Chapter 6

Ancillary Data

Your CDQPrima is designed to handle several different types of ancillary data, from multiple RS232 data streams to SMPTE time code.

6. Ancillary Data Features

The ***CDQPrima*** can send several different types of ancillary data along with the compressed audio with no reduction in audio quality. Ancillary data includes up to two RS232 data paths, SMPTE time code, up to eight relay closures, signaling and cueing indicators, frame header bits and far-end remote control.

Several different ancillary data formats are available to insure compatibility with older CCS and MUSICAM USA products as well as codecs manufactured by others. In addition, ancillary data formats are also available for DAB and ADR systems.

6.1 Ancillary Data Basics

<Common><Anc Data><Asy AData> <MUX mode>	CAN	Setup, Ancillary data	Set ancillary data mode

The ***CDQPrima*** has two basic modes of ancillary data, MUX and NOMUX. The NOMUX mode is used for sending RS232 ancillary data to older CCS and MUSICAM USA products, such as the CDQ2001, and other manufacturers products that do not support multiplexed ancillary data. RS232 data rates up to 38,400 baud are supported in the NOMUX mode. The NOMUX mode only allows a single RS232 ancillary data stream and no other form of ancillary data including far-end remote control.

The MUX mode allows the ***CDQPrima*** to multiplex several different types of ancillary data together at the encoder, and demultiplex at the decoder. This enables SMPTE time code, two RS232 data paths, switch closures, virtual commands, and far-end remote control to be used simultaneously. Please remember however, that the ancillary data is sent over the same digital interface that audio data is sent and is included in the audio payload. Therefore, the more bits that are used for ancillary data, the more bits are taken from the audio data, reducing audio quality. However, these bits are used only when there is actual data, and are spread equally over all connections when multiple connections are used. Figure 6-1 shows how the ***CDQPrima*** encodes the ancillary data.

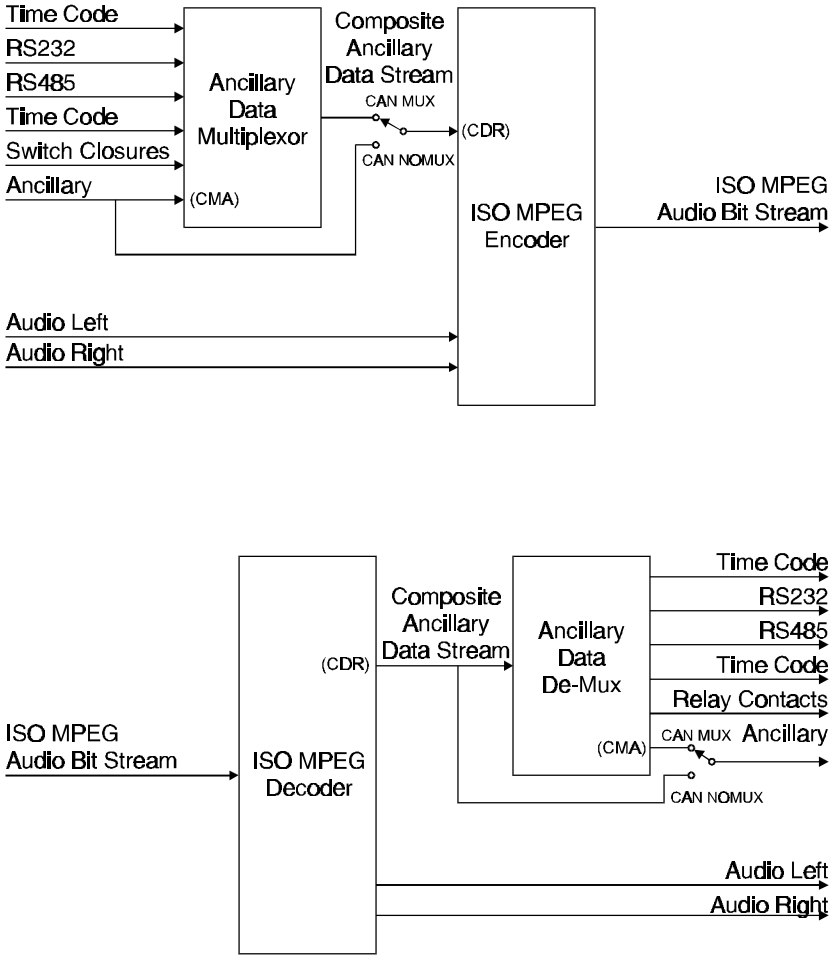

Figure 6-1 Async Data Mux/Demux Block Diagram

The ancillary data mode is set using the **CAN**

<Common><Anc Data><Asy Adata><Mux Mode>

command, or by clicking on 'Setup' and 'Ancillary Data' from the Windows Remote Control program.

