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ENC1000A29-00, -01, -02
VIDEO COMPRESSION ENCODER

User Manual

Document Part Number:
ENC1000A2900MAN

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- Printing History -

First Edition - SPENC001 - September, 1996
Second Edition - SPENC001 - January, 1997
Third Edition - SPENC001 - October, 1997
Fourth Edition - SPENC001 - March, 1998
Fifth Edition - ENC1000A2900MAN - June 1, 1999
Sixth Edition - ENC1000A2900MAN - May 1, 2002
Revised – ENC1000A2900MAN – December 22, 2004

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Chapter 1 Introduction

About This Manual

This manual, PN SPENC001, is a user guide for the ENC1000A29 Video Compression Encoder, a member of Enerdyne's family of ADVS® compatible video encoders. The ENC1000A29 is a compact, self-contained, airborne qualified unit requiring 28 VDC power (Figure 1).

This manual contains the information required to install, operate, and maintain the ENC1000A29. If you have questions or problems that cannot be resolved using this manual, please contact Customer Support at 619-438-6000 for assistance.

Some of the conventions used in this manual include: capitalizing all references to command names, e.g., RECALL; setting actual command entries in bold, e.g., **RECALL 01**; and indicating variable alpha-numeric command arguments with the bold character **n**, where consecutive **n** characters represent the actual number of characters required in the argument, e.g., **nn** requires two valid alpha-numeric characters, and where **n . . . n** indicates a variable number of alpha-numeric characters, e.g., the argument for the BAUD command which can range from three characters (300) to five characters (38400).

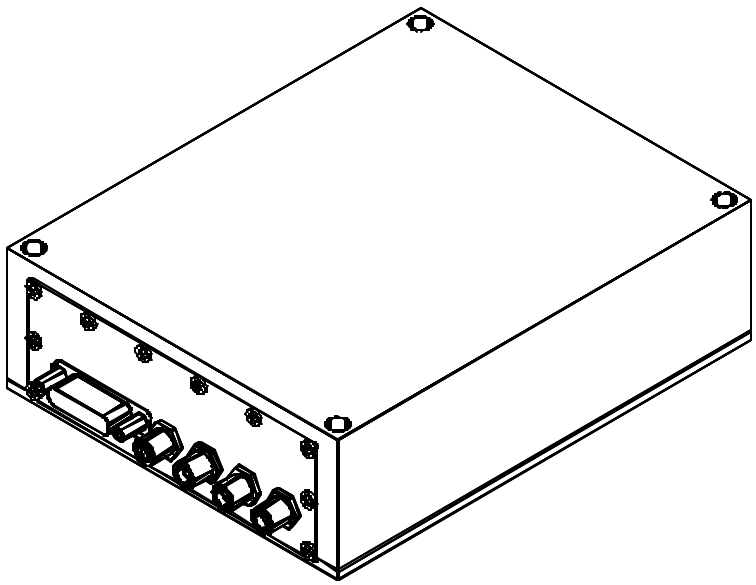

Figure 1 ENC1000A29 Airborne Video Compression Encoder

Typical Application

Figure 2 shows an example of a typical user installation for the ENC1000A29. Various configurations are possible and are dependent upon user requirements and equipment.

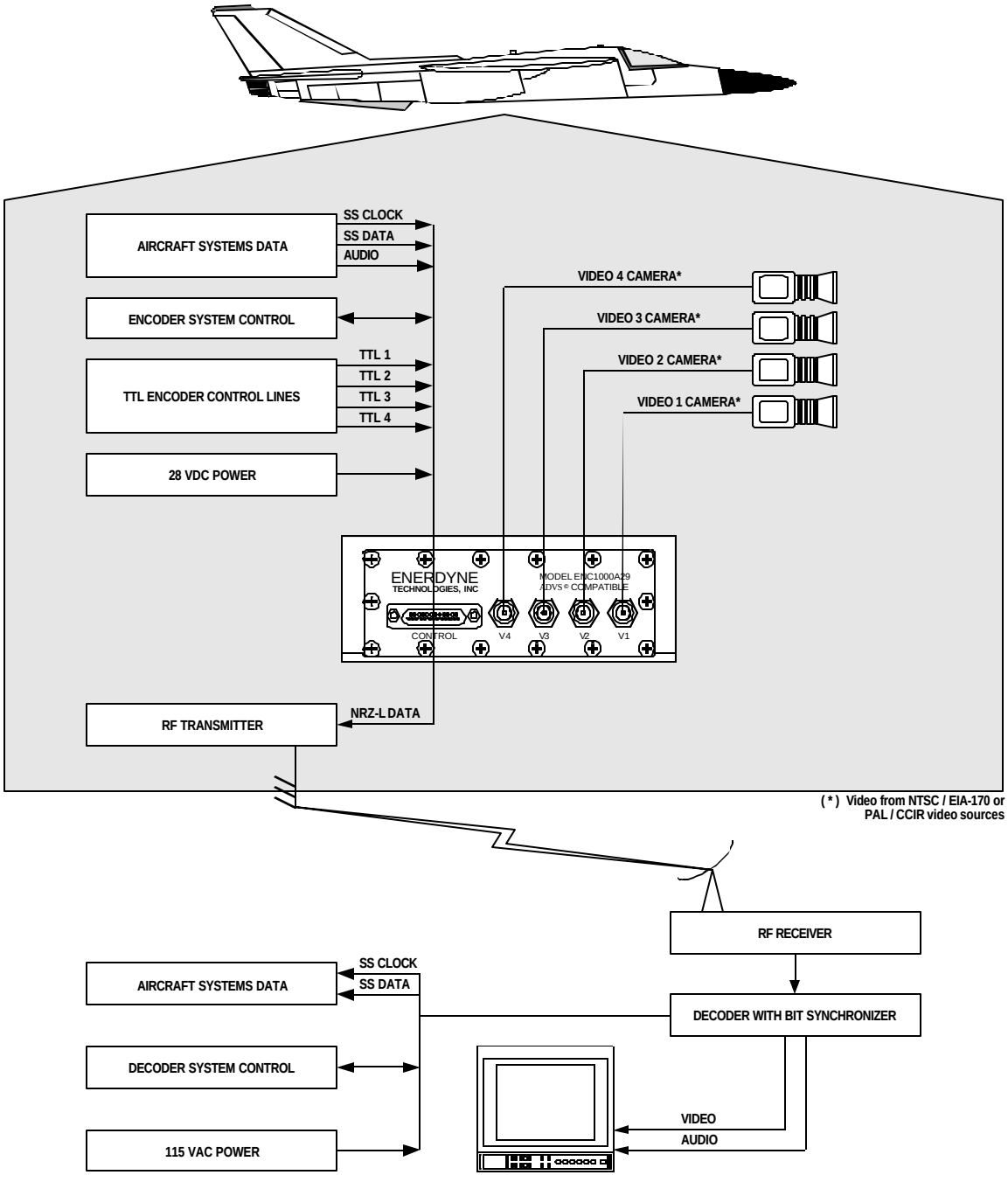

Figure 2 Typical Application of ENC1000A29

Chapter 2 Encoder Functional Description

Functional Flow

An overview of all of the features of the ENC1000A29 encoder is illustrated in Figure 3 below.

A single, selectable, input signal (composite, monochrome or Y/C) is sent to the Analog to Digital (A/D) converter. The Analog to Digital converter changes the signal to digital format. This signal is then compressed and optionally routed to the Data Multiplexer, where user data (Analog Audio (AA), optional Asynchronous Serial (AS), and Synchronous Serial (SS) clock and data) can be multiplexed with the compressed Digital Video (DV) stream. The multiplexed signal is then processed with optional Forward Error Correction (FEC), optional Passlink encryption and then Randomized.

