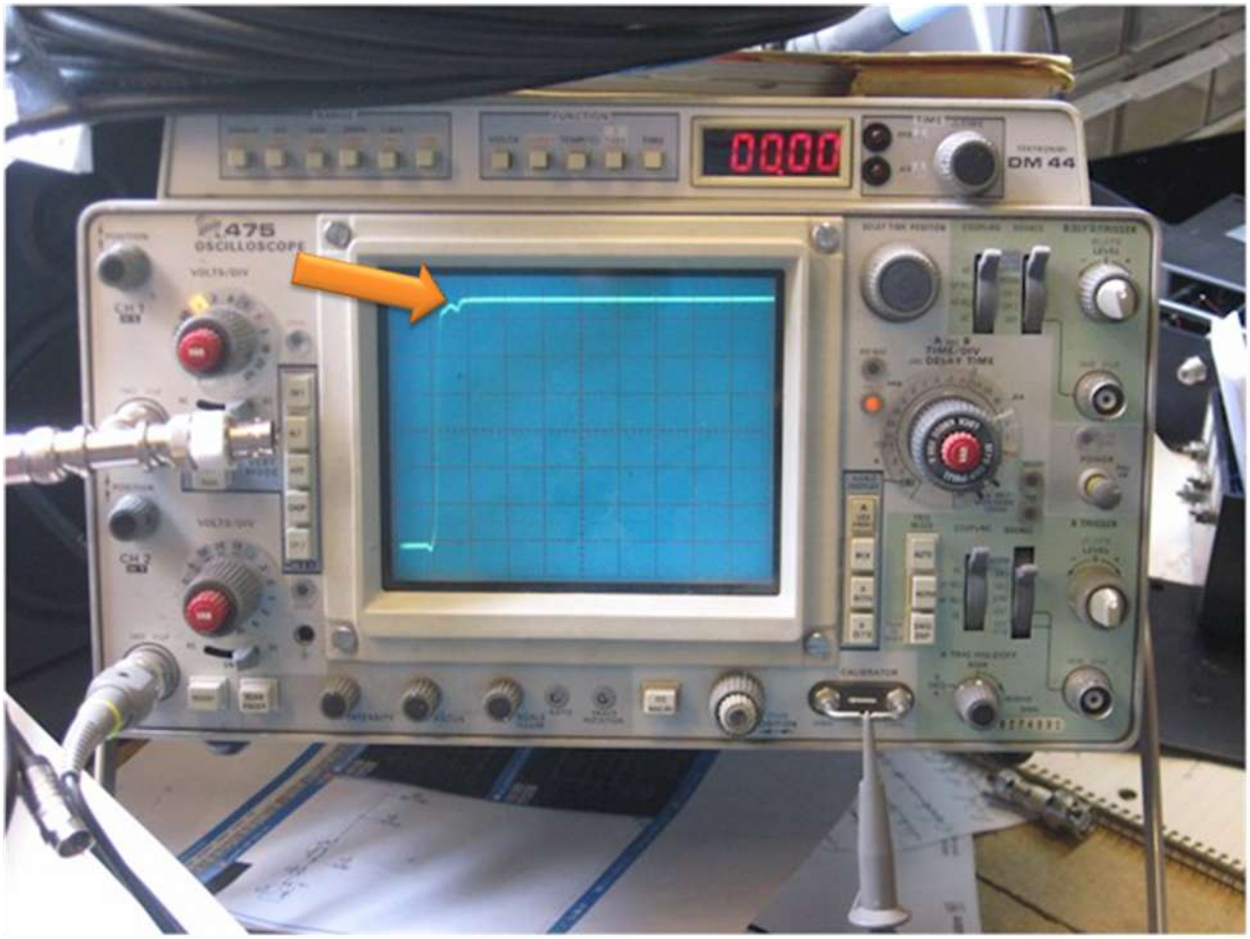
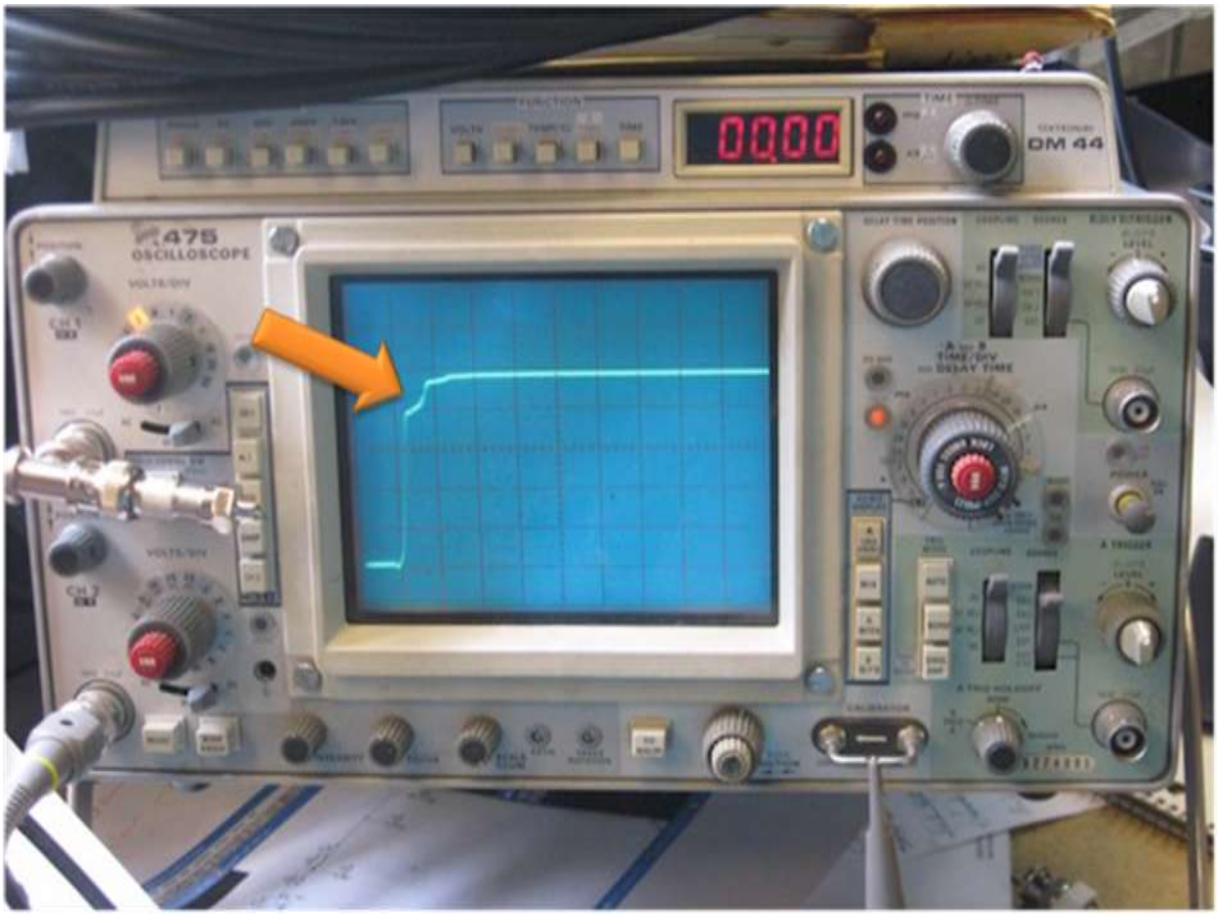
A Quick TDR Setup Using a Tek 475 scope

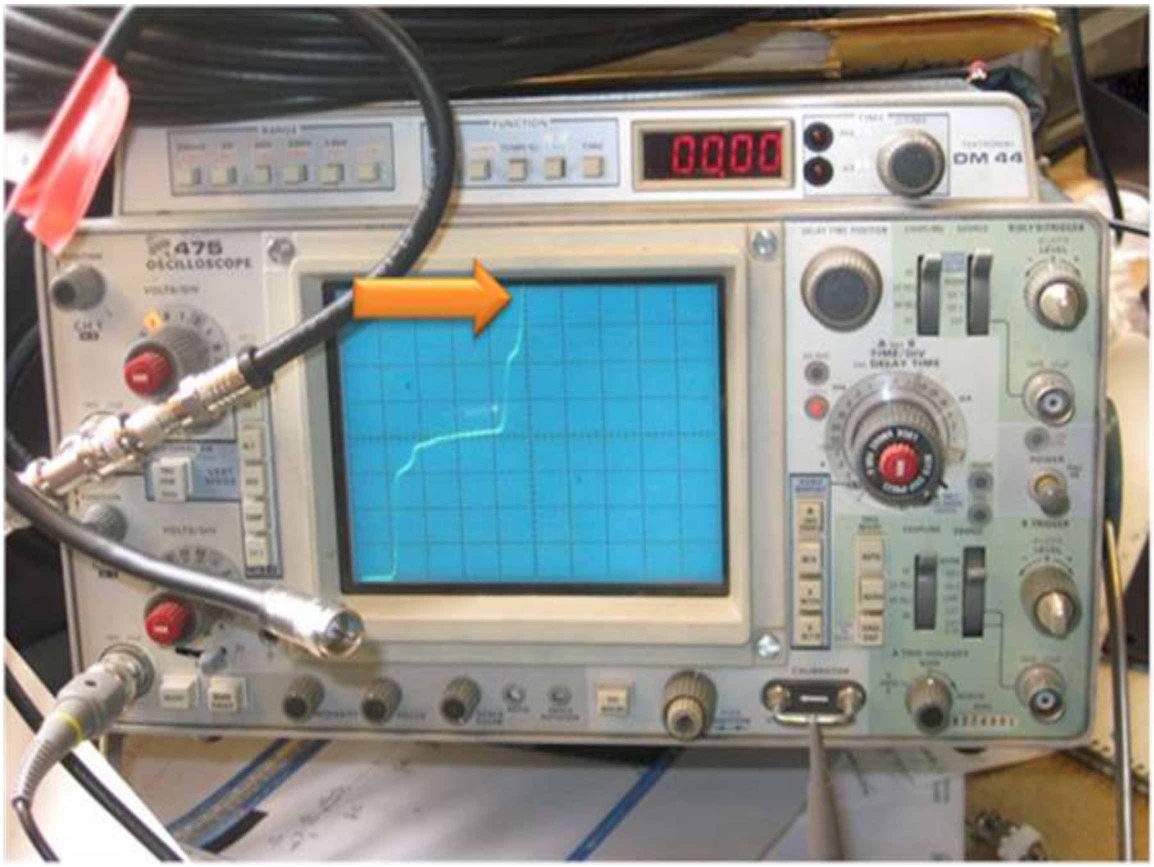
The Tektronix 465-475 series scopes and possibly many others can be used as a simple TDR (Time