6.2 Ancillary Data Format

<Common><Anc Data><Fmt/L2> <Dec Fmt>	DAF	DC	Set decoder ancillary data format, Layer II
<Common><Anc Data><Fmt/L3> <Dec Fmt>	DAH	DC	Set decoder ancillary data format, Layer III
<Common><Anc Data><Fmt/L2> <Enc Fmt>	EAF	DC	Set encoder ancillary data format, Layer II
<Common><Anc Data><Fmt/L3> <Enc Fmt>	EAH	DC	Set encoder ancillary data format, Layer III

All Layer II ancillary data formats (as of the date of this writing) are supported. The **DAF**

<Common><Anc Data><Fmt/L2><Dec Fmt>

and **EAF**

<Common><Anc Data><Fmt/L2><Dec Fmt>

commands are used to set the data format, and command echo for the asynchronous ancillary data. The allowed formats include CCS and CCSPLUS, two proprietary formats, GENERIC, DAB, and ADR, three standard compliant formats. **When using far-end remote control, CCS or CCSPLUS must be selected.**

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The DAH

<Common><Anc Data><Fmt/L3><Dec Fmt>

and EAH

<Common><Anc Data><Fmt/L3><Dec Fmt>

commands are used to set the ancillary data format with Layer III encoding. The CCS mode should be used when communicating with another *CDQPrima*, since all ancillary data features are supported. Use the CCS PROTECT mode when communicating with a Telos Zephyr. The CCS PROTECT format uses the NOMUX mode, and therefore only supports a single RS232 data path.

6.3 RS232 Ancillary Data

<Common><Anc Data><ASY AData> <DSP Rate>	CDR	Setup, Ancillary data	Set ancillary data rate for encoder and decoder DSP
<Common><Anc Data><ASY AData> <MUX Rate>	CMA	Setup, Ancillary data	Set MUX and DEMUX ancillary data baud rate

Asynchronous RS232 ancillary data can be sent to the far end ***CDQPrima*** along with the audio data. This data can be used for any purpose you choose, including far end control of external devices, or an additional communications channel to a remote users terminal. The bi-directional ancillary data is passed transparently to and from a far end device connected to the ancillary data port. All ***CDQPrima*** models come standard with a rear panel ancillary data port, the primary RS232 data port. This port can support standard baud rates from 300 to 19,200 (MUX mode) or 38,400 (NOMUX mode) .

!note:

When using the MUX mode, the encoder/decoder baud rate setting must be made with the multiplexer/demultiplexer rate in mind. The decoder baud rate is slaved to the encoder baud rate setting, and the demultiplexer baud rate is slaved to the multiplexer baud rate. **Since the ancillary data mux adds some overhead bits to the data, the encoder baud rate setting (set with the CDR command) *must be higher* than the multiplexer baud rate (set with the CMA command).** For example, if you want to pass RS232 data at 4800 baud, you set the mux rate to 4800, but you must set the encoder rate to 9600 baud. When using the NOMUX mode, the mux rate is ignored and the data rate is set by the DSP data. Refer to Appendix A for the C-1700 null-modem cable used for RS232 ancillary data. **Please remember that the jumpers indicated are required for proper operation.** Refer to Appendix B for the ancillary data port pin-out.

The algorithm for the transmission of ancillary data is for the encoder to look during each MUSICAM frame interval and see if any ancillary data is in its input buffer. If there are characters in the encoders input buffer, then the maximum number of characters consistent with the selected baud rate is sent.

Bit Rate	Number of Characters
300	1
1200	3
2400	6
3600	9
4800	12

7200	18
9600	24
19200	47

Table 6-1 Number of characters/frame (48 kHz Sampling Rate)

Table 6.1 shows the maximum number of characters sent for each baud rate during a frame period.

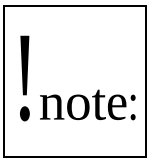
The ***CDQPrima*** provides no error detection or correction for the ancillary data. The user assumes the responsibility for the error control strategy of this data. For example, at an error rate of 10^{-5} (which is relatively high) and an ancillary data rate of 1200 baud, one out of every 83 characters will be received in error. Standard computer data communication protocol techniques can be used to maintain data integrity.

When designing an error protection strategy, remember that the ***CDQPrima*** may occasionally repeat the last frame of audio under certain error conditions. The effect on the audio is nearly imperceptible; however, the ancillary data is not repeated, and may therefore be lost.

6.4 Other RS232 Data

<Common><Other 232><Baud Rate>	COB	DC	Set OTHER RS232 port baud rate
<Common><Other 232><CR cmd>	COC	DC	Send command to far-end RS232 port
<Common><Other 232><CR timout>	CON	DC	Set command response time out
<Common><Other 232><EOM chars>	COS	DC	Set command terminating characters
<Common><Other 232><Usage>	COT	DC	Set OTHER RS232 port usage

A second RS232 ancillary data channel is available on all 200 series models, which can be used independently from the ancillary data port. The dedicated RS232 port on the rear panel of all 200 Series models has been made available for use as a true RS232 data port. Using this port along with the ancillary data port allows for two independent RS232 paths. **Please note that the combined baud rate of the two paths cannot exceed 19,200 baud for bursty data. For guaranteed reliability with constant data, the total combined throughput should not exceed 14,400 baud.** The **COB** command



<Common><Other 232><Baud Rate>

changes the baud rate for this port, and the **COT** command

<Common><Other 232><Usage>

makes the port active. This port should be set to the NONE (inactive) state and should only be set to the active (NORM) state when in use. The MCCURDY setting is for a custom application using McCurdy equipment, and should not be used.

