The derived clock is the 16-MHz clock divided in binary steps as defined by  $2^{\text{BRC}}$  that defines all timing and internal sampling. Block period is 20,160 derived clock periods which limits the submux aggregate to 256 megabits per second (Mbps), limits the maximum block rate to 793.65 blocks per second, and in conjunction with a 16-bit bit count field, limits the subchannel maximum data rate to 52 Mbps.

#### 4.0 SubMux Data Format Field Definitions Summary

##### 4.1 Frame length

Frame length is variable or fixed with fill. Minimum is 3-word block sync plus one channel block, maximum is 20,160x16-bit words.

##### 4.2 Block length

This field is variable from 3x16-bit words to 4099x16-bit words per channel data block. The length is specified by  $\text{CHT} > 0$  and integer of  $(\text{Bit\_Count} + 15/16)$  and may be limited by implementation.

##### 4.3 Block sync

This is defined by Channel ID = 31, 3-word block, 2-word sync. The channel defines a period of 20,160 derived clocks.

##### 4.4 General form

All channel data blocks contain this information in the 3-word header.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel of any type. CHN ID = 31 reserved for Block Sync.
	(bits 10 to 8)	CHT - Channel type. From 0 to 7 defines type of processing performed on the data and the format of header word fields.
		CHT = 0 Timing channel, block sync or time tag, 3-word only
		CHT = 1 Annotation text or block count, variable length
		CHT = 2 Digital serial external or internal clock, variable
		CHT = 3 Digital parallel external clock, variable
		CHT = 4 Analog wide band, variable
		CHT = 5 Analog stereo, variable
		CHT = 6 TBD by future implementation
		CHT = 7 TBD

	Variable length	General form with variable data block length
HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel of any type.
	(bits 10 to 8)	CHT - Channel type. From 1 to 7 defines type of processing performed on the data and the format of header word fields.

	(bits 7 to 4)	FMT - Format, defines the number of bits minus one in each sample. Data block sample size (bits) = (FMT+1). Range 0 to 15, binary format.
	(bits 3 to 0)	ST1 to ST4, status bits, define dynamic conditions within this block period such as over range.
HW2	(bits 15 to 0)	Bit_Count defines the number of valid data bits in the data block starting with the most significant bit of the first data word DW1. Variable word length of the data block is the Integer of $\{(Bit\_Count + 15)/16\}$ . Range 0 to 65,535, binary format.
HW3	(bit 15)	I/E - Internal/external clock
	(bits 15 to 0)	Depends on CHT field, defines block count, time delay, or sample period.

#### 4.5 Block Sync

The following defines the start of channel data blocks and start of block period that lasts for 20,160 derived clocks.

HW1	(bits 15 to 0)	SYNC 1 = F8C7 hex, defines the first sync word.
HW2	(bits 15 to 0)	SYNC 2 = BF1E hex, defines the second sync word.
HW3	(bits 15 to 13)	BRC - Block rate clock, defines the binary divisor for the 16 MHz system clock. $Derived\ CLK = 16\ MHz / 2^{BRC}\ MHz$ . Block rate = $Derived\ CLK / 20,160\ Hz$ . Period = $1 / Derived\ CLK$ .
	(bit 12)	FILL - indicates if the primary channel requires fill for constant rate.
	(bits 11 to 4)	TBD
	(bit 3)	AOE - Aggregate overrun error if set indicates that the aggregate of the enabled channels exceeds the submux aggregate (data truncated to 20,160 words between sync).
	(bit 2)	PCRE - Primary channel rate error if set indicates that primary channel is unable to maintain the aggregate rate of the submux. Excess blocks are truncated.
	(bits 1 to 0)	ST3, ST4, Status reserved.

#### 4.6 Time Tag

The following defines the time tag channel for time stamping the frame.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 0, Channel Type = 0, Time Tag IRIG Time code processing and 3-word format.

HW	(bits 7 to 0)	DAYS - Most significant 8 bits of Time Code Days field. BCD format.
	(bits 15 to 14)	DAYS - Least significant 2 bits of Time Code Days field. BCD format.
	(bits 13 to 8)	HOURS - Time code hours, 6-bit field. BCD format.
HW	(bits 7 to 0)	MINUTES - Time code minutes, 7-bit field. BCD format.
	(bits 15 to 8)	SECONDS - Time code seconds, 7-bit field. BCD format.
	(bits 7 to 0)	FRACTIONAL SECONDS - Time code fractional seconds, 8-bit field. BCD format.