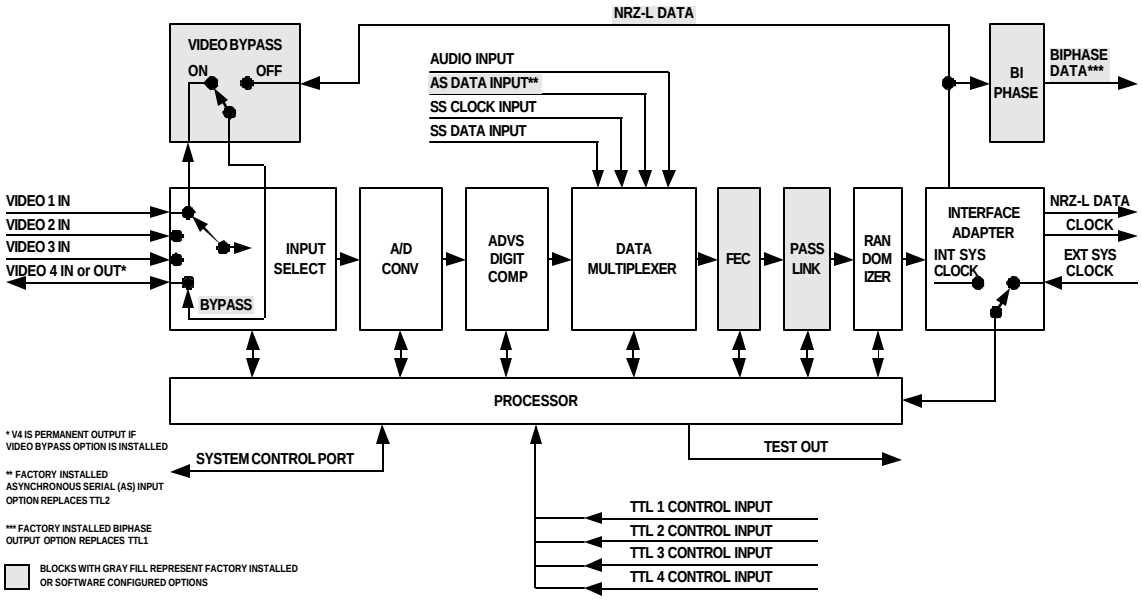

Figure 3 ENC1000A29 Functional Block Diagram

Inputs

Standard Video Input

The ENC1000A29 Encoder digitizes and compresses any of the analog video signal formats listed in Table 1.

Table 1 Analog Video Input Formats

Color	Monochrome
NTSC Composite	EIA-170
NTSC Y/C	CCIR
PAL Composite	
PAL Y/C	

Up to four composite or monochrome video signals may be connected to the video inputs (V1-V4), or three video signals (V1-V3) if the unit is equipped with the Video Bypass Output option. Only one of the video input signals is selected for processing at any one time.

Y/C Mode Video Input

In Y/C mode (**MODE 10** or **14**), the V1 and V2 inputs are used for the chromanance and luminance signals (See MODE command). While in Y/C mode, inputs V3 and V4 cannot be selected by the JACK command.

Control

All encoder and Data Multiplexer functions are individually controlled via the System Control Port using a dumb terminal or a PC with a terminal emulation program. They may also be controlled with pre-configured settings set by up to four TTL signal level inputs using logical or mechanical switching. From the Data Multiplexer functions forward, the user may elect to turn on or to turn off, the Data Multiplexer input, FEC, Passlink or Randomizer processing functions. The encoder and Data Multiplexer command sets accessed from the System Control Port and TTL Control Lines are described in detail in Chapter 4.

System Control Port

The encoder and Data Multiplexer command sets accessed from the System Control Port are described in detail in Chapter 4.

TTL Control Lines

The standard means of configuring the ENC1000A29 encoder is via individual commands issued through the System Control Port. With the use of the STORE command, up to 16 different sets of configuration settings may be saved for subsequent recovery by the RECALL command.

A secondary means of configuring the encoder is through the four standard TTL level control line inputs (Figure 4). The TTL control lines provide a simple means of selecting the configurations saved with the STORE command (00 to 0C HEX) by sending a RECALL command to the encoder that consists of a single binary bit pattern from a user-supplied logical or mechanical switching source. The TTL lines are continuously monitored by the ENC1000A29. Every time the binary bit pattern on the TTL control lines changes, the ENC1000A29 CPU reads the new bit pattern and executes the selected setting or test function.

The user may elect to have a factory-installed option which converts the TTL 1 pin connection to a Biphase Output signal. A second factory-installed option may also be selected which converts the TTL 2 pin connection to an Asynchronous Serial (AS) Input signal to the Data Multiplexer. As each of these options is installed, the number of previously-defined encoder configuration settings that can be accessed by the remaining TTL control lines is reduced.

See Table 3 under the RECALL command for the binary bit patterns required to identify and set previously defined encoder configurations and test functions.

NOTE

Each of the available RECALL locations specified in Table 3 is initially loaded at the factory with the default system settings identified in the table accompanying the DEFAULT command.

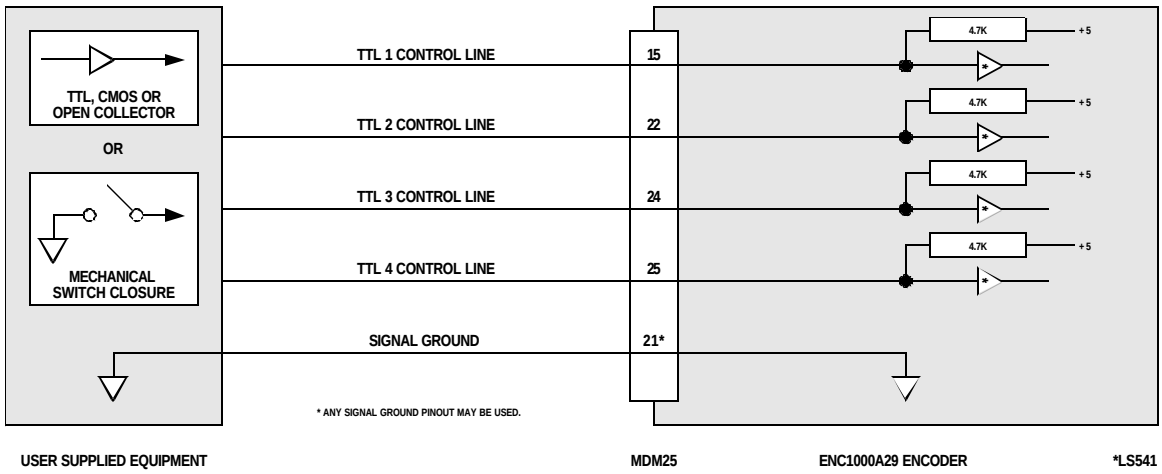

Figure 4 Representative TTL Control Line Circuit

Outputs

The encoder interface adapter provides up to four sources of data output: a standard NRZ-L data signal with clock; optional Biphase Output; and Video Bypass Output option with either NRZ-L data or analog video fed to V4. The encoder can be configured to clock data out using the ENC1000A29 internal system clock, or it can be configured to accept an externally supplied system clock signal. The system data output, internal system clock output and external system clock input are all EIA-422 signals.

NRZ-L Clock and Data Outputs

Final output from the encoder is an EIA-422 NRZ-L data stream and clock signal.

Video Bypass Output Option

If the Video Bypass Output option is installed, V4 is, selectively, either an analog video output or compressed NRZ-L data output. If the command **BYPASS ON** is selected or, if the equivalent TTL signal is passed or, if the power is switched off, a relay automatically bypasses the encoder function and feeds analog video directly from the V1 input source to the V4 output. If the command **BYPASS OFF** is selected, with the power switched on, the output on V4 is fed from the final encoded NRZ-L data signal. BYPASS commands have no effect if the Video Bypass Output option is not installed, and V4 functions as a normal video input source.

Biphase Output Option

The factory-installed Biphase Output option processes the NRZ-L data stream into a biphase-L data stream. When installed, the Biphase Output replaces the TTL 1 input at the System Control Port.

Test Out Signal

The Test Out Signal is part of the ENC1000A29 Built-In Test (BIT) system (See CHECK command). This TTL level signal may be used to drive an LED (through a current limiting resistor) or, it may be fed to a TTL level user-supplied equipment input. After the start of a self test, the signal on this pin goes high and then immediately low. If an error is detected, the signal stays high.

Chapter 3 Data Multiplexer Functional Description

Functional Flow

When turned on, the Data Multiplexer (Figure 3) allows the user to combine into one data stream various mixes of user data (Analog Audio (AA), digital Asynchronous Serial (AS), and digital Synchronous Serial (SS) clock and data) with the compressed digital video (DV) signal. This multiplexed data stream is optionally further processed by the FEC option, the Passlink option, and the Randomizer before being output.

User Data Inputs

Analog Audio (AA) Input

The Analog Audio (AA) data channel accepts a 1 Vpp, 600 ohm analog audio signal and provides a frequency response of 300 Hz to 3000 Hz. The AA input is digitally sampled at a fixed rate of 64 kbps. When AA user data is fed to the Data Multiplexer, it automatically uses a fixed percentage of the encoder's total output data rate, as determined by values specified in the MUXDATA command.

Asynchronous Serial (AS) Input Option

The factory-installed simplex Asynchronous Serial (AS) Input option is an EIA-232 level signal input to the Data Multiplexer. The AS Input option replaces the TTL 2 input at the System Control Port. The AS data channel is user programmable from 300 to 38,400 baud (8-N-1). When AS user data is fed to the Data Multiplexer, it automatically uses a fixed percentage of the encoder's total output data rate, as determined by values specified in the MUXDATA command.

Synchronous Serial (SS) Clock and Data Inputs

The Synchronous Serial (SS) input channel accepts digital SS clock and SS data. Depending upon the industry and the application, SS data is variously identified as PCM data, Telemetry data, or any one of many other forms of digital data. The SS input levels are all EIA-422. When SS user data is fed to the Data Multiplexer, it automatically uses a fixed percentage of the encoder's total output data rate, as determined by values specified in the MUXDATA command.

