



# APPLICATION NOTES



## ALTAIR Software Chapter 7 Capabilities

### INTRODUCTION

The ALTAIR Software Suite is designed to support and enhance Ulyssix Technologies' Tarsus/ Bald Eagle RF product series as well as be a standalone Chapter 7/10 processing software suite. ALTAIR's Chapter 7 capability adds IRIG 106 Chapter 7 processing to the already robust software suite. This creates a Chapter 7 Receiver for processing incoming RF telemetry data and

or PCM data acquired from one or more Ulyssix Tarsus PCM Processor cards. ALTAIR can output the PCM bit stream through the RF Transmitter of a Bald Eagle RF card or the PCM Simulator of a Tarsus or Bald Eagle RF card. Alternatively, ALTAIR can save the simulated PCM bit stream to a binary file or embed it as a PCM channel in a Chapter 10 file.

### CHAPTER 7 STANDALONE SOFTWARE SOLUTION

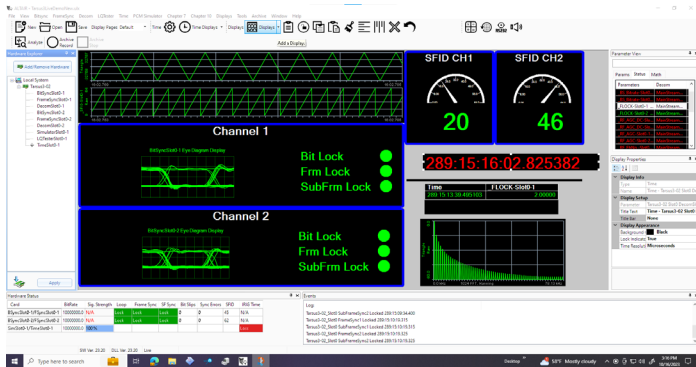
ALTAIR Chapter 7 can work as a standalone feature or can interface with Ulyssix RF/PCM Processor cards. The ALTAIR software is fully functional as a standalone software from the Ulyssix RF/PCM Processor cards by linking the ALTAIR software to the host computer's NIC address.

The Chapter 7 Receiver acquires Chapter 10 data via the ALTAIR Chapter 10 UDP receiver; processes a Chapter 10 PCM channel that includes Chapter 7 data; extracts the embedded Chapter 10 packets from the Chapter 7 data; and then processes embedded Chapter 10 packets. The ALTAIR software can display, store, or transmit the Chapter 10 packets. This includes Chapter 10 analog and PCM data formats.

ALTAIR Chapter 7 generates Chapter 10 files with Chapter 7 inside a PCM channel. ALTAIR is a software replacement for building a hardware test kit with PCM simulators and Chapter 7 encoders. The ALTAIR Chapter 7 Simulator builds a Chapter 10 file with an IRIG channel and a single PCM channel with user defined PCM settings. The telemetry stream in the PCM channel includes Chapter 7 data built from a user supplied Chapter 10 file.

### SETUP THE ALTAIR CHAPTER 7 RECEIVER

Configuring the ALTAIR Chapter 7 Receiver begins on the Ch7 Frame tab form (see below), which contains the controls to define the Chapter 7 location inside of the PCM frame, setup the UDP transmitting the embedded



a Chapter 7 RF or PCM Simulator to generate outgoing telemetry data from stored Chapter 10 files.

### ALTAIR CHAPTER 7 RECEIVER DESCRIPTION

The ALTAIR Chapter 7 Receiver takes an input PCM stream from a Bald Eagle RF receiver, Tarsus Bit Sync/Frame Sync, or from Chapter 10 UDP stream. The ALTAIR software extracts the Chapter 7 portion of the frame, processes the Chapter 7 data, extracts the embedded Chapter 10 packets, and processes the IRIG channels as well as one or more channels of PCM and Analog data. ALTAIR can save the embedded Chapter 10 packets to a file or transmit it via UDP.