#### 4.7 Annotation Text

The following defines block count and annotation text that pertains to the subchannels at this time.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 1, Channel Type = 1, Block Count and Annotation Text if any.
	(bits 7 to 4)	FMT = 7, Format = 7, defines 8 bit ASCII character in text.
	(bit 3)	NC - No Characters (Bit_Count = 0) Block count only.
	(bits 2 to 0)	OVR, PE, OE - Overrun Parity and async framing error.
HW	(bits 15 to 0)	Bit_Count defines the number of valid data bits in the data block starting with the MSB of the first data word DW1. Variable word length of the data block is the Integer of $\{(Bit\_Count + 15)/16\}$ . Range 0 to 65,535, binary format.
HW	(bits 15 to 0)	Block_Count sequential block numbering with rollover at maximum. Range 0 to 65,535, binary format.
DW1	(bits 15 to 8)	1st character - first text character.
DW	(bits 8 or 0)	Last character - LSB is defined by the bit count.

#### 4.8 Digital Serial External Clock

Defines digital serial data such as PCM externally clocked.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 2, Channel Type = 2, digital serial or data and clock over sampled data.
	(bits 7 to 4)	FMT = 0 Format = 0, defines 1-bit data samples.
	(bit 3)	NSIB - No Samples In Block (Bit_Count=0) header only.

	(bit 2)	OVR - Overrun indicates that input is clocking at faster than specified rate. Data is truncated at specified bit rate (Bit Count per Block).
HW	(bits 15 to 0)	Bit_Count - Defines the number of valid data bits in the data block starting with the most significant bit of the first data word DW1. Variable word length of the data block is the Integer of $\{(Bit\_Count + 15)/16\}$ . Range 0 to 65,535, binary format. Limited by set maximum rate.
HW	(bit 15)	I/E = 0 - Internal/external clock flag indicates that external clocking was used with relative phasing to block as specified in next field.
	(bits 14 to 0)	Time Delay - provides the measure of time between start of block period and the first external clock in derived clock periods. Range 0 to 20,160, binary format.
DW1	(bit 15)	DS <sub>1</sub> - first data sample at the first clock time in the block.
Dw <sub>n</sub>	(bit L)	DS <sub>L</sub> - last data sample in this block period.

#### 4.9 Digital Serial Internal Clock

This information defines digital serial data low rate (> 2 samples per block period) internally oversampled.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 2 - Channel type = 2, Digital serial or data and clock over sampled data.
	(bits 7 to 4)	FMT = 0 - Format = 0, defines 1-bits data samples.
	(bits 3 to 0)	0, reserved.
HW2	(bits 15 to 0)	Bit_Count - Defines the number of valid data bits in the data block starting with the most significant bit of the first data word DW1. Variable word length of the data block is the Integer of $\{(Bit\_Count + 15)/16\}$ . Range 0 to 65,535, binary format. Limited by set maximum rate.
HW3	(bit 15)	I/E = 1 - Internal sampling flag indicates that internal sampling was used as specified in next field.
	(bits 14 to 9)	TBD
	(bits 8 to 0)	SAMPLE PERIOD - Defines the period of the over-sampling clock that samples data and clock, in derived clock periods. Range 0 to 4 mega samples per second, binary format.
DW1	(bit 15)	DS <sub>1</sub> - first data sample at block time.
	(bit 7)	CS <sub>1</sub> - first clock sample at block time.

DW <sub>n</sub>	(bit 8)	DS <sub>L</sub> - last data sample in this block period.
	(bit 0)	CS <sub>L</sub> - last clock sample in this block period.