Multiplexing

Overview

The ENC1000A29 encoder has the capacity to output data at rates of up to 10 Mbps. This output data rate offers the user an extremely wide range of high performance choices in the mix of user data (AA, AS and SS) with the compressed digital video (DV) signal.

When the Data Multiplexer is turned off, the encoder's total output data rate, barring marginal system requirements, is dedicated to the compressed digital video (DV) signal.

When the Data Multiplexer is turned on, user data processed by the multiplexer absorbs some determined percentage of the encoder's output data rate, leaving less for the compressed digital video (DV) signal that was being encoded before the multiplexer was turned on. Under certain circumstances this may result in a small reduction of the video frame rate.

The percentage of the encoder's total output data rate absorbed by user data is determined both by the input rates of the data (baud rates, input clock frequencies) and by the percentage mix of the data (AA vs. AS vs. SS). Consult the guidelines section below for assistance in determining the actual output data rate requirements of each of the user data elements.

With the ENC1000A29 encoder, user data requirements (AA, AS and SS combined) may never exceed 50% of the encoder's total output data rate.

The percentage mix of user data (AA vs. AS vs. SS) is specified by the user with the MUXDATA command. If the MUXDATA command has not been used to specify a user data mix, the default mix of user data (AA vs. AS vs. SS) is 100% SS data. Refer to the Data Multiplexer MUXDATA command for identification of the various user data mix options available.

Every choice the user makes in shaping the content of the encoder's output impacts the encoder's output data rate requirement. If a fixed rate transmission facility is being employed, the user must determine how best to use the encoder's output data rate respecting those fixed rate design limits.

Even though the ENC1000A29 encoder has the capacity to output data at rates of up to 10 Mbps, the encoder's actual output data rate may be limited by the design of the transmission link used to transport the data. The CLOCKFREQ command is used to set the encoder's actual output data rate to match that of the transmission link.

Guidelines for Determining User Data Configurations

For purposes of clarity and consistency, all of the data guidelines below are designed to interpret encoder input and output user data rate requirements in kbps.

Determining the Encoder Output Data Rate

Before the mix of user data (AA, AS, SS) is specified, the total output data rate of the encoder must be determined.

The encoder's total output data rate, measured in kbps, is determined by taking the exact clock frequency value from the table in the CLOCKFREQ command, dividing that value by 2, and moving the decimal point three places to the right. As an example, a clock frequency setting of 20.000 MHz from the CLOCKFREQ table, divided by 2 is 10.000. Moving the decimal point three places to the right yields the resultant encoder data output rate of 10,000 kbps.

Determining the Maximum User Data Output Rate

The combined output data rate requirements of all three types of user data (AA, AS, SS) cannot exceed one half of the encoder's total output data rate.

To determine the maximum permissable user data output rate (AA, AS and SS combined), simply divide the encoder's total output data rate by 2. Continuing with the previous example, an encoder total output data rate of 10,000 kbps, divided by 2, is 5,000 kbps. In this example, the combined output data rate requirements for all three types of user data (AA, AS and SS combined) cannot exceed 5,000 kbps.

Due to the efficient way in which the ENC1000A29 encoder processes user data, only the single, HIGHEST, output data rate requirement in the selected mix of user data (AA, AS or SS) is used to determine the impact these requirements have on the encoder's total output data rate.

Continuing with the example, if it is determined that the output data rate requirement for the AA component of a data mix is 256 kbps, and that the output data rate requirement for the AS component is 38.4 kbps, and that the output data rate requirement for the SS component is 3,000 kbps, only the HIGHEST rate, 3,000 kbps, is required to process ALL user input signals combined, AA at 256 kbps + AS at 38.4 kbps + SS at 3,000 kbps.

At this point it is important to understand the function of the MUXDATA command. This command not only allows the user to select among one, two or three user data input types (AA, AS, SS), but also to determine the relative percentages by which these user data types are processed.

Whenever a **MUXDATA nn** value is selected which processes a component of user data at a 100% mix of the total, the output data rate requirement for the data type is the same as the original input rate of that data. However, when a **MUXDATA nn** value is selected which processes a component of user data at a 50% or 25% mix of the total, the output data rate requirement for each type of data specified is either twice (for 50%) or four times (for 25%) the original input rate of that data. These increases in the output data rate requirements are caused by the necessity to process 50% of the data twice as fast and 25% of the data four times as fast as the rate of the original input signal. By way of example, if an AA input signal, sampled at a rate of 64 kbps is processed as 25% of the total user data output mix, this component requires 256 kbps to output, or 4 times the input rate.

Determining the AA User Data Output Rate

The Analog Audio (AA) input data rate, under all circumstances, is fixed at 64 kbps. The AA output data rate is determined by multiplying 64 kbps by the percentage mix multiplier specified for this data type in the MUXDATA command (100% = 1x, 50% = 2x, 25% = 4x). By way of example, an AA input signal, sampled at a rate of 64 kbps, and processed as 25% of the total user data output mix, uses the 4x multiplier to determine the output data rate requirement for this component, i.e., 64 kbps, times 4, equals a 256 kbps output data rate requirement.

Determining the AS User Data Output Rate

The Asynchronous Serial (AS) output data rate, measured in kbps, is determined by taking the exact baud rate argument (**n . . . n**) from the table in the ABAUD command, shifting the decimal point three places to the left, and then multiplying that result by the percentage mix multiplier specified for this data type in the MUXDATA command (100% = 1x, 50% = 2x, 25% = 4x). As an example, if 9600 baud had been used as the argument for the ABAUD command to set the AS input frequency, and 25% had been used as the percentage mix of AS user data with the MUXDATA command, moving the decimal place three places to the left (9.600) and then multiplying the result by 4, yields a resultant AS user data output rate of 38.4 kbps.

Determining the SS User Data Output Rate

The Synchronous Serial (SS) output data rate, measured in kbps, is determined by taking the exact input clock frequecy in MHz, dividing that value by 2, moving the decimal point three places to the right (SS input data rate in kbps), and then multiplying that number by the percentage mix multiplier specified for this data type in the MUXDATA command (100% = 1x, 50% = 2x, 25% = 4x). As an example, an input SS clock frequency setting of 3.000 MHz, divided by 2 is 1.500 MHz. Moving the decimal point three places to the right yields a result of 1,500 (SS input data rate in kbps). Multiplying this result by the percentage mix multiplier (in this example, 2x for a 50% mix), yields a resultant SS user data output rate of 3,000 kbps.

Determining the Actual User Data Output Rate

Only the single, HIGHEST, output data rate requirement in any selected mix of user data (AA, AS or SS) is used to determine the total user output data rate requirement.

Continuing with the example above, if it is determined that the output data rate requirement for the AA component of a data mix is 256 kbps, and that the output data rate requirement for the AS component is 38.4 kbps, and that the output data rate requirement for the SS component is 3,000 kbps, only the HIGHEST rate, 3,000 kbps, is required to process ALL user data input signals combined. In this instance, the total output data rate of the encoder must be a minimum of 6,000 kbps, which translates to a clock frequency of 12.000 MHz.

Control

All Data Multiplexer functions, FEC, Passlink and Randomizer functions are individually controlled via the System Control Port using a dumb terminal or a PC with a terminal emulation program. They may also be controlled with pre-configured settings set by up to four TTL signal level inputs, using logical or mechanical switching. The Data Multiplexer command set accessed from the System Control Port and TTL Control Lines is described in detail in Chapter 4.

Forward Error Correction (FEC) Option

The factory-installed Forward Error Correction (FEC) option allows the user to transmit data in a noisy environment by correcting bit errors received at the decoder. The encoder applies a Reed-Solomon algorithm that uses two check bytes to correct one data byte in every sixteen byte packet. If used, FEC must be set to ON at both the encoder and decoder.

Passlink Option

The Passlink option is a proprietary scrambling technology offered by Enerdyne Technologies, Inc. which processes the NRZ-L signal to provide more secure transmission between encoder and decoder. This function must be set to ON at both the encoder and decoder.

Randomizer

The encoder Randomizer, in conjunction with the Derandomizer in the decoder, ensures that the density of ones and zeros in the transmitted data stream are approximately equal. This allows good operation of the decoder's bit synchronizer and minimal distortion in the transmission to the decoder caused by DC offsets in the data stream. If used, the Randomizer and Derandomizer functions must be set to ON at the encoder and decoder, respectively.

