ASD Scorpius

Calibration Plan

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National Nuclear Security Administration

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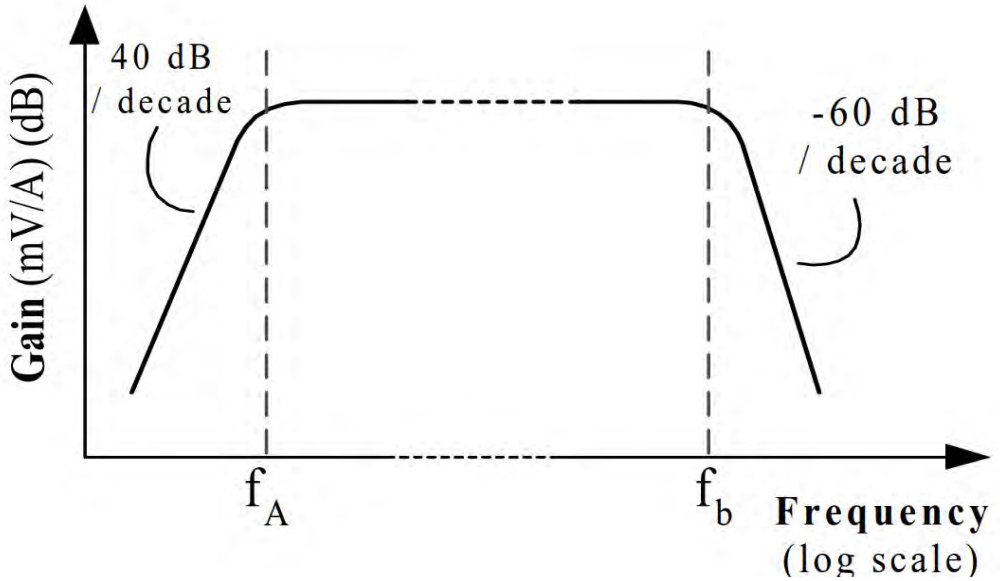
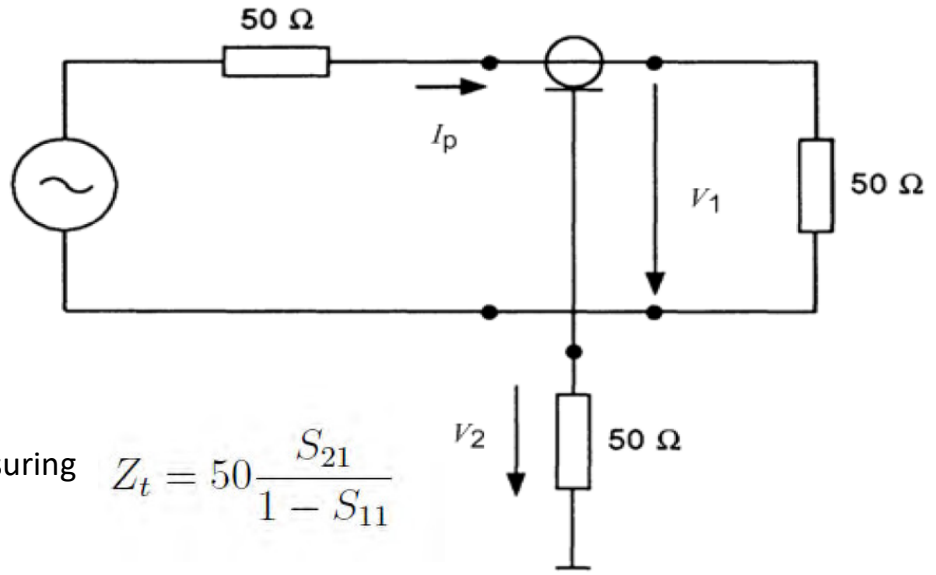
Calibration Setup

- Need to calibrate Rogowski coil to determine usable bandwidth
  - Will help with characterizing improved versions of the Rogowski coil design
- How can this be done?
  - With the VNA of course
- Use S11 and S21 in a transform to get a Z_t.
- Z_t relates current flowing in conductor to an output voltage at the probe terminal

$$Z_t = \frac{V_2}{I_p} \quad \text{or} \quad Z_t = 50\frac{S_{21}}{1 - S_{11}}$$