The ALTAIR Chapter 7 Simulator creates a PCM bit stream with embedded Chapter 7 data. The Chapter 7 data source is either a Chapter 10 file

Ch7 Receiver Setup Form

Format File: Ch7 Receiver ITC Demo.ulg  
 Card: BaldEagle RF PCI Slot: 0  
 Decom: DecomSlot0-1

Ch7 Frame | **TMATs** | PCM Channels | Packet Filters

Ch7 Word Location  
 Set the Start Word and End Word location for the Ch7 Transport Packet in the Frame  
 Start Word: 1 End Word: 1115

Ch10 UDP Transmitter Settings  
 UDP Enable:  UDP Enable  
 Adapter: 127.0.0.1  LoopBack  
 Destination IP: 127.0.0.1  Multicast  
 Port: 11000  Multicast LoopBack

Ch10 File  
 Save Ch10 File: Ch7Data.ch10

Ch7 Enable Ch7 Monitor

Lock Apply OK Cancel

Chapter 10 packets, and saving the embedded Chapter 10 packets to a file.

The Start Word and End Word are telemetry word numbers as defined in ALTAIR's Decommutator Setup for the PCM frame.

The TMATs tab contains controls for setting up

Ch7 Receiver Setup Form

Format File: Ch7 Receiver ITC Demo.ulg  
 Card: BaldEagle RF PCI Slot: 0  
 Decom: DecomSlot0-1

Ch7 Frame | **TMATs** | PCM Channels | Packet Filters

TMATs Source: Controls

TMATs File: Load TMATs File

IRIG Time Channel  
 IRIG Time Format: IRIG-B Channel: 1

PCM Channels  
 Number of PCM: 2

Card and FS	BS Setup	FS Setup	Channel	PCM Mode
PCM Virtual Slot 1 Fs1	BitSync	FrameSync	23	Throughput
PCM Virtual Slot 2 Fs1	BitSync	FrameSync	24	Throughput

Calc TMATs Save TMATs

Ch7 Enable Ch7 Monitor

Lock Apply OK Cancel

the TMATs for the embedded Chapter 10 packets. There are two options on the form: load a TMATs file or setup the embedded Chapter 10 channels via the user interface. The user interactive controls configure the IRIG Channel and one or more PCM Channels.

The PCM Channels tab routes the embedded Chapter 10 channels to the elements that process

Ch7 Receiver Setup Form

Format File: Ch7 Receiver ITC Demo.ulg  
 Card: BaldEagle RF PCI Slot: 0  
 Decom: DecomSlot0-1

Ch7 Frame | **PCM Channels** | TMATs | Packet Filters

Enable	Ulyssix Card	FrameSync Source	Ch10 PCM Channel
<input type="checkbox"/>	BaldEagle RF Slot0	FS1	None
<input type="checkbox"/>	BaldEagle RF Slot0	FS2	None
<input checked="" type="checkbox"/>	PCM Virtual Slot 1	FS1	Ch7Rx
<input checked="" type="checkbox"/>	PCM Virtual Slot 2	FS1	None
<input checked="" type="checkbox"/>	Analog Virtual Slot 3	FS1	Ch7Rx

Ch7 Enable Ch7 Monitor

Lock Apply OK Cancel

them. PCM Virtual Slot 1 is strictly a software PCM processor with a Frame Sync and Decom (no Ulyssix hardware is utilized).

The Packet Filters tab contains a list of the channels from the embedded Chapter 10 data with an option to disable the channels. Disabling

Ch7 Receiver Setup Form

Format File: Ch7 Receiver ITC Demo.ulg  
 Card: BaldEagle RF PCI Slot: 0  
 Decom: DecomSlot0-1

Ch7 Frame | TMATs | PCM Channels | **Packet Filters**

Channel	Data Type	Allowed
0	User Defined	<input checked="" type="checkbox"/>
1	Time	<input checked="" type="checkbox"/>
7	UART	<input checked="" type="checkbox"/>
19	Video MPEG4	<input checked="" type="checkbox"/>
21	Video MPEG4	<input checked="" type="checkbox"/>
23	PCM 1	<input checked="" type="checkbox"/>
24	PCM 1	<input checked="" type="checkbox"/>
29	1553	<input checked="" type="checkbox"/>
30	1553	<input checked="" type="checkbox"/>
34	ARINC	<input checked="" type="checkbox"/>
35	ARINC	<input checked="" type="checkbox"/>
47	Ethernet Data	<input checked="" type="checkbox"/>
54	Analog	<input checked="" type="checkbox"/>
58	Ethernet Data	<input checked="" type="checkbox"/>

Packet Filter applies to Ch10 UDP Output and ALTAIR Internal Ch10 Stream

Ch7 Enable Ch7 Monitor

Lock Apply OK Cancel

a Chapter 10 channel removes the channel from any Chapter 10 UDP Transmission and Chapter 10 File storage. Filtering out Chapter 10 channels removes unwanted or protected data and reduces

the required data bandwidth.