Specifications

Table 2 ENC1000A29 Video Compression Encoder Specifications

ELECTRICAL			
Inputs	**Level**	**Frequency**	**Impedence**
Video			
Composite NTSC (60 Hz), PAL (50 Hz)	1 Vpp	0-2 MHz 0.2 dB	75 Ohms
Y/C NTSC (60 Hz), PAL (50 Hz)	1 Vpp	0-2 MHz 0.2 dB	75 Ohms
Mono EIA-170 (60 Hz), CCIR (50 Hz)	1 Vpp	0-5 MHz 0.2 dB	75 Ohms
Multiplexed			
Analog Audio (AA)	1 Vpp	300 Hz – 3 kHz 3 dB	600 Ohms
Asynchronous Serial (AS) - optional	EIA-232	See Chap. 3 AS User Data	
Synchronous Serial (SS) Clock	EIA-422	See Chap. 3 SS User Data	
Synchronous Serial (SS) Data	EIA-422	See Chap. 3 SS User Data	
Control			
Four TTL Lines	TTL		4.7 k Ohms
System Control Port	EIA-232	9,600 baud	
External System Clock	EIA-422	20 MHz max.	
Outputs	**Level**	**Frequency**	**Impedence**
System			
System Clock	EIA-422	20 MHz max.	
System Data	EIA-422 NRZ-L	10 Mbps max.	
Video Bypass (V4) - optional	1 Vpp	See Chap. 2 Vid. Byp. Out.	75 Ohms
Biphase - optional	TTL		
Test	TTL (Fault = High)		
MECHANICAL			
Dimensions	4 in. wide x 5 in. deep x 1.45 in. high		
Weight	25 oz.		
Mounting Holes	.203 in. diameter thru entire case, 4 places		
Enclosure Materials	6061-T6 aluminum, stainless steel hardware		
Enclosure Finish	Electroless nickel plate on matte beadblast finish		
ENVIRONMENTAL			
Operational Temperature	-40° C to +85° C		
Non-Operating Temperature	-40° C to +100° C		
Humidity	95% maximum (non-condensing)		
Vibrations Operational Transportation	 As per MIL-STD-810E, method 514.4, category 4 figure 514.4-7 As per MIL-STD-810E, method 514.4, procedure 1 figures 514.4-1/2/3 in transit, when packaged in shipping box		
Shock, Operational	As per MIL-STD-810E, method 516.4, procedure 1, figures 516.4-4 (20 g, 11 ms sawtooth)		
RFI/EMC	As per MIL-STD 461C part 2: CE03,CE07, CS01, CS06, RE02		
MTBF, Calculated	15,000 hours as per MIL-HDBK-217 for airborne, uninhabited cargo environment at 50° C		
CONTROL			
System Control, EIA-232	See Chap. 2 System Control Port		
TTL Control Lines	See Chap. 2 TTL Control Lines		
GENERAL			
Horizontal Resolution	560, 280 or 140 pixels/line, user selectable		
Vertical Resolution	240 lines/field digitized, 480 lines/frame 60 Hz 288 lines/field digitized, 576 lines/frame 50 Hz		
Reed Solomon FEC	2 check bytes to correct 1 data byte in every 16 byte packet		
Voltage	28 VDC nominal, as per MIL STD 704E		
Power	10 watts max.		

Chapter 4 Encoder Operation

Encoding Equipment

This chapter provides detailed explanations of each operating mode and available option for the ENC1000A29 ADVS® compatible Video Compression Encoder.

Software Interface

The encoder contains all of the software required to communicate with terminal hardware. The user must provide only a dumb terminal operating at 9600 baud or a PC running terminal-emulation software set for half-duplex (local echo) mode.

Upon power-up, the encoder-to-terminal link displays power-on test messages, followed by the logon message.*

```
Lca configured from Flash #0.

ENC1000A29 ADVS(R)   Software    Rev.    7.6    990507-1630
                     FirmwareRev. Xa29pe_4c.a29pu600.a29e_4c

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A29 multiplexer firmware version is 64

ADVS encoder configuration is completed.
```

*This is a typical power-on message sequence. The actual message sequence varies with the software revision and installed options.

Following the power-up messages, the system prompt is displayed:

```
ADVS:\Encoder>
```

The prompt text can be customized with the **PR** command. See **PR** command in this chapter for details.

There is *no* battery in the system. All software configuration values are stored in an EEPROM and are retained through power-off/power-on cycles.

Using the Software Interface

Software commands are entered at the system prompt. They may be either a single word, or a single word followed by a space and an argument string. The software is not case sensitive. Upper and lower case alpha characters are interpreted as the same value. Depressing the ENTER key (RETURN key) executes the command.

Commands must be entered at the system prompt, one command at a time. Command sequences, executed in rapid succession, before the system prompt returns to the screen, are not buffered for execution, and may cause truncated character strings to appear in the command field when the prompt is redisplayed. When this occurs, the error message below is displayed:

```
[String] < was an unrecognized command.
```

Use the BACKSPACE key to edit incorrect entries. If a system prompt fails to appear, press the ENTER key to display the prompt. If the prompt still fails to appear, check all connections and ensure that the terminal port, encoder and decoder are all set to the same baud rate.

In addition to a default single-word or character command structure, some of the commands permit the use of alternate command entries. These alternate entries are shown in parenthesis. Where applicable, the default settings are identified by the word *default* next to the appropriate character string. The command set currently supported by the system software and hardware follows. Type **HELP** followed by ENTER to display this command list.

ABAUD n . . . n

This command is enabled if the Asynchronous Serial Input option is installed. It selects the baud rate for the Asynchronous Serial (AS) Input to the Data Multiplexer. The following baud rates are supported:

n . . . n	Baud Rate
300	300 baud
600	600 baud
1200	1,200 baud
2400	2,400 baud
4800	4,800 baud
9600	9,600 baud
19200	19,200 baud
38400	38,400 baud

BAUD n . . . n (BD n . . . n)

This command selects the baud rate for the encoder System Control Port. The baud rate changes only after the encoder is reset. The following baud rates are supported:

n . . . n	Baud Rate
300	300 baud
1200	1,200 baud
2400	2,400 baud
4800	4,800 baud
9600	9,600 baud
19200	19,200 baud
38400	38,400 baud

BRIGHT nn (BR nn)

This command sets the picture brightness level of the encoded signal. There are 256 steps of picture brightness. All values from 00 to FF HEX may be used. The normal (default) setting is HEX 00. The list below shows the HEX values used to define picture brightness levels:

nn	Relative Brightness
80	Minimum
81-FF	
00	Normal (default)
01-7E	
7F	Maximum

BYPASS ON/OFF (BP ON/OFF)

If the Video Bypass Output option is installed, V4 is, selectively, either an analog video output or compressed NRZ-L data output. If the command **BYPASS ON** is selected or, if the equivalent TTL signal is passed or, if the power is switched off, a relay automatically bypasses the encoder function and feeds analog video directly from the V1 input source to the V4 output. If the command **BYPASS OFF** is selected, with the power switched on, the output on V4 is fed the final encoded NRZ-L data signal. BYPASS commands have no effect if the Video Bypass Output option is not installed, and V4 functions as a normal video input source. If the Video Bypass Output option is installed, the command **JACK 03** is not allowed, nor is **MODE 03**, **07**, **0B** or **0F**. These commands define V4 as an input signal source when there is no Video Bypass Output option present.

CHECK (CK)

This command performs a Built-In Test (BIT) system check and displays the results on the monitor. Items checked include the pixel formatter, EEPROM memory checksum, the system controller, the video signal processor, the multiplexer controller and software revision, CPU RAM, and software and firmware checksums. See also Test Out Signal.

CLOCK NORMAL/INVERT

This command changes the clock edge (rising or falling) at which the NRZ-L data is clocked out of the encoder. **CLOCK NORMAL** clocks out NRZ-L data on the rising edges of the clock. **CLOCK INVERT** clocks out NRZ-L data on the falling edges of the clock.

CLOCKFREQ nn (CF nn)

This command sets the encoder's output clock frequency. Valid frequencies are from 20 MHz to 19 kHz.

Values of 00 to 77 HEX select a fixed frequency. **HELP 03** displays the list of valid entries. An external system clock can be selected by entering a value of 0F. Listed below are the valid encoder output clock frequencies in MHz.

Frequency	nn	Frequency	nn	Frequency	nn	Frequency	nn	Frequency	nn
External	0F	2.222	17	0.555	37	0.138	57	0.034	77
20.000	0E	2.000	16	0.500	36	0.125	56	0.031	76
13.333	0D	1.818	15	0.454	35	0.113	55	0.028	75
10.000	0C	1.666	14	0.416	34	0.104	54	0.026	74
8.000	0B	1.538	13	0.384	33	0.096	53	0.024	73
6.666	0A	1.428	12	0.357	32	0.089	52	0.022	72
5.714	09	1.333	11	0.333	31	0.083	51	0.020	71
5.000	08	1.250	10	0.312	30	0.078	50	0.019	70
4.444	07	1.111	27	0.277	47	0.069	67		
4.000	06	1.000	26	0.250	46	0.062	66		
3.636	05	0.909	25	0.227	45	0.056	65		

3.333	04	0.833	24	0.208	44	0.052	64		
3.076	03	0.769	23	0.192	43	0.048	63		
2.857	02	0.714	22	0.178	42	0.044	62		
2.666	01	0.666	21	0.166	41	0.041	61		
2.500	00	0.625	20	0.156	40	0.039	60		

NOTE

The encoder's output data rate in kbps is numerically one half of the encoder's output clock frequency in kHz.

