

# LUMISTAR

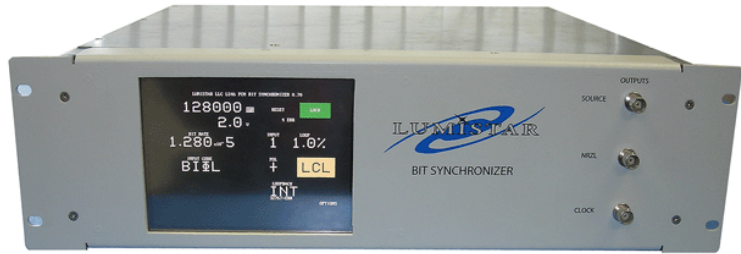
## LS-44-R3B 3U Rack Mount Bit Sync with Touch-screen Display Data Sheet

### Key Features:

- 3U Rack Mount Bit Synchronizer with Color LCD Touch-screen Display
- Data rates to 20 Mbps for NRZ-L (10 Mbps for BI $\phi$  Codes)
- Data rate may be limited by Legacy Software Interface
- Performance within 1 dB of theoretical to 10 Mbps (1.5 dB to 20 Mbps)
- All digital design ensures high reliability and long term performance
- Built-in-Test allows internal BER measurement
- Embedded DOS based software allows quick turn-on or off
- Local control using touch-screen
- Remote control optional using “legacy software commands”
- Replace dinosaur bit synchronizers without having to re-write software

### Description:

The LS-44-R3B contains a Lumistar LS-40-DB20 Bit Synchronizer Daughterboard in a 3U Rack-Mount chassis with color LCD touch-screen display for setup, control, and monitoring. The design contains an internal computer which runs off embedded DOS allowing quick turn-on/off. When power is applied, the bit synchronizer will operate with the last configuration unless the operator wishes to change the setup.



The Lumistar LS-40-DB20 Bit Synchronizer Daughterboards are used to provide optimal reconstruction of serial PCM data streams that have been corrupted by noise, phase jitter, amplitude modulation, or base line variations. The all-digital design ensures a consistent product with high reliability and long-term stability. Please refer to the Lumistar LS-40-DB Data Sheet for a description of the daughterboard bit synchronizer used in the LS-44-R3B.

### PCM Data Rate and Input Codes:

The LS-40-DB20 Bit Synchronizers can operate over a range of 100 bits per second to 20 Mbps for all NRZ codes or from 100 bits per second to 10 Mbps for the Bi-Phase and Miller codes. The LS-40-DB10 is limited to 10 Mbps for NRZ codes. The user can select any of the following IRIG PCM input codes:

NRZ codes:	NRZ-L, NRZ-M, NRZ-S
RZ codes	RZ
Split phase codes	BI $\phi$ -L, BI $\phi$ -M, BI $\phi$ -S
Miller codes	DM-M, DM-S, M <sup>2</sup> -M, M <sup>2</sup> -S
Randomized codes	RNRZ-L, RNRZ-M, RNRZ-S
Randomization sequence:	2 <sup>11</sup> -1, 2 <sup>15</sup> -1, 2 <sup>17</sup> -1, 2 <sup>23</sup> -1

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*Specifications are subject to change. Please verify the latest specifications at time of order. 10-1-06*

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### Input and Signal Characteristics:

Inputs signals:	Single-ended or differential
Input Impedance:	Shipped with 75Ω; 50Ω, 1KΩ is jumper selectable
Input Polarity:	Auto-detect (normal or inverted)
Input Signal Amplitude:	0.4 V pp to 10 V pp
Maximum Voltage Input:	5V RMS for 50Ω and 75Ω Inputs 25V RMS for 1KΩ Impedance
Maximum DC Offset:	+/- 5V for 50Ω and 75Ω Inputs; +/- 25 V for 1KΩ Impedance
Dynamic AC baseline:	Baseline variations up to 100% of the input signal at rates to 0.1% of the signal frequency for sinewave or sawtooth signals (100 Hz max)

### Phase-Locked Loop Performance:

Loop-Bandwidth:	Programmable from 0.01% to 2% depending on Bit Rate
Acquisition Range:	0.04% to 8% depending on the Loop-Bandwidth selected
Tracking Range:	0.1% to 20% depending on the Loop-Bandwidth selected

### Bit Error Rate Performance:

The LS-40 Bit Synchronizer performance relative to theoretical is indicated below when the applied signal has a S/N ratio within 1dB of the specified synchronization threshold with a Gaussian white noise bandwidth up to three times the bit rate, and has no jitter or base line variations on the input signal.

<u>Codes:</u>	<u>Bit Rate:</u>	<u>Degradation from Theory:</u>
NRZ	<10 Mbps	< 1 dB max (0.5 dB typical)
NRZ	10 to 20 Mbps	< 1.5 dB max (1 dB typical)
BI $\phi$ , RZ	<5 Mbps	< 1 dB max (0.5 dB typical)
BI $\phi$ , RZ	5 to 10 Mbps	< 1.5 dB max (1 dB typical)
DM, M <sup>2</sup>	up to 10 Mbps	< 2 dB max (1 dB typical)

### Capture Threshold:

Capture Threshold when the applied signal has a S/N ratio within 1 dB of the specified synchronization threshold with a Gaussian white noise up to three times the bit rate, and no jitter or base line variations on the input signal is defined below:

<u>Codes:</u>	<u>Capture Threshold:</u>
NRZ	-1 dB (-3 dB typical)
BI $\phi$	+1 dB (+0 dB typical)

### Synchronization Hold:

The LS-40 Bit Synchronizer is capable of maintaining synchronization during periods of a signal loss or during continuous periods of 1s or 0s lasting up to 245 bits in every 1024 bits, for NRZ coded signals up to 5 Mbps or BI $\phi$  coded signals up to 2.5 Mbps, providing:

- S/N ratio is greater than 12 dB
- PLL bandwidth is equal to 0.1%
- 50% Transition Density when the signal is present
- Input signal has no jitter or base line variations
- Signal has a constant amplitude

### Acquisition Time:

The mean acquisition time is a function of the Loop Bandwidth and will be less than 100 bits with a Loop Bandwidth of 1% and less than 150 bits with a Loop Bandwidth of 0.1% for NRZ signals up to 5 Mbps or BI $\phi$  signals up to 2.5 Mbps, providing:

- Gaussian white noise is in a band up to three times the bit rate
- Transition Density is more than 2% of the bit rate
- No jitter or baseline variations on the input signal

### Output Signals:

Data	TTL; RS-422 Optional
Zero Degree Clock	TTL; RS-422 Optional
Tape Outputs	1 V pp into 50 Ω (code programmable) TTL and RS-422 (Optional)

### Environmental:

Temperature (Operating)	0 to 40 °C
Temperature (Non-Op)	-25 to +70 °C
Humidity (Operating)	10% to 90% Non-Condensing

### Physical:

Form Factor	3U high rack mount unit with internal color touch-screen LCD display
Power required (typical)	115/230 VAC 60/50 Hz 70 W Max

### Legacy Commands:

The unit is designed to replace existing dinosaur bit synchronizers without having to re-write software. Consult Lumistar for Legacy software interfaces available.

### I/O Connectors:

Inputs and Outputs	BNC Connectors for TTL, High Density Connector for RS-422 and Legacy Control Signals
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