IEEE Std. 1394-1995 Electrical Issues

-October '97 meeting-

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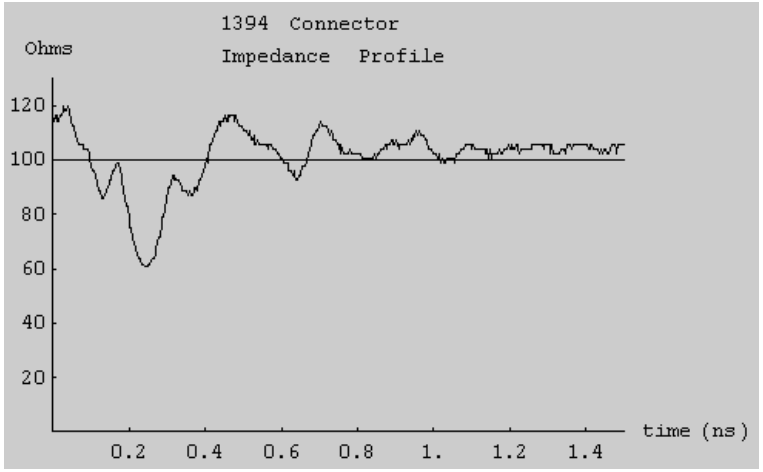
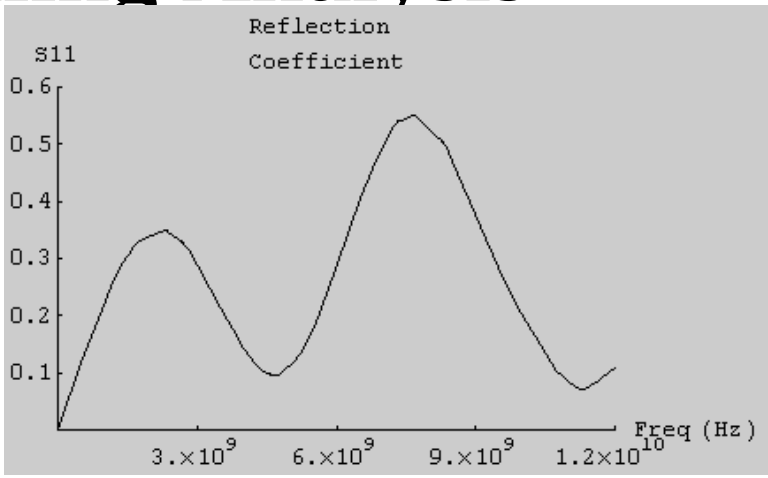
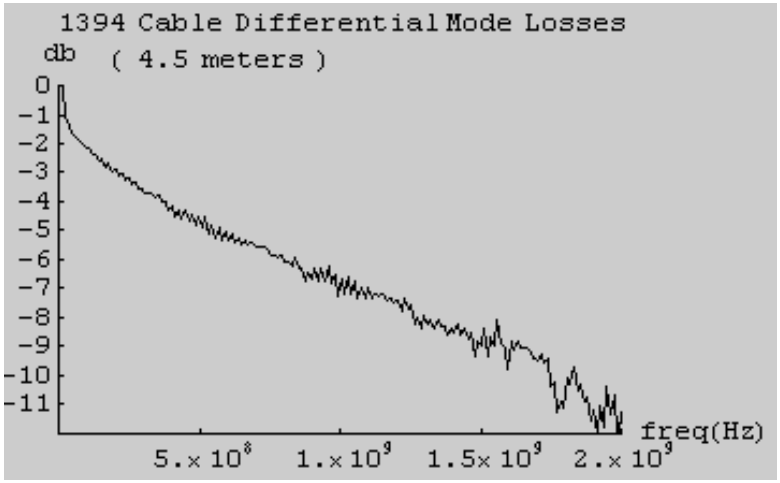
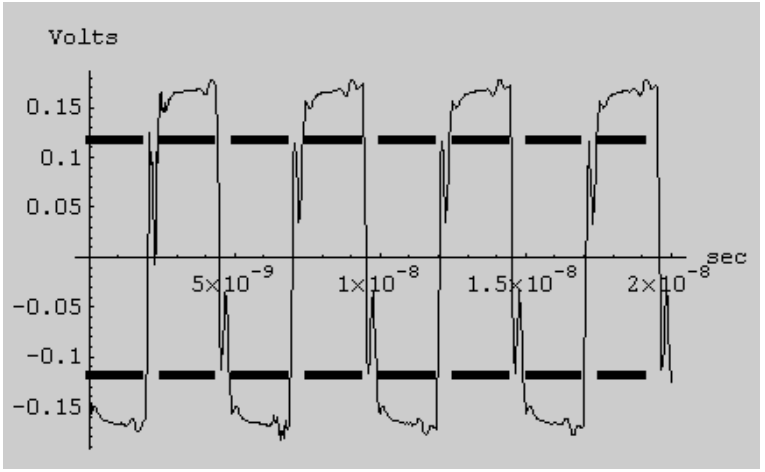
Data/Strobe Signaling Analysis