CONTRAST nn (CT nn)

This command sets the contrast level of the encoded signal. There are 256 steps of picture contrast. All values from 00 to FF HEX may be used. The normal setting is 6C HEX. The list below shows the HEX values used to define contrast:

nn	**Contrast Level**
00	Minimum
01-6B	
6C	Normal (default)
6D-FE	
FF	Maximum

CROP nn

This command sets the current screen cropping value. Cropping reduces the actual number of pixels per video frame that are included in the image that is compressed and transmitted. A value of 00 HEX processes the entire video area, plus the normally blanked data lines starting at line 10. A value of 01 HEX processes the entire video area, but excludes data lines below line 20. A value of 02 HEX processes the entire visible image area, excluding the overscanned areas around the edges of the picture (some monitors may display blanked video around the edges - this is normal). A value of 03 HEX digitizes and processes the center 'window' of the screen. **CROP 04** and **05** perform the same functions as **CROP 00** and **01** respectively, except that 6% more of the NTSC signal (3% at each end of a video line) is encoded to ensure that edge encoded data is consistently recovered. In **CROP 04** or **05**, each line of video is 594 pixels (560 plus 6%) instead of the normal 560 pixels. The additional pixels on each end of a video line are outside the normal viewing area. **CROP 04** and **05** require a 6% increase in the output data rate to maintain the same frames per second yielded by **CROP 00** or **01**.

nn	Percent of total lines
00	104% standard video
01	100% standard video
02	85% standard video
03	63% standard video
04	104% standard video with edge encoded data
05	100% standard video with edge encoded data

NOTE

Interlace can be on only with crop values of 00 and 04. Any other values turn interlace off.

DATA NORMAL/INVERT

This command changes the polarity of the NRZ-L data output from the encoder.

DATE mm:dd:yy (DA mm:dd:yy)

This command sets the default date used by the system. The date is entered in the month (**mm**), day (**dd**), year (**yy**) format and is valid only for the day of entry. This date does not automatically increment with a new calendar day. When power is lost or a reset occurs, the system date is set to the last date entered.

DEFAULT nn (DF nn)

This command resets all of the internal EEPROM variables to factory-installed NTSC default settings (**DEFAULT 00**) or, alternately to PAL settings (**DEFAULT 01**). After this command is executed, a reset (**RESET** or **Z** command) should be performed. Default values are set to the following:

nn	Default Variables
00	Mode 00 - NTSC
01	Mode 08 - PAL

Parameter	Default Setting
Baud	9600
Brightness	00
Contrast	6C
Crop	00
Clock	10 Mbps
Error	OFF
Interlace	OFF
Multiplexer, FEC, Passlink, Randomizer	OFF
Quantization	18
Resolution	02

Saturation	7F
Sequencing (Preset to 0-1-2-3)	OFF
Tint	00

To execute this command, the write protect mode must be disabled. To disable write-protect, enter the **PROTECT OFF** command. (The **PROTECT ON** command is automatically executed after the **RESET** command is entered. Consultation with the factory is recommended before any additional changes are made with write-protect disabled.)

NOTE

When write-protect is disabled, configuration data can be changed or invalid data conditions may be entered.

ERROR ON/OFF (ER ON/OFF)

This command turns system error handling on or off. This setting *must* be the same at the encoder and decoder. When turned ON, this feature reduces the propagation of errors from one tablet (picture segment) to the next in the decoded video frame. This feature, when turned on, requires an increase of approximately 10% in the output data rate. This command must be followed by a reset.

FEC ON/OFF

This command turns the optional Forward Error Correction (FEC) function ON or OFF. Turning this feature ON automatically processes FEC into the multiplexed data stream.

HELP nn

This command, entered without **nn** arguments, invokes the main help screen. Secondary help screens can be invoked with the **HELP nn** commands below. If video sync is lost and restored while viewing the help screen, video at the monitor is not restored until the help screen is exited.

nn	**Help Screen**
00	Troubleshooting hints, baud rates
01	Factory assistance
02	Hardware interconnctions
03	Clock modes
04	Video input modes
05	Multiplexer commands
06	Muliplexer data input commands

ID nn

This command embeds a video channel identification code in the compressed video data packets output by the encoder. The normal default value is HEX 00.

nn	Channel ID
00	Channel 1 ID on current video
01	Channel 2 ID on current video
02	Channel 3 ID on current video
03	Channel 4 ID on current video
04	Sequence between user selected input jacks.

NOTE

Sequencing (**04**) assigns ID 00 to input V1, ID 01 to V2, ID 02 to V3, and ID 03 to V4. If the Video Bypass Output option is installed, V4 is not available as an input, but has been altered by the factory to an output.

INTERLACE ON/OFF (IN ON/OFF)

This command sets the system operation to either interlaced (**ON**) or non-interlaced (**OFF**) operation. Normal operation is non-interlaced.

NOTE

If CROP is a value of 01, 02, 03, or 05, this command automatically changes the CROP value to 00.

JACK nn (JK nn)

This command allows switching between the video inputs without a reload of any other parameters. This results in almost instantaneous switching.

nn	Input Number
00	V1
01	V2
02	V3
03	V4

If the Video Bypass Output option is installed, V4 cannot be selected. It is an output source.

MODE nn (MD nn)

This command selects the system operating mode. Twenty-two modes from 00 to 15 HEX are valid. The mode change requires several frames to take effect and remains in effect until changed again. The table below shows the currently supported modes (**HELP 04** displays this list).

nn	Mode
00	NTSC 3.58 MHz burst, 60 Hz composite input on V1
01	NTSC 3.58 MHz burst, 60 Hz composite input on V2
02	NTSC 3.58 MHz burst, 60 Hz composite input on V3
03*	NTSC 3.58 MHz burst, 60 Hz composite input on V4
04	RS-170 60 Hz monochrome input on V1
05	RS-170 60 Hz monochrome input on V2
06	RS-170 60 Hz monochrome input on V3
07*	RS-170 60 Hz monochrome input on V4
08	PAL 4.43 MHz burst, 50 Hz composite input on V1
09	PAL 4.43 MHz burst, 50 Hz composite input on V2
0A	PAL 4.43 MHz burst, 50 Hz composite input on V3
0B*	PAL 4.43 MHz burst, 50 Hz composite input on V4
0C	CCIR 50 Hz monochrome input on V1
0D	CCIR 50 Hz monochrome input on V2
0E	CCIR 50 Hz monochrome input on V3
0F*	CCIR 50 Hz monochrome input on V4
10	Y=V1, C=V2 60 Hz
11	Reserved
12	Reserved
13	Reserved
14	Y=V1, C=V2 50 Hz
15	Reserved

NOTE

- These modes use V4 as a video input source and are not available if the Video Bypass Output option is installed. The Video Bypass Output option uses V4 as an output.

MUX ON/OFF

This command turns all selected user data inputs (AA, AS and SS) to the Data Multiplexer ON or OFF. The FEC, Passlink and Randomizer functions are not affected by this command.

MUXDATA nn

The Data Multiplexer MUXDATA command determines the mix of user data (AA, AS, SS) processed with the video signal. See Chapter 3 for discussions on determining user output data rate requirements. These requirements serve as guidelines in selecting the appropriate **MUXDATA nn** value. See **HELP 06** for an online listing of the values expressed in the table below. When this command is entered, new user data mix values are set and the current multiplexer status is displayed. See also the MUXSTATUS command.

NOTE

Whenever a **MUXDATA nn** value is selected which processes user data at a 100% mix of the total, the output data rate requirement for the data type is the same as the original input rate of that data. Whenever a **MUXDATA nn** value is selected which processes user data at a 50% or 25% mix of the total, the output data rate requirement for each type of data is either twice (for 50%) or four times (for 25%) the original input rate of that data. These increases in the output data rate requirements are caused by the necessity to process 50% of the data twice as fast and 25% of the data four times as fast as the rate of the original input signal.

MUXDATA User Data Mix nn Values (Output Data Rate Multipliers: 100% = 1x, 50% = 2x, 25% = 4x)			
nn Value	**Synchronous Serial %**	**Audio %**	**Asynchronous Serial**

			%
00	100 (Default)	0	0
01	0	0	100
02	0	100	0
03	50	0	50
04	50	50	0
05	0	50	50
06	50	25	25
07	25	25	50
08	25	50	50

CAUTION

The data mix settings on the decoder must be identical to the data mix settings on the encoder. To be compatible with decoders that do not have the MUXDATA command, matching values for the decoder OPTION 3 and OPTION 4 commands are displayed whenever the MUXDATA command is used. To ensure decoder settings are correct, copy these matching decoder HEX arguments and use then in the decoder OPTION 3 and OPTION 4 commands.