It is also possible to send ASCII character strings to the far end RS232 port directly from the keypad or remote control port, or using Prima Logic Language and Virtual Actions. This feature can be used to control external recording equipment or other RS232 controllable devices at the far end from your ***CDQPrima***. It is even possible to automatically start the playback device at the far-end when frame is established.

The **COC**

<Common><Other 232><CR cmd>

command defines and sends the ASCII character string, terminated with the string terminator defined by the **COS**

<Common><Other 232><EOM chars>

command. The ***CDQPrima*** will wait for a response for a period defines by the **CON**

<Common><Other 232><CR timout>

command. The 'Other RS232' port on the far end ***CDQPrima*** must be made active to accept data from the local remote control port by the **COT CR** command.

6.5 SMPTE Time Code

Since different SMPTE time code generators and readers trigger on different pulse edges, it may be necessary to reverse the polarity of the signal. For example, Sony equipment requires polarity reversal. If time code does not work with your equipment, reverse the + and – leads.

<Common><Time Code><Dsply src>	CTI	DC	Set Time Code readout source
<Common><Time Code><Dsply 1st>	CTL	DC	Print last Time Code received
<Common><Time Code><Dsply spd>	CTS	DC	Print Time Code speed
<Common><Time Code><On/Off>	CTT	DC	Enable/disable Time Code

SMPTE time code is an optional feature in 200 Series ***CDQPrima*** units. SMPTE time code is read by the optional reader, converted into a digital bit stream, multiplexed with other data and sent to the decoder as ancillary data. The mux mode of ancillary data (**CAN 2**) must be used and the audio algorithm cannot be G.722 to use SMPTE time code.

All MUX modes of MPEG Layer II and III ancillary data support SMPTE time code. The required C-1600 adapter cable can be found in Appendix A.

The SMPTE time code reader and generator in the ***CDQPrima*** automatically senses the input time code rate with no external control necessary. The ***CDQPrima*** allows the user to transmit time code simultaneously with the audio and thus the ***CDQPrima*** is the perfect unit for studios utilizing audio-for-video time code. The **CTS** command

<Common><Time code><Dsply spd>

is used to show the time code speed of either the input (send) or output (receive) time code.

Although the DSP rate must be set to the maximum, 38,400, SMPTE time code only uses approximately 2.4 kb/s of digital bandwidth. This small overhead allows transmission of time code even at bit rates of 56 and 64 kb/s. If the time code input is removed, then no digital bandwidth is used. Since it may be inconvenient to remove the time code input, the **CTT** command can be used to enable or disable the transmission of time code. Turning time code off with the **CTT**

<Common><Time code><On/Off>

command has the same effect as removing the time code connector from the rear of the ***CDQPrima***.

!note:

Although only 2.4 kb/s of actual data is transmitted, the continuous nature of the data, and the need for a non-bursty data path requires that the DSP data rate be set to 38,400. This is done using the **CDR** command as shown in section 6.3.

The current time code is displayed by the **CTI**

<Common><Time code><Dsply src>

command. The displayed time code may be the time code input to the encoder or the time code received by the decoder. If there is currently no time code in use, The last time code received may be displayed by the **CTL** command

<Common><Time code><Dsply lst>.

6.6 Virtual Links, Cue LEDs, Relay Closures And Simulated Switches

<Encoder><More><Contacts> <Set Swtch>	ESW		Set a simulated switch

The ***CDQPrima*** contains 12 Virtual Links that can be considered a 12 bit data word for communications between codecs. The factory default condition of these links is to tie the optional opt-isolated inputs of the encoder to the relay outputs and CUE indicators of the far end decoder. The utility and re-definition of these links will be discussed in the Prima Logic Language chapter. Any MUX mode supports the use of these links. The factory default assigns links 0 through 7 to relays 0 through 7 and the inverse of opto-inputs 0 through 7 to links 0 through 7.

Similar to virtual links are simulated switches, which can be used to open and close far end relays and send cue indications. These will also be discussed with Prima Logic Language, and also require any ancillary data MUX mode be used. The factory default of these simulated switches if OFF, with CI1 and CI2 linked, through Virtual Links 8 and 9 to the far-end RCUE1 and RCUE 2 indications.

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6.7 Ancillary Data With Independent Mono Operation

<Decoder><Line Fmt><Ind. Mono>	DAS	DC	Set decoder ancillary data channel (Ind. Mono only)
<Encoder><Line Fmt><Ind. Mono>	EAS	DC	Set encoder ancillary data channel (Ind. Mono only)

When using the *CDQPrima*s independent mono mode to send two discrete audio signals to two or more destinations, the EAS command is used to select which locations are to receive any ancillary data. The ancillary data, including RS232, time code and far end remote control can be directed all locations receiving the left channel audio, all locations receiving the right channel audio, or all locations. The DAS command is used to select which individual line to monitor for the return ancillary data. The *CDQPrima* can also be set to receive ancillary data from any one of the connected locations.

Please remember that ancillary data is not supported when using G.722.