The NPS and COMPCAL Readout
Response to Short and Long Cables

Fernando J. Barbosa
Jefferson Lab

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Following on a previous note, "Tests of the NPS and COMPCAL Readout", this note presents tests performed with an LED source with short and long cable runs. These simple tests will show how long cable runs effect the signals driven from the HV divider and amplifier unit. A long cable run, as expected in the experimental halls, presents a relatively high capacitive output load to the preamp.

1. Experimental Setup

The NPS/COMCAL readout is shown in fig. 1. The readout includes an optical fiber coupled to the face of the crystal to allow for calibration via an external optical source.

Fig. 1 – The NPS/COMCAL readout test setup

LED source characteristics:

Wavelength	420 nm
Pulse width (FWHM)	20 ns
Repetition rate	1 KHz

Other

Amplitude	300 mV, set via LED pulse generator
HV	-1.1 kV
Short Cable	10 ft
Long Cable	65 ft

The long cable run consisted of the short cable (10 ft) plus an additional cable of 55 ft for a total length of 65 ft. This RG-58 type cable has a characteristic capacitance of 25.4 pf/ft for a total load capacitance of about 1.7 nF in the case of the long cable run.

2. Measurements

Fig. 2 shows an average pulse after 10 ft of cable while fig. 3 shows the response with a 65 ft cable run.

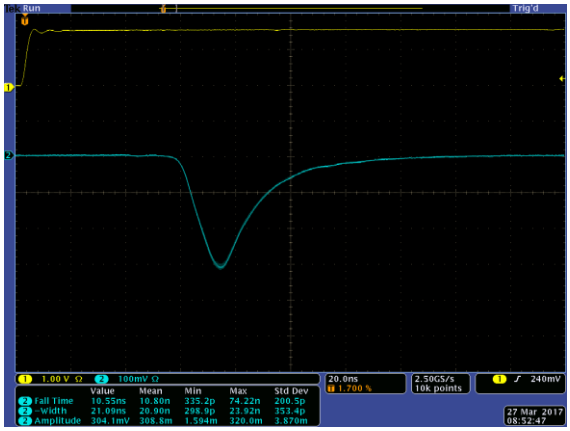

Fig. 2 – Pulse output with 10 ft cable

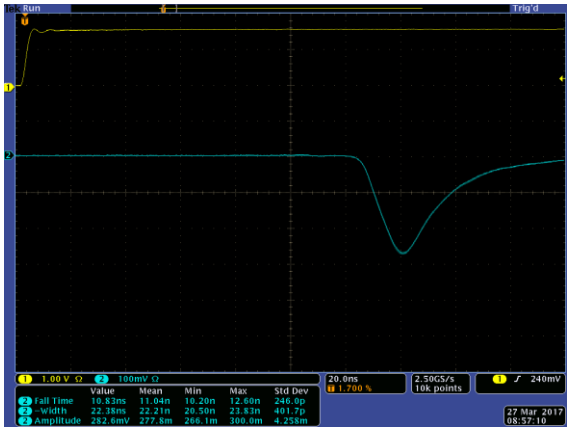

Fig. 3 – Pulse output with 65 ft cable

The following table summarizes the nominal pulse characteristics:

	Short Cable (10 ft)	Long Cable (65 ft)
Leading Edge (ns)	10.8	11.0
Pulse Width (FWHM)	20.9	22.2
Amplitude (mV)	309	278

Although pulse dispersion in the cable accounts for changes in the pulses, the most obvious change, pulse amplitude attenuation ~ 10%, occurs due to ohmic losses in the cable. These changes, however, are not significant because these pulses have relatively slow characteristics.

3. Summary

Fig. 4 shows the pulses from the previous figs. saved on the scope and displayed together. Aside from the delay due to the different cable lengths, the pulses are very similar, showing very good behavior from the HV divider and preamp in driving long cables.

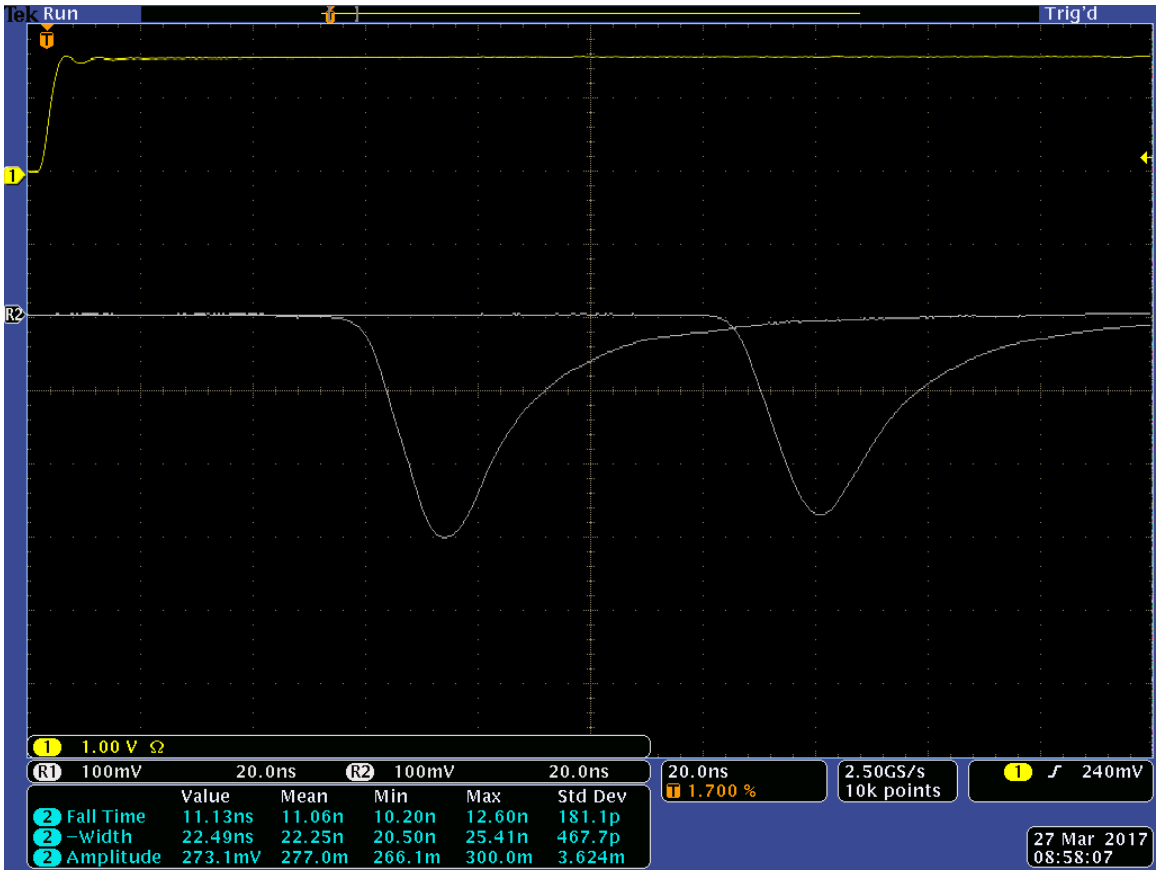

Fig. 4 – Pulse comparison for short and long cable runs