Domain Reflectometer), The following pictures describe the simple setup.



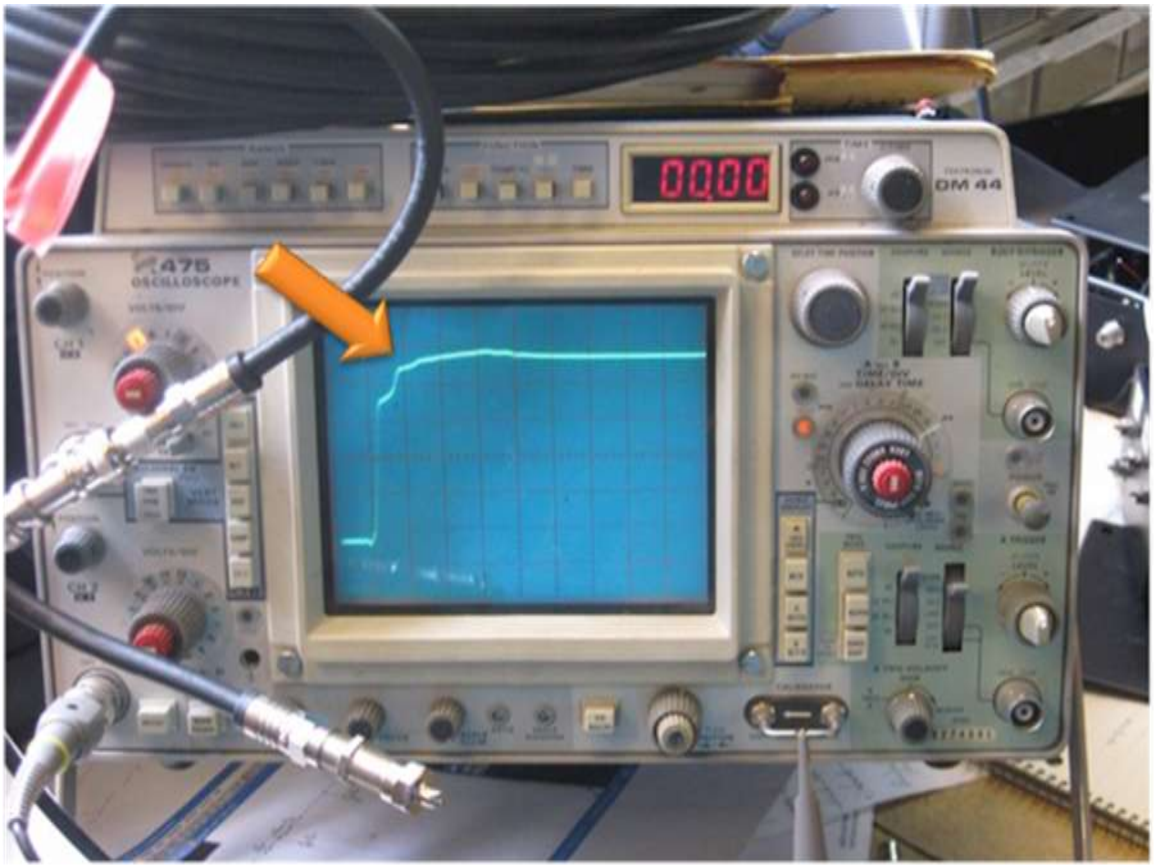
This picture shows the trace produced by connecting the A Gate output on the back of the scope into the A vertical input on the scope. This