Fast XX SCSI Testing

- Next Step Goals
- Setup Hold Testing
- BIAS Issue (Wally)
- ISI Issue (Bill Gintz)
Next Step

• 80 Mega Transfers Using Dual Edge Clocking
  – Keeps max frequency same

• ISI Resolved By Some Means/Suggesting Dual Strength Driver

• BIAS Would be Better If Lower But To Keep Compatibility Could Just Lower The Low Limit

• Distance - Try To Keep Same. Should Be Possible Since No Frequency Increase And We Now “Recommend” 28 Gauge Above 12 Meters.
Setup Hold Measurement

• Used TIA (HP3310A)

• Measured Data Transition To ACK Transition With Statistic

• Tests Run @ 80 MHz Single Edge Which Provides Same Setup And Hold Time Allowances As 40 MHz Dual Edge

• Tests Run For:
  – Short Pt to Pt cable
  – 25 meter Pt to Pt cable
  – Multipoint loaded
Test Setup

Pulse Generator → Xmit Board → Cable → Rev Board → TIA

Drive Levels BIAS

Pulse Generator

Xmit Board

Load 1
Load 2
Load 5

Drive Levels BIAS

Load Capacitance = 13.2 pf

3.5 ft. × x ft.
Comparison Short Cable Vers 5 25 Meter (Pt to Pt)

<table>
<thead>
<tr>
<th></th>
<th><strong>Short</strong></th>
<th><strong>Long</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setup</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.92 ns</td>
<td>5.983 ns *</td>
</tr>
<tr>
<td>Pk to Pk</td>
<td>781 ps</td>
<td>1.191 ns</td>
</tr>
<tr>
<td>Deviation</td>
<td>103 ps</td>
<td>206 ps</td>
</tr>
<tr>
<td><strong>Hold</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>5.68 ns</td>
<td>6.601 ns *</td>
</tr>
<tr>
<td>Pk to Pk</td>
<td>1.035 ns</td>
<td>1.465 ns</td>
</tr>
<tr>
<td>Deviation</td>
<td>139 ps</td>
<td>230 ps</td>
</tr>
</tbody>
</table>
Short Cable (PT to PT)
Long Cable (25 M, PT to PT)
## Comparison Short To 13.5 Feet Teflon MP

<table>
<thead>
<tr>
<th>Setup</th>
<th>Short (3 Loads)</th>
<th>1 (3 Loads)</th>
<th>2 (3 Loads)</th>
<th>3 (8 Loads)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.92 ns</td>
<td>7.43 ns</td>
<td>6.95 ns</td>
<td>7.6 ns</td>
</tr>
<tr>
<td>Pk to Pk</td>
<td>781 ps</td>
<td>898 ps</td>
<td>918 ps</td>
<td>1.426 ns</td>
</tr>
<tr>
<td>Deviation</td>
<td>105 ps</td>
<td>126 ps</td>
<td>133 ps</td>
<td>235 ps</td>
</tr>
</tbody>
</table>

**Hold**

| Mean        | 5.68 ns        | 5.21 ns     | 5.63 ns     | 4.99 ns *   |
| Pk to Pk    | 1.035 ns       | 1.23 ns     | 1.113 ns    | 1.602 ns    | △ 567 ps    |
| Deviation   | 139 ps         | 154 ps      | 157 ps      | 256 ps      |
1. Flat (Teflon), 14 ft, 3 Loads

3.5'  18''  18''  18''  6'

XMIT  M  L  L  L  T/L
2. Flat (Teflon), 14 ft, 3 Loads

3.5'  18''  18''  7.5'

XMIT  L  L  L  M  T/L
3. Flat (Teflon), 14 ft, 9 Loads

18”  18”  18”  18”  18”  18”  18”

XMIT   L   L   L   M   L   L   L   T/L
### Comparisons Short To 14 Feet Twisted/Flat MP

<table>
<thead>
<tr>
<th>Setup</th>
<th>Short</th>
<th>1 5 Loads</th>
<th>2 10 Loads</th>
<th>3 10 Loads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.92 ns</td>
<td>6.17 ns</td>
<td>6.42 ns</td>
<td>6.040 ns *</td>
</tr>
<tr>
<td>Pk to Pk</td>
<td>781 ps</td>
<td>1.13 ns</td>
<td>957 ps</td>
<td>773 ps</td>
</tr>
<tr>
<td>Deviation</td>
<td>105 ps</td>
<td>218 ps</td>
<td>119 ps</td>
<td>122 ps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Pk to Pk</td>
</tr>
<tr>
<td>Deviation</td>
</tr>
</tbody>
</table>
1. Twist/Flat, 14.5 ft, 5 Loads

XMIT L L L L M T/L
2. Twist/Flat, 14.5 ft, 10 Loads

3.5'   6'   6'   6'   6'   6'   6'   6'   6'   6.5'

XMIT  L    L    L    L    L    L    L    L    M    T/L
3. Twist/Flat, 14.5 ft, 10 Loads

3.5'  6"  6"  6"  6"  6"  6"  6"  6"  6.5'

- XMIT
- 3.5' L L L L M L L L L T/L

Vince Bastiani/T10

11/3/97 - 15
To The Distributions Measured One Must Add Cable Skew Factor.

Cable Skew Pair To Pair Difference Range. Form.

0.03 ms/ft -------- 0.045 ns/ft (Hitachi Catalog)

<table>
<thead>
<tr>
<th>Distance</th>
<th>Skew Factor (ms/ft)</th>
<th>Skew Factor (ns/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12m</td>
<td>0.03</td>
<td>0.045</td>
</tr>
<tr>
<td>25m</td>
<td>0.03</td>
<td>0.045</td>
</tr>
</tbody>
</table>

12m: 1.17 1.755
25m: 2.43 3.65
Margin = Mean - 1/2 pp - Cable Skew

Margin (Low Skew Cable) = 5.983 - 0.5955 - 2.43
= 2.9575 ns

Margin (High Skew Cable) = 5.983 - 0.5955 - 3.65
= 1.7375 ns
Margin (Hold) 25 Meter Pt to Pt

Bit Cell 12.5 ns

Hold

6.6601

Margin = Mean - 1/2 pp - Cable Skew

Margin (Low Skew Cable) = 6.601 - 0.7325 - 2.43

= 3.43 ns

Margin (High Skew Cable) = 6.601 - 0.7325 - 3.65

= 2.2189 ns
Margin (Setup) = Mean - 1/2 pp - Cable Skew

Margin (Low Skew Cable) = 6.040 - 0.386 - 1.17 = 4.48 ns

Margin (High Skew Cable) = 6.040 - 0.386 - 1.755 = 3.899 ns
Margin (Hold) = Mean 1/2 pp - Cable Skew

Margin (Low Skew Cable) = 4.99 - 0.801 - 1.17
= 3.019 ns

Margin (High Skew Cable) = 4.99 - 0.801 - 1.755
= 2.434 ns