measured cable attenuation



Worst case short cable received signal: S400, 200ps Tr/f, 18" long

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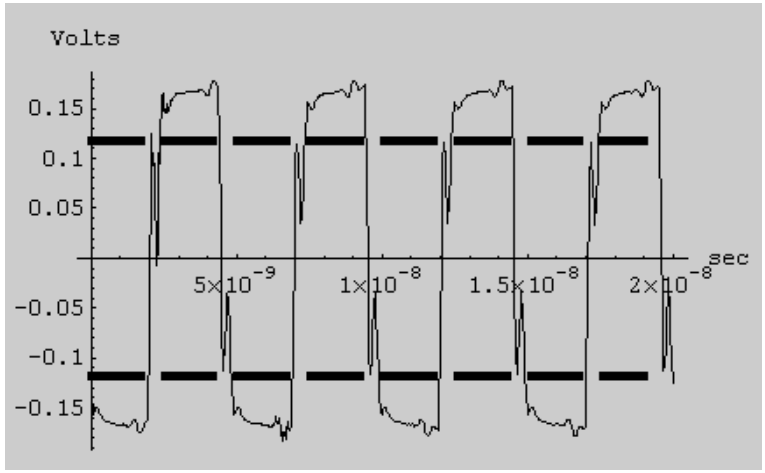
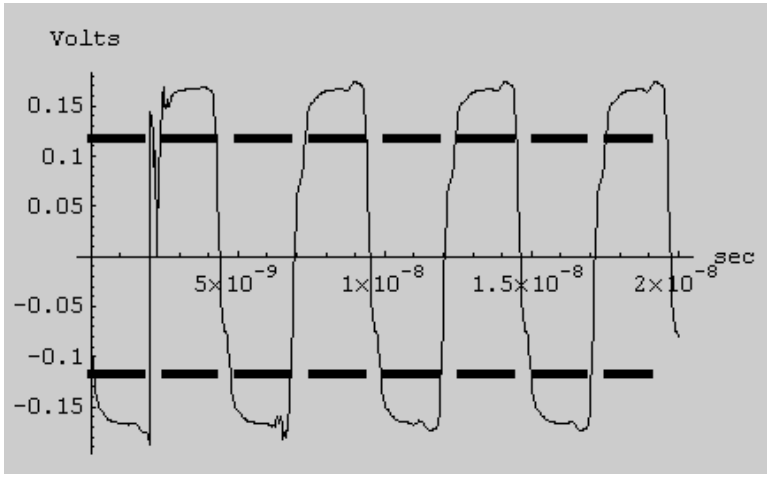
Minimum Rise Time Study