was done with a 50 ohm coax cable and a 50 ohm terminator. Notice the little wiggle of the trace at the beginning of the top part. This is showing a slight reflection on the connecting cable. Put scope settings here. (time, vertical)



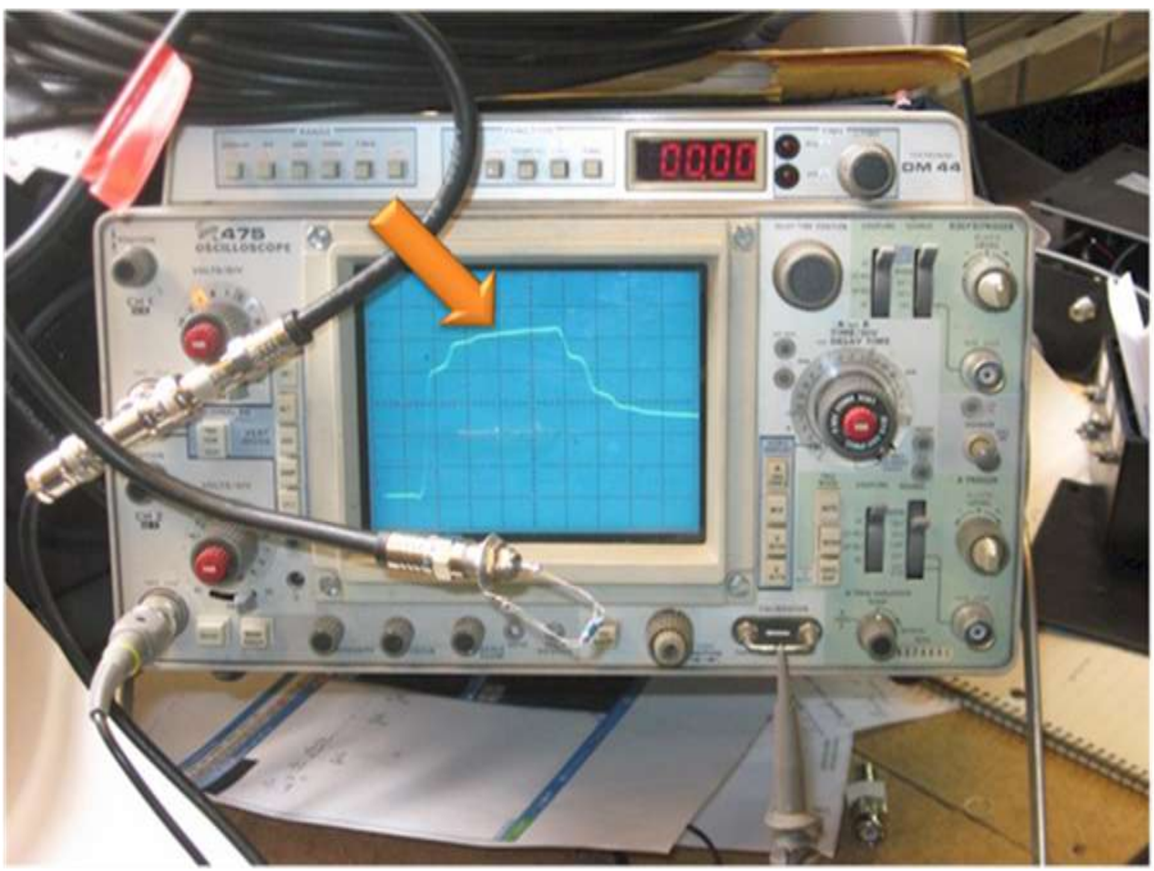
The 50 ohm terminator was replaced with a 75 ohm termination and the wiggle is a bit worse. This wiggle is fairly insignificant as any cable connected for a test, will be considerably longer and the reflections will show later in the trace. Scope settings