#### 4.10 Digital Parallel External Clock

This information defines digital data, including serial externally clocked.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 3 -Channel type = 3, Digital parallel or serial data.
	(bits 7 to 4)	FMT - Format defines the number of bits minus one in each sample. Data block sample size (bits) = (FMT+1). Range 0 to 15, binary format.
	(bit 3)	NSIB - No Samples In Block (Bit_Count = 0) Header only.
	(bit 2)	OVR - Overrun indicates that input is clocking at faster than specified rate. Data is truncated at specified bit rate (Bit Count per Block).
HW2	(bits 15 to 0)	Bit_Count defines the number of valid data bits in the data block starting with the most significant bit of the first data word DW1. Variable word length of the data block is the Integer of ((Bit_Count + 15)/16). Range 0 to 65,535, binary format. Limited by set maximum rate.
HW3	(bit 15)	I/E = 0 - Internal/external clock flag indicates that external clocking was used with relative phasing to block as specified in next field.
	(bits 14 to 0)	Time delay provides the measure of time between start of block period and the first external clock in derived clock periods. Range 0 to 20,160, binary format.
DW1	(bit 15)	DS <sub>1</sub> - MSB of the first data sample at the first clock time in the block.
DW <sub>n</sub>	(bit L)	DS <sub>L</sub> - LSB of the last data sample in this block period.

#### 4.11 Analog Wide Band

The following defines analog wide band data using a sampling A/D and internal block synchronous clock.

HW1	(bits 15 to 11)	CHN ID - Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 4 - Channel Type = 4, analog wide band sampled data.

	(bits 7 to 4)	FMT - Format, defines the number of bits minus one in each sample. Data block Sample Size (bits) = (FMT+1). Range 0 to 15, binary format. Limited by the A/D resolution.
	(bit 3)	AOR - Analog overrange (A/D 4-MSB = F).
	(bits 2 to 0)	ST2 to ST4, reserved status
HW2	(bits 15 to 0)	Bit_Count defines the number of valid data bits in the data block starting with the MSB of the first data word DW1. Variable word length of the data block is the Integer of ((Bit_Count + 15)/16). Range 0 to 65,535, binary format. Limited by set maximum rate.
HW3	(bit 15)	I/E = 1 - Internal Sampling flag indicates that internal sampling was used as specified in next field.
	(bits 14 to 12)	TBD
	(bits 11 to 0)	Sample period defines the period of the over-sampling clock that samples data and clock, in derived clock periods. Range 0 to 4m samples per second, binary format.
DW1	(bit 15)	DS <sub>1</sub> - MSB of the first data sample at the first clock time in the block.
DW <sub>n</sub>	(bit L)	DS <sub>L</sub> - LSB of the last data sample in this block period.

#### 4.12 Analog Stereo “L” & “R”

The following defines analog stereo data using a sigma-delta A/D and internal block synchronous clock with tracking Finite Impulse Response filter.

HW1	(bits 15 to 11)	CHN ID -Channel ID number. From 0 to 30 represents normal channel.
	(bits 10 to 8)	CHT = 5, Channel Type = 5, Analog stereo voice band data.
	(bits 7 to 4)	FMT, Format defines the number of bits minus one in each sample. Data block sample size (bits) = (FMT+1). Range 0 to 15, binary format. Limited by the A/D resolution.
	(bit 3)	LAOR, left subchannel over range.
	(bit 2)	RAOR, right subchannel over range.
	(bits 1 to 0)	ST2 to ST4, reserved status.
HW2	(bits 15 to 0)	Bit_Count defines the number of valid data bits in the data block starting with the MSB of the first data word DW1. Variable word length of the data block is the Integer of {(Bit_Count + 15)/16}. Range 0 to 65,535, binary format. Limited by set maximum rate.
HW3	(bit 15)	I/E = 1 - Internal sampling flag indicates that internal sampling was used as specified in next field.

	(bit 14)	ENL - Enable left subchannel.
	(bit 13)	ENR - Enable right subchannel.
	(bit 12)	TBD
	(bits 11 to 0)	Sample period defines the period of the over-sampling clock that samples data and clock, in derived clock periods. Range 3.76 to 40K samples per second, binary format.
DW <sub>1</sub>	(bit 15)	DS <sub>1</sub> - MSB of the first data sample left subchannel if enabled.
	(bit 15)	DS <sub>1</sub> - MSB of the first data sample right subchannel if enabled, else second sample (FMT-1).
DW <sub>n</sub>	(bit L)	DS <sub>L</sub> , LSB of the last data sample in this block period.

#### 4.13 Fill

This term defines a fill word that can be inserted at the end of all channel data blocks if required by the constant rate primary channel.

Fwx (bits 15 to 0) FILL, defined as FFFF hex word.

\*\*\*\* END OF APPENDIX G \*\*\*\*