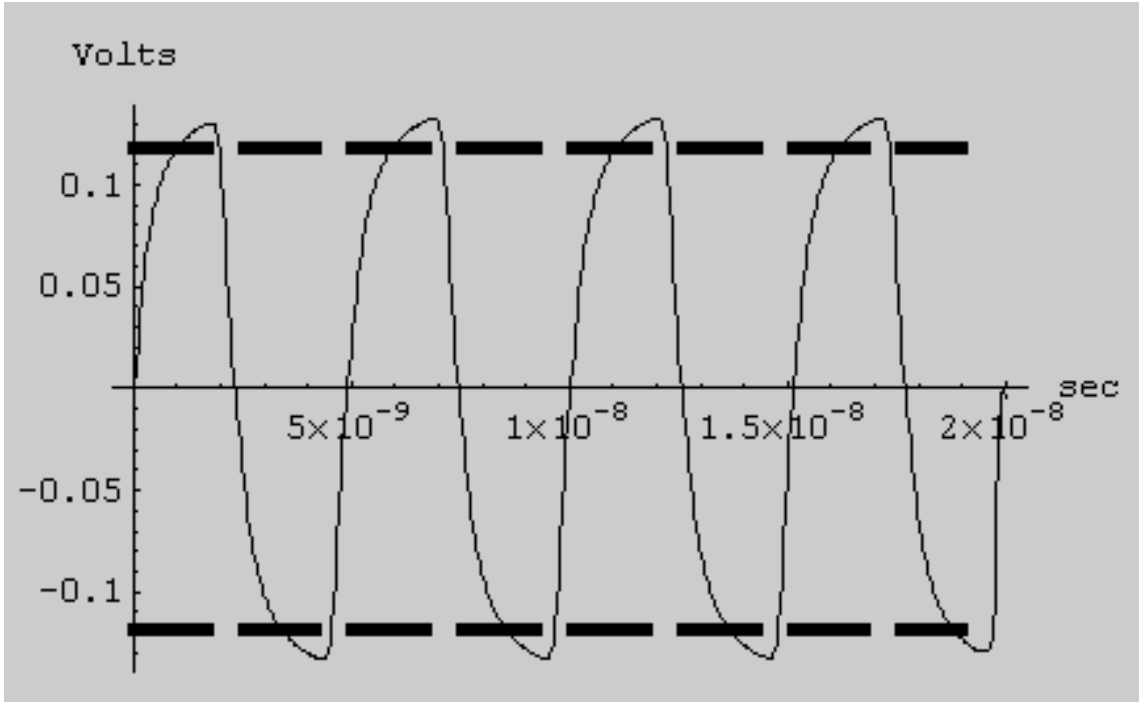


Worst case short cable received signal: S400, 200ps Tr/f, 18" long



Acceptable case short cable received signal: S400, 500ps Tr/f, 18" long

Receiver Sensitivity



4.5 meters, 500 ps rise/fall, worst case launch voltage (172 mV) and cable losses

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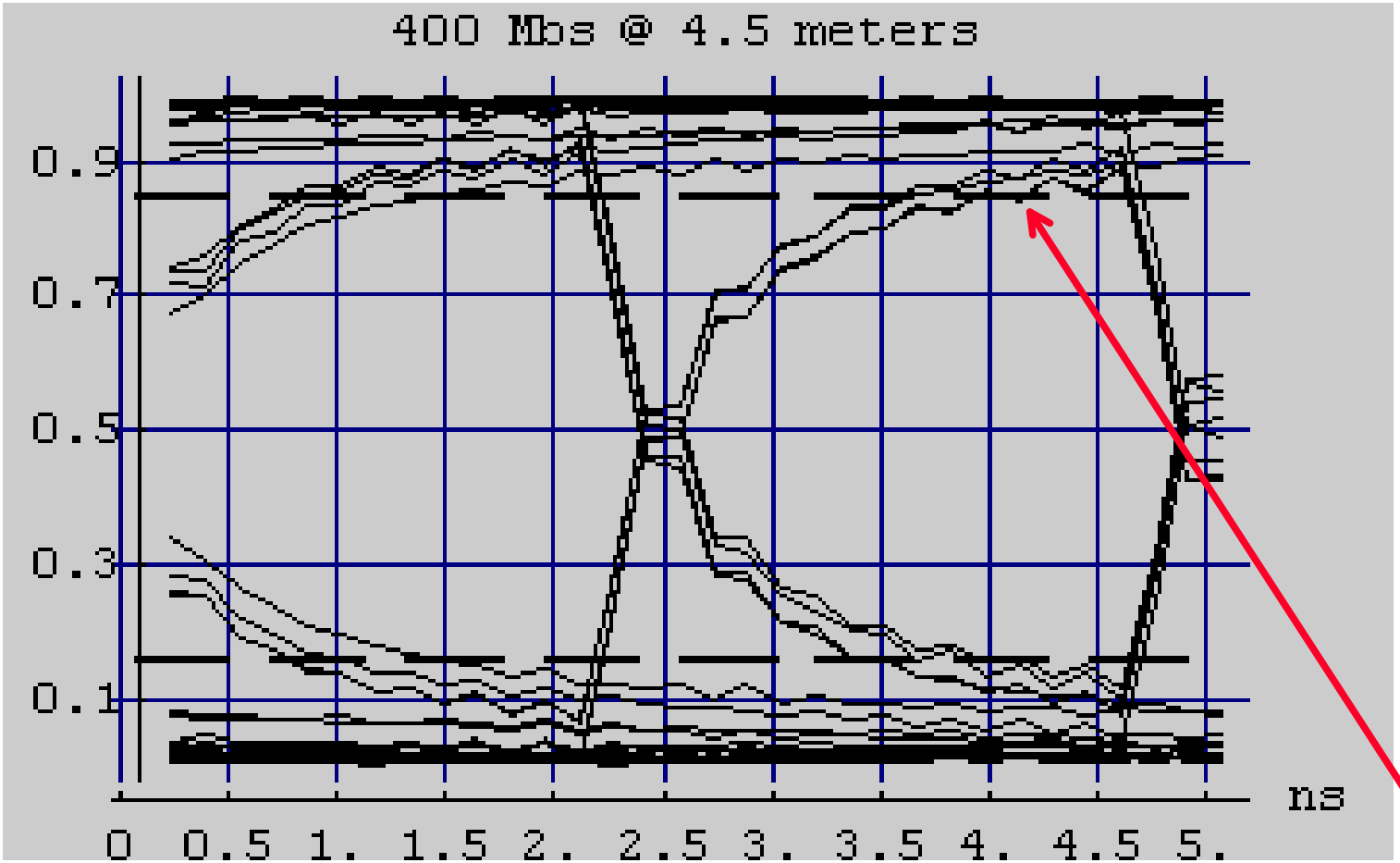
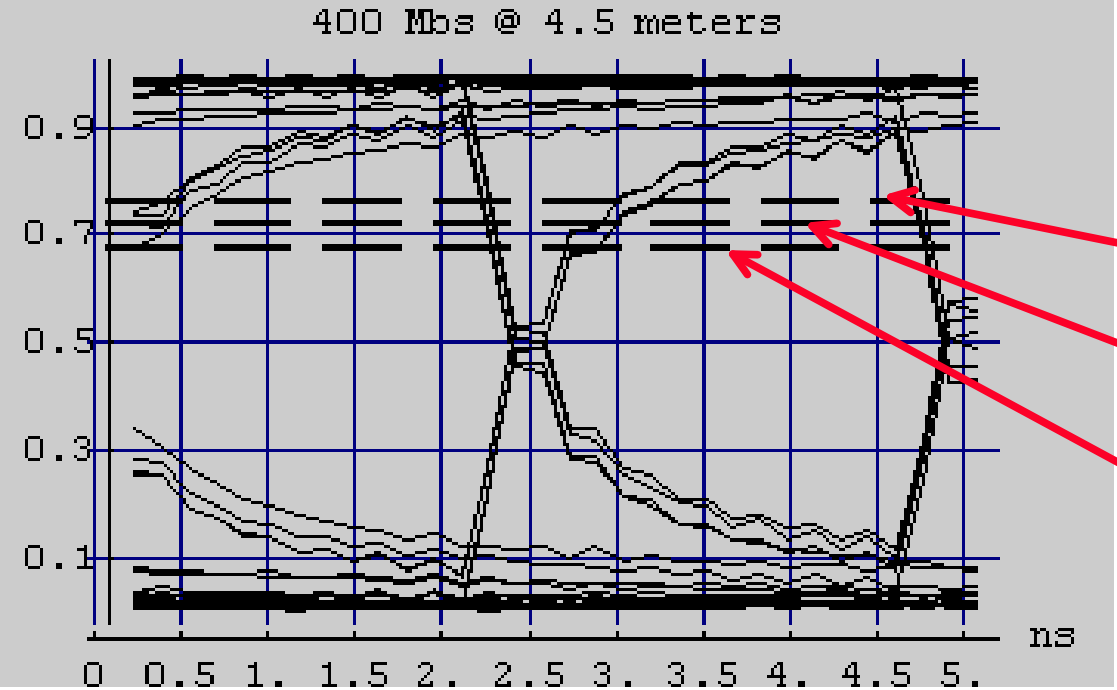
Worst Case Receiver Eye Diagram