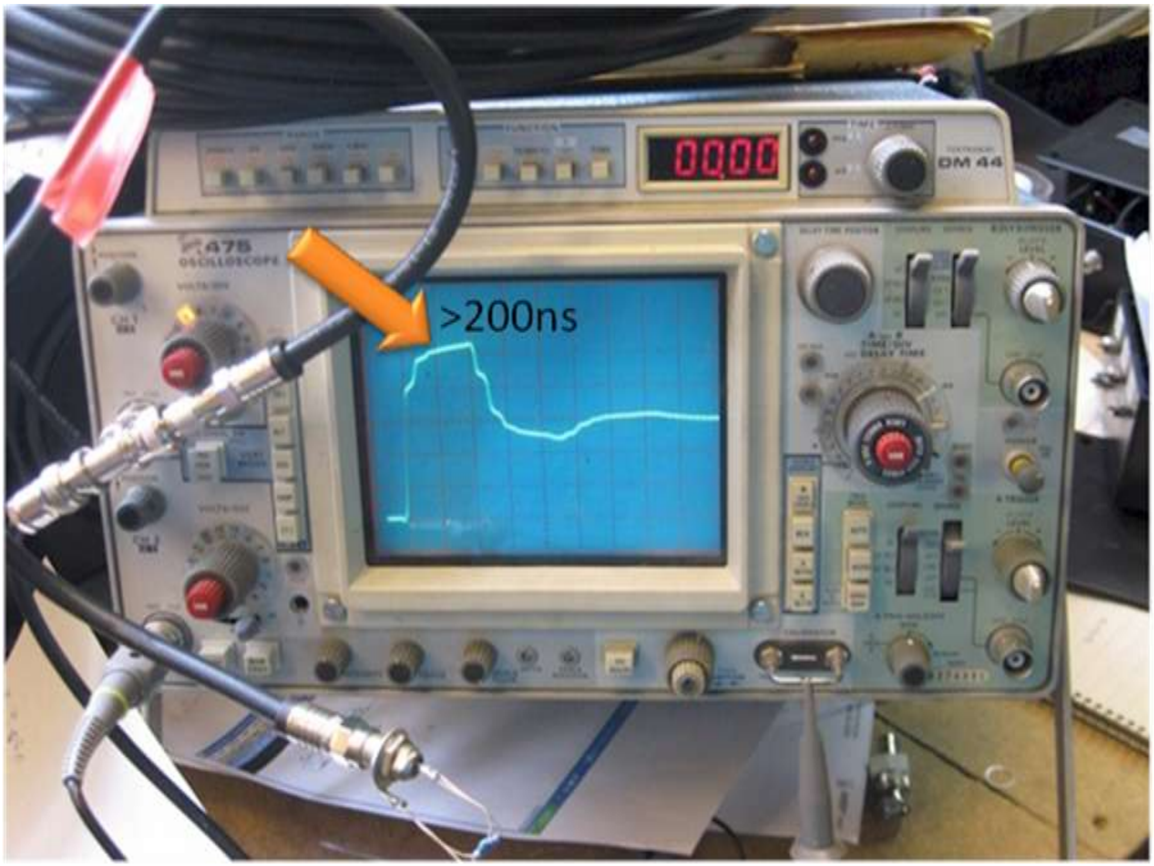
A piece of 75-ohm cable was added to the connection with no termination resistance. It is very easy to see the reflected signal coming back from the open end so large it is off scale to the top.