MUXSTATUS (MS)

This command displays the current settings of the Data Multiplexer, and also the settings for the optional subsequent FEC, Passlink and Randomizer processes. The table below lists the values displayed by the MUXSTATUS command.

Function	**Status**
MULTIPLEXER:	ON/OFF
CLOCK:	INVERTED/NORMAL
DATA:	INVERTED/NORMAL
FEC:	ON/OFF (If FEC option is installed)
PASSLINK:	ON/OFF (If Passlink option is installed)
RANDOMIZER:	ON/OFF
ASYNC DATA RATE:	nnnn
SS DATA:	INVERTED/NORMAL
SS CLOCK:	INVERTED/NORMAL
MUXDATA nn SELECTED:	nnn% AUDIO nnn% SYNC nnn% ASYNC
OPTION 3:	nn
OPTION 4:	nn

The listing above is followed by a list of installed options: FEC, Passlink, Biphase Output, Asynchronous Serial Input and Video Bypass Output.

NORMAL (NR)

This command sets the TINT, SATURATION, BRIGHTNESS, and CONTRAST parameters to their default values, which are HEX 00, 7F, 00, and 6C respectively.

NTSC (NT)

This command forces the system to accept standard 525 line NTSC video. This command performs the same function as **MODE 00**.

PAL (PL)

This command forces the system to accept standard 625 line PAL video. This command performs the same function as **MODE 08**.

PASSLINK ON/OFF (PA ON/OFF)

This command turn the optional proprietary signal scrambling processor ON or OFF.

PK nnnnnnnnnnnnnnnn

This command loads a defined sixteen-character Passlink Key into the multiplexer. All sixteen characters must be entered.

PROMPT n . . . n (PR n . . . n)

This command changes the text of the system prompt. Up to eight alphanumeric characters are accepted. Prompts entered using the PROMPT command are retained through reset. Upper and lower case characters are accepted.

PROTECT ON/OFF

This command turns the non-volatile system write-protection ON or OFF. The command **PROTECT OFF** must be used before writing defaults to memory with the DEFAULT command. The addition of this command to the system makes the use of the **DEFAULT nn** command a more secure two-step process. Protection is automatically turned on (**PROTECT ON**) upon reset.

Q nn (QU nn) (QUANTIZATION nn)

This command sets the relative quantization level for the system. The Q value has a direct relationship to the amount of compression achieved. As with all DCT based systems, the compression level cannot be specified. The resulting compression level depends on quantization, resolution, picture content, and other system parameters.

Valid ranges for the variable are 10 to FF HEX, with 10 HEX being the best picture quality (minimum compression) and with FF HEX being the highest compression. As a rule of thumb, a Q value of 18 yields good quality, 28 yields average quality, and values greater than 50 yield lower quality.

There is a direct correlation between quantization and the number of frames per second (frame rate). As the Q value decreases, the number of video frames per second decreases, with each individual video frame represented at a higher quality. Conversely, as the Q value is increased, the system throughputs more video frames per second, but at a lower pixel resolution. The quantization parameter is usually adjusted for every specific video situation, depending upon the video subject matter, overall data link bit rate, and required resolution.

The decoder will automatically detect the Q value of the encoder and operate accordingly. See also SPEED command.

RAN ON/OFF

This command turns the Randomizer ON or OFF.

RECALL nn (RC nn)

The standard means of configuring the ENC1000A29 encoder is via individual commands issued through the System Control Port. With the use of the **STORE** command, up to 16 different sets of configuration settings may be saved for subsequent recovery by this **RECALL** command. Valid ranges for **nn** are 00 to 0F HEX. See also STORE command.

nn	**Recall Location**
00	Recall 1
01	Recall 2
02	Recall 3
03	Recall 4
04	Recall 5
05	Recall 6
06	Recall 7
07	Recall 8
08	Recall 9
09	Recall 10
0A	Recall 11
0B	Recall 12
0C	Recall 13
0D	Recall 14
0E	Recall 15
0F	Recall 16

A secondary means of configuring the encoder is through the four standard TTL level control line inputs (Figure 4). The TTL control lines provide a simple means of selecting any of the first 13 configurations saved with the **STORE** command (00 to 0C HEX) by sending a **RECALL** command to the encoder that consists of a single binary bit pattern from a user-supplied logical or mechanical switching source. The TTL lines are continuously monitored by the ENC1000A29. Every time the binary bit pattern changes, the ENC1000A29 CPU reads the new bit pattern and executes the selected setting or test function. See Table 3 for the appropriate binary bit patterns used to recall specific system settings or test functions with different TTL line configurations.

Table 3 ENC1000A29 TTL Control Line Configurations

TTL Control Line				Pre-Defined Control Line Settings Using TTL4, TTL3, TTL2 and TTL1 (Factory-Installed Standard Four TTL Line Configuration at Pins 25, 24, 22 and 15)
4	3	2	1	
0	0	0	0	(RECALL 0C) Connects V1 analog input to V4 output if Video Bypass Output option is installed
0	0	1	0	(RECALL 00)
0	0	1	1	(RECALL 01)
0	1	0	0	(RECALL 02)
0	1	1	0	(RECALL 03)
0	0	0	1	Video Test Mode Performs encoder system check and generates PAL color bars
1	0	1	0	(RECALL 04)
1	0	1	1	(RECALL 05)
1	1	0	0	(RECALL 06)
1	1	1	0	(RECALL 07)
0	1	0	1	(RECALL 08)
1	1	0	1	(RECALL 09)
0	1	1	1	(RECALL 0A)
1	0	0	0	(RECALL 0B)
1	0	0	1	Video Test Mode Performs encoder system check and generates NTSC color bars
1	1	1	1	No TTL control line inputs (Default)
TTL Control Line				**Pre-Defined Control Line Settings Using TTL4, TTL3 and TTL2 (Factory-Installed Biphase Output Option at TTL1, Pin 15)**
4	**3**	**2**		
0	0	0		(RECALL 00) Connects V1 analog input to V4 output if Video Bypass Output option is installed
0	0	1		(RECALL 01)
0	1	0		(RECALL 02)
0	1	1		(RECALL 03)
1	0	0		(RECALL 04)
1	0	1		(RECALL 05)
1	1	0		Video Test Mode Performs encoder system check and generates default format color bars
1	1	1		No TTL control line inputs (Default)
TTL Control Line				**Pre-Defined Control Line Settings Using TTL4, TTL3 and TTL1 (Factory-Installed AS Input Option at TTL2, Pin 22)**
4	**3**		**1**	
0	0		0	(RECALL 00) Connects V1 analog input to V4 output if Video Bypass Output option is installed
0	0		1	(RECALL 01)
0	1		0	(RECALL 02)
0	1		1	(RECALL 03)
1	0		0	(RECALL 04)
1	0		1	(RECALL 05)
1	1		0	Video Test Mode Performs encoder system check and generates default format color bars
1	1		1	No TTL control line inputs (Default)
TTL Control Line				**Pre-Defined Control Line Settings Using TTL4 and TTL3 (Factory-Installed Biphase Output at TTL1, Pin 15 & AS Input at TTL2, Pin 22)**
4	**3**			
0	0			(RECALL 00)
0	1			(RECALL 01)
1	0			(RECALL 02)
1	1			No TTL control line inputs (Default)

RES nn (RL nn)

High horizontal resolution roughly corresponds to laser disc quality, standard horizontal resolution to VHS quality and low horizontal resolution to multimedia quality. Each time the resolution is lowered, the frame rate is almost doubled, and vice-versa.

nn	Resolution	Pixels
00	low resolution	140
01	standard resolution	280
02	high resolution	560

RESET (RS) (Z)

This command reinitializes all parameters from EEPROM and resets all internal timing.

SAT nn (SA nn)

This command sets the color saturation level for the selected video source. There are 256 steps of saturation. All values from 00 to FF are valid. The normal value is 7F.

nn	Saturation Level
00	Minimum (Monochrome)
01-7E	
7F	Normal (default)
80-FE	
FF	Maximum

SEQ n . . . n (SQ n . . . n)

This command allows the user to sequence the video input feed to the encoder between the video input jacks V1 thru V4. Each argument character **n** corresponds to an input jack number V1, V2, V3 or V4. Any number of characters, up to 16 consecutive characters, in any numerical sequence, can be entered. Sequencing is turned ON when a new sequence is entered with the SEQ command or when the command **ID 04** is executed. Selecting **ID 00-03** turns the sequencing function OFF.

n	Video Input
1	V1
2	V2
3	V3
4	V4

As an example, the command **SEQ 1234** sets up a sequence where video inputs V1 thru V4 are repeatedly selected in ascending numerical order.

If the Video Bypass Output option is installed, arguments addressing V4 (**n** = **4**) are not allowed.