118 mv sen. / 172 mV launch

Eye Diagram for Proposed Receiver Sensitivities



172 mV, worst case launch

90 mV, worst case sensitivity

75 mV, mid-case sensitivity

60 mV, best case sensitivity

60 - 90 mV differential sensitivity gives low jitter detection

P1394a Recommendations

- **Add minimum rise/fall time (10-90%) requirement of 500 ps for S400**
- **Add a table for minimum receiver sensitivity for S400 of 60 mV - 90 mV differential**

5. Revised media signal interface

This section revises the media signal interface specification previously described in section 4.2.2 of IEEE Std 1394-1995.

Analysis of connectors and cables reveals that the minimum rise or fall times of the differential signaling voltage need to be limited to avoid excessive reflections of energy from connector impedance discontinuites. Such reflections degrade the rise/fall characteristics of received signals and add deterministic jitter. Additionally, interpreting the IEEE Std. 1394-1995 Table 4-13 received signal amplitude as the minimum required receiver sensitivy would result in very marginal systems for long cable/low transmitter launch voltage situations.

5.1 Data signal rise and fall times (normative)

In addition to tables 4-22 and 4-23 in IEEE Std 1394-1995 we specify the minimum rise or fall time for data signals. The output rise and fall times for data signals are measured from 10% to 90% and are dependent on the data rate as specified in table 5-1. This specifcation shall be adhered to by measurement at the connector/cable interface of the 1394 device.

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Table 5-1 — Minimum output rise and fall times

	Minimum rise or fall time (ns)
S100	0.5
S200	0.5
S400	0.5

5.2 Signal amplitude (normative)

Table 4-13 of IEEE Std 1394-1995 gives a minimum receiver signal amplitude of 118 mV for S400 signals at the receiver side bulkhead. A receiver with a minimum sensitivity at this level would have negligible margin for reliable operation. Consequently this document specifies the following receiver sensitivity requirement (signal levels are measured at the receiver side bulkhead connector).

Table 5-2—Receiver sensitivity at S400

	Minimum receiver senitivity	Units
Max	90	mV
Min	60	mV