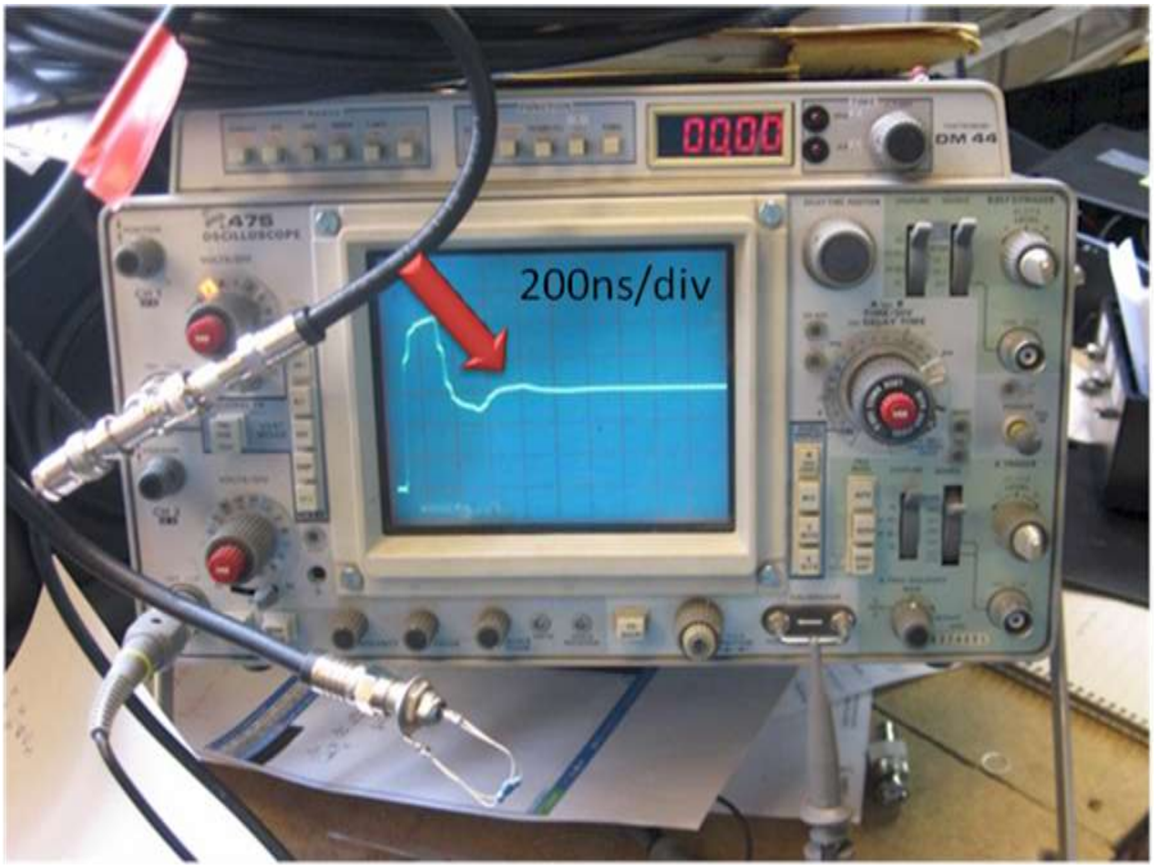
A 75 ohm terminator was added to the end of the 75 ohm cable and the reflection was nearly eliminated.



A pair of 75 ohm resistors were added in parallel as a termination on the cable. This of course terminates the cable in 37.5 ohms which shows a severe mismatch compared to the cable terminated with the 75 ohm proper termination.



The scope time base was calibrated in the above picture so that the reflection width could be measured. The 75 ohm cable that was added for measurement had been previously measured with a vector voltmeter. It read 71.8 degrees at 1.850 MHz. 1.850 MHz has a period of 541 nanoseconds so taking the 71.8 degree portion of the 360 degrees the cable delay should be about 108 nanoseconds. Looking at the scope trace at 100 nanoseconds per division, you see a pulse width just over 200 nanoseconds. This is a very close answer as the pulse must travel down the coax and back . By the vector voltmeter one should see about 216 nanoseconds for a round trip. The scope shows a bit over 200 nanoseconds. Had the system been optimized for 75 ohm cables some of the minor wiggles would have been eliminated, making the measurement more accurate and easier to evaluate.



The scope time base was lengthened out in time so one can see that the reflections eventually die out after being absorbed by the load and source impedances. The time base is 200 nanoseconds per division in this picture.

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