SPEED (SP)

This command displays the current video motion processing speed of the system in average fields per second: over the last two seconds, over the last 15 seconds, and over the last 60 seconds. An example of this display appears below:

```
Average fields per second, last 2 seconds  = 030
Average fields per second, last 15 seconds = 030
Average fields per second, last 60 seconds = 027
```

SSCLK NORMAL/INVERT

This command changes the edge (rising or falling) of the SS clock signal on which the SS data is clocked into the Data Multiplexer. **SSCLK NORMAL** clocks in SS data on the rising edges of the clock. **SSCLK INVERT** clocks in SS data on the falling edges of the clock.

SSDATA NORMAL/INVERT

This command changes the polarity of the SS data signal input to the Data Multiplexer.

STATUS (ST)

This command displays all of the current operating modes that are stored in EEPROM. It also displays other current status items and errors, if any.

STORE nn (SR nn)

This command stores the current system settings to one of 16 locations (**nn**) in the EEPROM. Up to sixteen different sets of configuration settings can be saved and recovered. The default setting at each location is the factory-installed set of default values. Valid locations are 00 to 0F HEX. See also RECALL command.

nn	**Storage Location**
00	Storage 1
01	Storage 2
02	Storage 3
03	Storage 4
04	Storage 5
05	Storage 6
06	Storage 7
07	Storage 8
08	Storage 9
09	Storage 10
0A	Storage 11
0B	Storage 12
0C	Storage 13
0D	Storage 14
0E	Storage 15
0F	Storage 16

TEST nn (TE nn)

This command puts the system into video test mode. Three test patterns and up to 32 color test screens may be specified (**nn**). Solid colors range from 00 to 1F HEX. Entering the command **TEST** with no argument displays the list of colors. The system displays solid colors of different amplitudes according to the table below. To return to normal operation upon completion of a test, a reset (**RESET** command) must be entered.

nn	**test pattern**
20	color bars
21	gray scale bars
22	multi-color display

100% amplitude		**75% amplitude**		**50% amplitude**		**25% amplitude**	
nn	**color**	**nn**	**color**	**nn**	**color**	**nn**	**color**
00	black	08	black	10	black	18	black
01	red	09	red	11	red	19	red
02	green	0A	green	12	green	1A	green
03	blue	0B	blue	13	blue	1B	blue
04	yellow	0C	yellow	14	yellow	1C	yellow
05	cyan	0D	cyan	15	cyan	1D	cyan
06	violet	0E	violet	16	violet	1E	violet
07	white	0F	white	17	white	1F	white

NOTE

For test patterns to display properly, the user is advised to switch the following encoder settings: resolution to high (**RES 02**), crop to 104% (**CROP 00**) and interlace to off (**INTERLACE OFF**).

TIME hh:mm:ss (TM hh:mm:ss)

This command sets the current system time. When a reset or power failure occurs, system time is reset to 00:00:00.

TINT nn (HUE nn) (HU nn)

This command sets the tint (hue) for the selected video source. There are 256 steps of tint. All values from 80 to 7F are valid. The normal value is 00.

nn	**Phase Shift**
80	Maximum Green
81-FF	
00	Normal (default)
01-7E	
7F	Maximum Red

Chapter 5 Pre-Installation Configuration and Test

System Setup

This chapter describes the procedures for configuration, test, installation and maintenance of the ENC1000A29 encoder.

The ENC1000A29 encoder is delivered with factory-installed NTSC default settings (**DEFAULT 00**). See Table 4 below. Users of PAL systems must reset these default values with the **DEFAULT 01** command. See encoder DEFAULT command.

Initial system setup is performed on the bench using the test setup configuration shown in Figure 5. See Table 5 for Video Connectors and System Control Port Connector Pinouts. All commands are entered on a CRT terminal or PC with terminal emulator software as described in Chapter 4. It is recommended that initial setup commands be invoked in the order in which they are presented in this section. Refer to Chapter 4 for encoder operation and commands.

Proper encoder operation requires that all encoder and decoder settings match (See MUXDATA command), and that related equipment, e.g., control terminals, bit synchronizers, monitors, etc., are all system compatible.

Table 4 ENC1000A29 Factory-Installed Default Settings

Parameter	Default Setting
Baud	9600
Brightness	00
Contrast	6C
Crop	00
Clock	10 Mbps
Error	OFF
Interlace	OFF
Multiplexer, FEC, Passlink, Randomizer	OFF
Quantization	18
Resolution	02
Saturation	7F
Sequencing (Preset to 0-1-2-3)	OFF
Tint	00

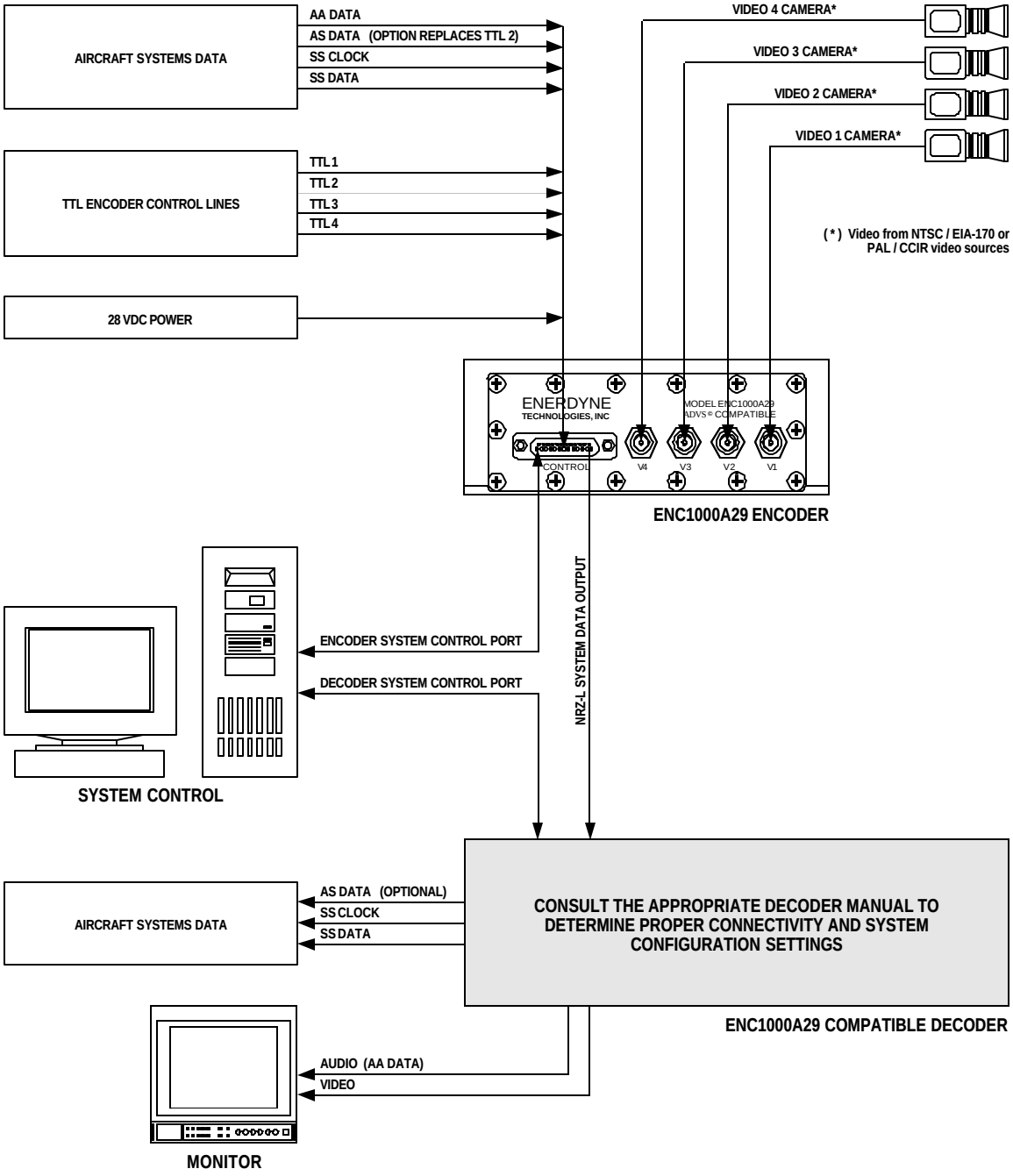
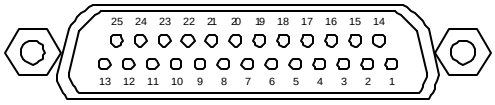


Figure 5 ENC1000A29 Test and Setup Configuration

Table 5 ENC1000A29 Video Connectors and System Control Port Connector Pinouts

ENC1000A29 Video Connectors		
Video Inputs:	V1	Connector: SMA
	V2	Connector: SMA
	V3	Connector: SMA
	V4 (If not equipped with Video Bypass Output option)	Connector: SMA
Video Bypass Output option (Analog Video or 1 Vpp NRZ-L Compressed Data) at V4		Connector: SMA
All Other Pinout Inputs and Outputs:		Control Connector: ITT Cannon MDM25PCBRP



MDM25PCBRP 25-Pin Connector

ENC1000A29 MDM25PCBRP System Control Port Connector Pinouts	
Pin Number	**Description**
1	Main power input + 28 VDC
2	Analog Audio (AA) input to multiplexer
3	System clock output +
4	System clock output -
5	Signal ground
6	SS clock input to multiplexer +
7	SS clock input to multiplexer -
8	Signal ground
9	System control port EIA-232 input RXD
10	System control port EIA-232 output TXD
11	Signal ground
12	External system clock input +
13	External system clock input -
14	Main power input return - 0 VDC
15	TTL 1 control line or optional Biphase data output
16	System data output +
17	System data output -
18	Signal ground
19	SS data input to multiplexer +
20	SS data input to multiplexer -
21	Signal ground
22	TTL 2 control line or optional Asynchronous Serial (AS) data input
23	Test output signal (TTL)
24	TTL 3 control line
25	TTL 4 control line

Step 1 - Verify system control communications

All encoder and decoder commands are issued through a dumb terminal or through a PC with terminal-emulation software. One com port of this terminal is used to communicate with the encoder. Another com port is used to communicate with the decoder. See the Pinout Connection Tables in the respective encoder and decoder manuals to determine the proper pinout connections to these devices.

