NIM-ECL Level Translator Test Plan

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Here is a test plan for the NIM-ECL level translator based on its design specifications [1]. The test is to be completed within 2 weeks (?) after the prototype assembly.

1. Input signals (level, width etc.):
   Using a function generator(FG) or pulser with adjustable width and amplitude, test:
   (a) Use a multi-meter to measure the input impedance of each channel (spec: $50\ \Omega \pm 10\%$); or
   (b) Send a 10ns wide, -1V pulse (low frequency) to input, connect input to the scope (can use a T) with input impedance to 1MΩ and look for reflections. Reflections should be as small as possible.
   (c) Set input width to 50 ns, negative pulses, measure the input threshold of each channel (spec: -300 mV) by observing both the "OR" (using a scope) and the ECL output (using a flatcable-LEMO connector and a scope with ECL probe);
   (d) Same input width as above, set the input amplitude to ± 8 V and beyond, see if the outputs vanish and the input is disabled (spec: protected to ± 8 VDC);
   (e) Set input width to 50 ns, negative pluses of -700 mV. Send the same input to all 16 channels (or as many at a time as possible). Use a scope to measure the difference in timing of all ECL outputs of these channels. Repeat the test for each group of outputs A, B, C and D. (spec: time jitter (< 1 ns) among all 16 outputs of each group);
   (f) Set the input amplitude to -700 mV (or another value if preferred), set the width to 2, 4, 6, 8, 10, 20, 50, 100, 200 ns, make a note on the input rise time, test whether each of these input widths produce expected outputs (both "OR" and ECL), find the minimal input width.
2. Output signals (including timing specs):
   (a) Set input to 10 and 100 ns, -700 mV, check whether all 4 ECL outputs are present and their levels, for all channels (spec.: $-0.9 \sim -1.6$ V);
   (b) Same input(s) as above, measure the time delay between the 4 ECL outputs and the input, for all channels (spec: < 10 ns, reliable and the variation between all channels and all modules < 1 ns);
   (c) Same input(s) as above, measure the rise and fall times of each ECL output (spec: both are 2 ns or less);
   (d) Same input(s) as above, check whether the "OR" output is present (on a scope), its levels, rise and fall times for all channels (spec: NIM levels, rise and fall are both 2 ns or less);

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(e) Change the input frequency from DC (or the minimal frequency of the FG or pulser used), to 100 KHz, 1 MHz, 10 MHz, 100 MHz, 200 MHz and beyond, test whether the "OR" and the ECL outputs are working as expected. Increase the frequency until they don't, make a note on the maximal working frequency; (spec: DC-200 MHz)

(f) Use two FG or pulsers that are independent of the other, set both amplitudes to -700 mV and widths to 10 ns, but with the interval between the two pulses changing from 1 ns to 50 ns (???), measure the minimal interval that can produce expected outputs when feeding to the same channel input;

3. Channel isolations:

(a) Connect FG to one input, measure its own ECL outputs as well as outputs of all other 15 channels, repeat for all 4 groups A, B, C and D (spec.: crosstalk <35 dB, 60 dB desired) (how to measure???);

References

[1] see http://www.jlab.org/∼xiaochao/pvdis/daq/converter_spec.pdf