The Chapter 7 Monitor Log displays counters for the received Chapter 7 elements, Chapter 7 Header, Golay Errors, and Chapter 10 Packet errors. This

Ch7 Packet Counters		Ch7 Header Golay Counters		
Name	Count	Name	Count	Errors
Transport	10,605	Transport	10,605	0
Low Latency	1,841	Encap	13,087	0
Encapsulation	13,087	Ch10	11,790	0
Encap Filler	1,276			
Encap App Specific	14			
Encap Test	7			
Encap Ch10	11,790			
Encap Raw MAC	0			
Encap IP	0			
Encap Ch24 TmNSM	0			
Encap Not Found	0			

Ch10 Packet Counters					
ChanID	Data Type	PacketCount	LengthError	ChecksumError	SequenceError
1	Time	7	0	0	0
7	UART	7	0	0	0
19	Video MPEG4	725	0	0	0
21	Video MPEG4	652	0	0	0
23	PCM 1	710	0	0	0
24	PCM 1	710	0	0	0
25	1553	353	0	0	0
30	1553	353	0	0	0
34	ARINC	102	0	0	0
35	ARINC	77	0	0	0
47	Ethernet Data	146	0	0	0
54	Analog	1,840	0	0	0
58	Ethernet Data	238	0	0	0

is useful for troubleshooting incoming Chapter 7 data.

## ALTAIR CHAPTER 7 SIMULATOR

Configuring the ALTAIR Chapter 7 Simulator begins in the Frame Settings group, where the controls configure PCM frame settings as Bit Rate, Bits Per Minor Frame, Frame Sync Pattern, and Common Bits per Word. The Common Bits per Word control values are 8-bits, 16-bits, or 32-bits.

The Chapter 7 Settings group defines the frame location for the Chapter 7 Data, the source of the embedded Chapter 10, and the output location for the PCM stream. The embedded Chapter 10 Source is either Ulyssix hardware or Chapter 10 file.

The last section of the ALTAIR Chapter 7 simulator is a tabbed control with two tabs: PCM Output and Output File. The PCM Output is either the PCM Simulator, Binary File, or Chapter 10 File. If the PCM Output is a PCM Simulator, then the PCM Simulator tab controls the Clock Phase, Data

Polarity, and Code Type of the PCM Simulator.

Ch7 Simulator Setup Form

Format File: Ch7 Simulator PCM Simulator Test.ulx  
Card: BaldEagle RF PCI Slot: 0  
Simulator: SimulatorSlot0-1

Frame Settings

Bit Rate: 5 Mbps Common Bits/Word: 8-bits  
Sync Bits: 32 Bpmf: 8192  
Sync Pattern: faf32048

Chapter 7 Settings

Start Word: 1 End Word: 1020 Last Word 1020  
Used Words: 1020  
Ch10 Source: Ch10 File File Loop  
C:\Archive\Ch10 Heim Dahlgren\ALTAIR\_TwoChan\_1Mbps.ch10  
PCM Output: PCM Simulator

PCM Simulator Output File

Clock Phase: 0 Degrees Code Type: RNRZ(15)  
Data Polarity: Normal

Empty Full  
Underflow Output Frame Buffer Desired

Start Stop  
Lock OK Apply Cancel

If the PCM Output is Binary File or Chapter 10 File, the Output File tab contains the destination file location.

The ALTAIR Chapter 7 Simulator software error checks the user settings to ensure that the selected Chapter 10 data source will fit inside the defined PCM frame and bit rate. If the Chapter 10 data source will not fit, ALTAIR suggests values for the Bit Rate, Start Word, and Stop Word. For example, a Chapter 10 file with two 10 Mbps PCM streams will not fit inside of a 5 Mbps PCM frame. ALTAIR will suggest increasing the Bit Rate from 5 Mbps to 22 Mbps.

Application Note: 2023-01  
Revised: December 22, 2023