The steps outlined below presume a working knowledge of the terminal software sufficient to properly access the respective com ports for each device. Refer to the respective manuals of each device for a complete description of the encoder and decoder command sets.

Step 2 - Power up units

Configure the test system as shown in Figure 5 with the NRZ-L ENCODER data output connected to the DECODER. The ENCODER must be supplied with 28-VDC power through pins 1 and 14 of the System Control Port. Power up both units, and ensure that the respective logon messages conform to the descriptions in the command set sections of each manual.

Step 3 - Set encoder clock frequency

Use the ENCODER **CLOCKFREQ** clock command to set the desired system output clock frequency. Typing **HELP 03** displays a complete list of possible inputs and their related frequencies. Use **CLOCKFREQ 0F** to turn off the internal system clock if an external system clock is being used.

Step 4 - Set encoder resolution

Use the ENCODER **RES** command to set the desired encoder resolution. For example, enter **RES 02** for 560 pixels per line (high resolution) or enter **RES 01** for 280 pixels per line (standard resolution).

Step 5 - Set encoder multiplexer user data inputs

FIRST, use the encoder **MUX ON** command to enable the encoder Data Multiplexer. NEXT, use the encoder FEC command to turn **FEC ON** or **FEC OFF**. FINALLY, use the encoder MUXDATA command to configure the desired mix of Analog Audio (AA), Asynchronous Serial (AS) and Synchronous Serial (SS) data. On execution of the encoder MUXDATA command, the system displays on the monitor the HEX values required for the DECODER OPTION 3 and OPTION 4 commands. Record these values and use them in Step 8 below to properly update decoder settings. Decoder configuration settings must be identical to those set in the encoder. The HEX values displayed by the MUXDATA command assure that the decoder can be set to the proper matching values.

Step 6 - Turn encoder multiplexer off

Use the ENCODER **MUX OFF** command, to disable the encoder multiplexer. If the encoder multiplexer is turned on when attempts are made to set the decoder values, the auto-tracking feature of the decoder, which automatically matches decoder settings to changes in the encoder, will cause the decoder to continuously reset, making it virtually impossible to properly enter decoder settings.

Step 7 - Confirm decoder default AUTO ON setting

By default, the DECODER auto-detect feature (AUTO ON/OFF), which reads and automatically matches ENCODER settings, is set to ON. Use the DECODER STATUS command to confirm that the auto-detect feature is set to ON. A message similar to the one below can be observed in the status message display. If the auto-detect feature has been turned of, turn it back on with the **AUTO ON** command.

```
Automatic parameter load from encoder is enabled.
```

Step 8 - Set decoder demultiplexer options

Use the appropriate DECODER commands, as described in the decoder manual to configure the decoder Data Demultiplexer, matching both user data, FEC, Passlink and Randomizer settings as appropriate. Use the HEX values displayed by the encoder MUXDATA command to execute the decoder OPTION 3 and OPTION 4 commands. The decoder configuration settings must be identical those set in the encoder.

Step 9 - Turn encoder multiplexer on

Use the ENCODER **MUX ON** command, to enable the encoder Data Multiplexer.

Step 10 - Reset decoder

Following encoder configuration, reset the decoder. After reset, a video picture is displayed on the monitor.

System setup and test are complete.

Encoder Installation

Figure 6 illustrates the overall package dimensions and the mounting-hole pattern for the ENC1000A29. Special shock mounting or vibration dampening is not required. Mounting bolts should be protected from vibrating loose by the standard method for the platform.

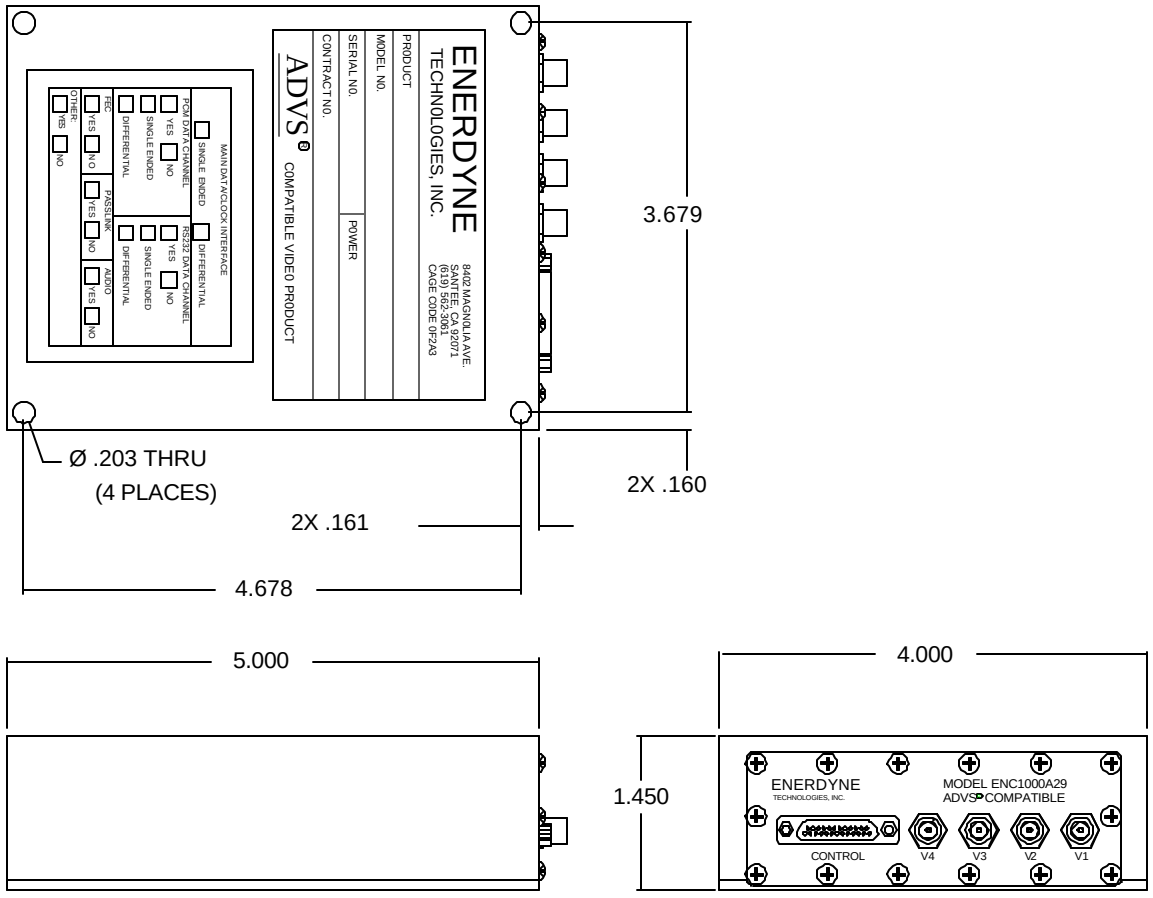


Figure 6 ENC1000A29 Overall Package Dimensions

Interconnecting Cable Installation

Ensure that all SMA connectors are fully seated. The 25-pin System Control Port connector must also be firmly seated, with jack screws properly tightened.

Dress and secure all cables in accordance with local safety and EMI standards.

Maintenance

The Enerdyne ENC1000A29 ADVS® compatible color-monochrome Video Compression Encoder requires very little maintenance.

A mild nonabrasive cleanser may be used to clean the unit. Care should be taken to prevent liquid from entering the connectors.

NOTE

There are no user serviceable parts located within the unit. Opening the unit or removing a circuit card will void the warranty. Units requiring service during the warranty period must be returned to the factory.