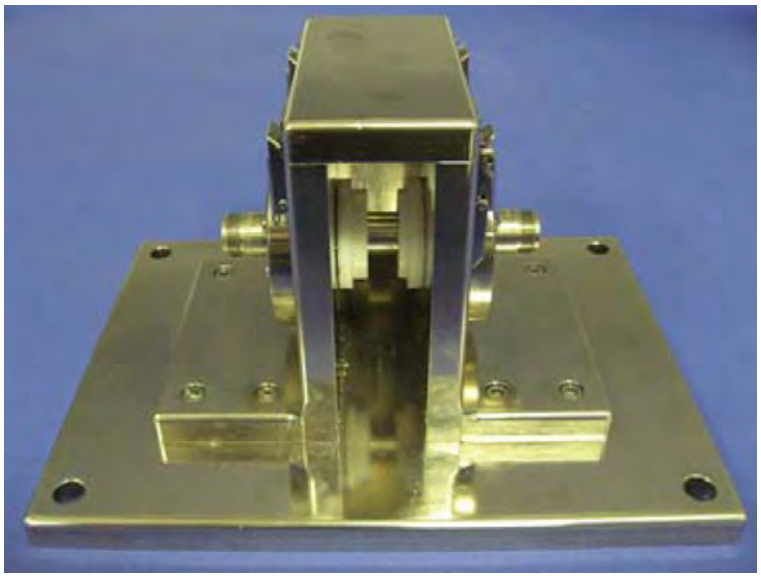




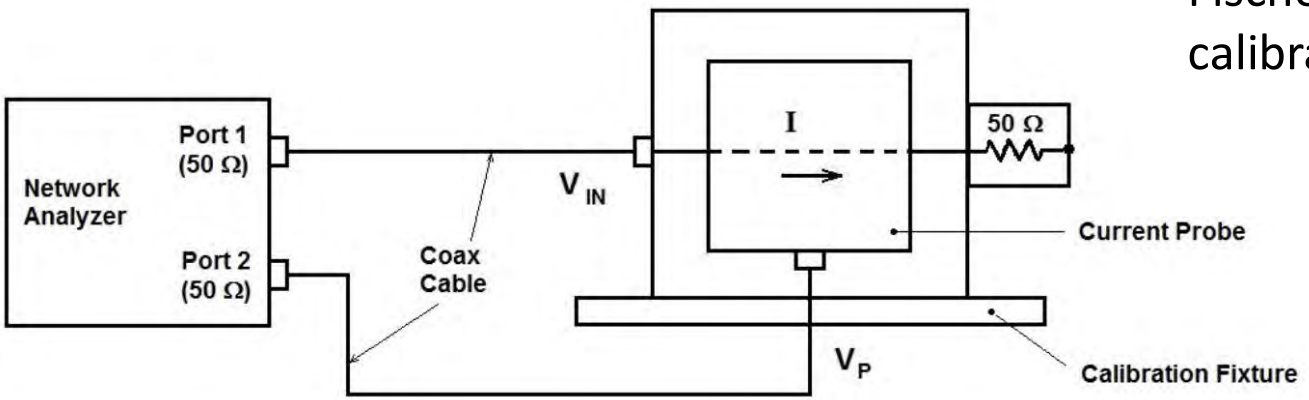
CISPR 16-1-2, Specification for radio disturbance and immunity measuring apparatus and methods, 2nd ed.

Calibration Test Fixture

- Current probe goes into a ‘test fixture’
- Dimensions form a matched coaxial transmission line
- Made up of two ‘L’ plates and a conductor connecting the two ports going through the L plates
- Currently looking into the design of a test fixture that can be readily made, CST simulation will aid in determining the appropriate impedance

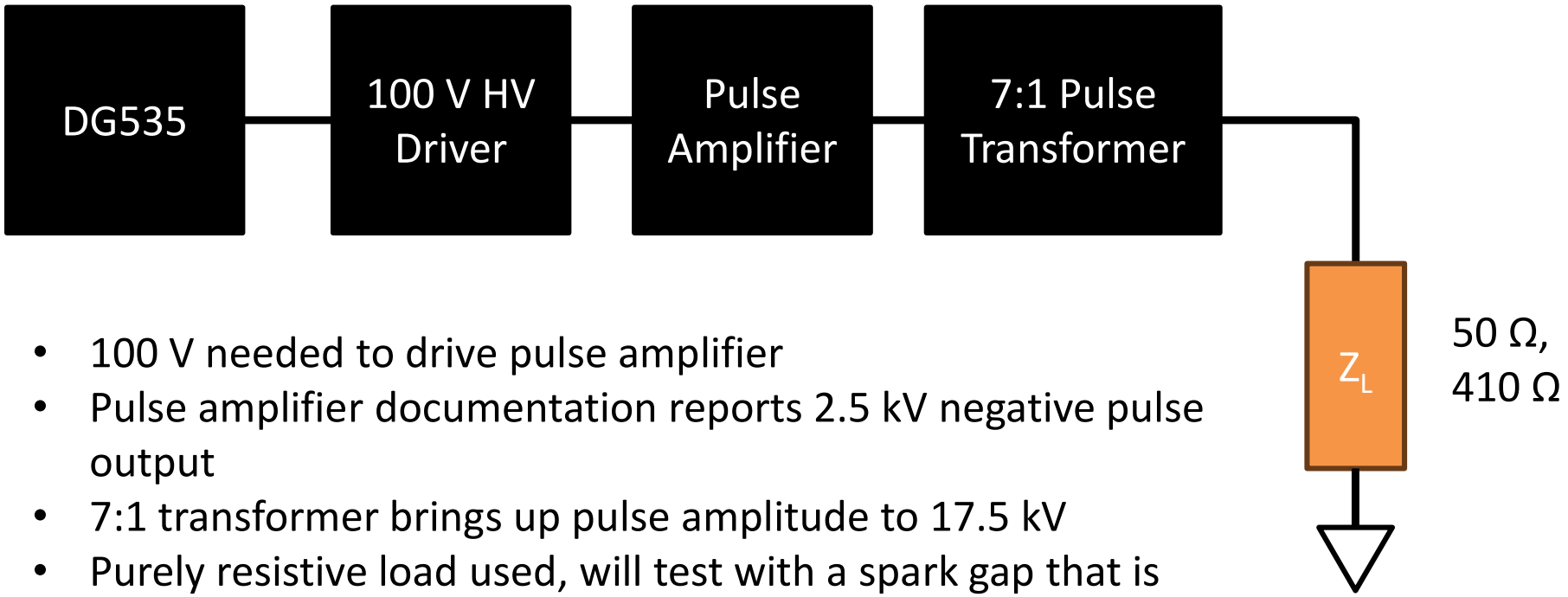


Fischer FCC-MPCF-3-32/71/1 calibration fixture



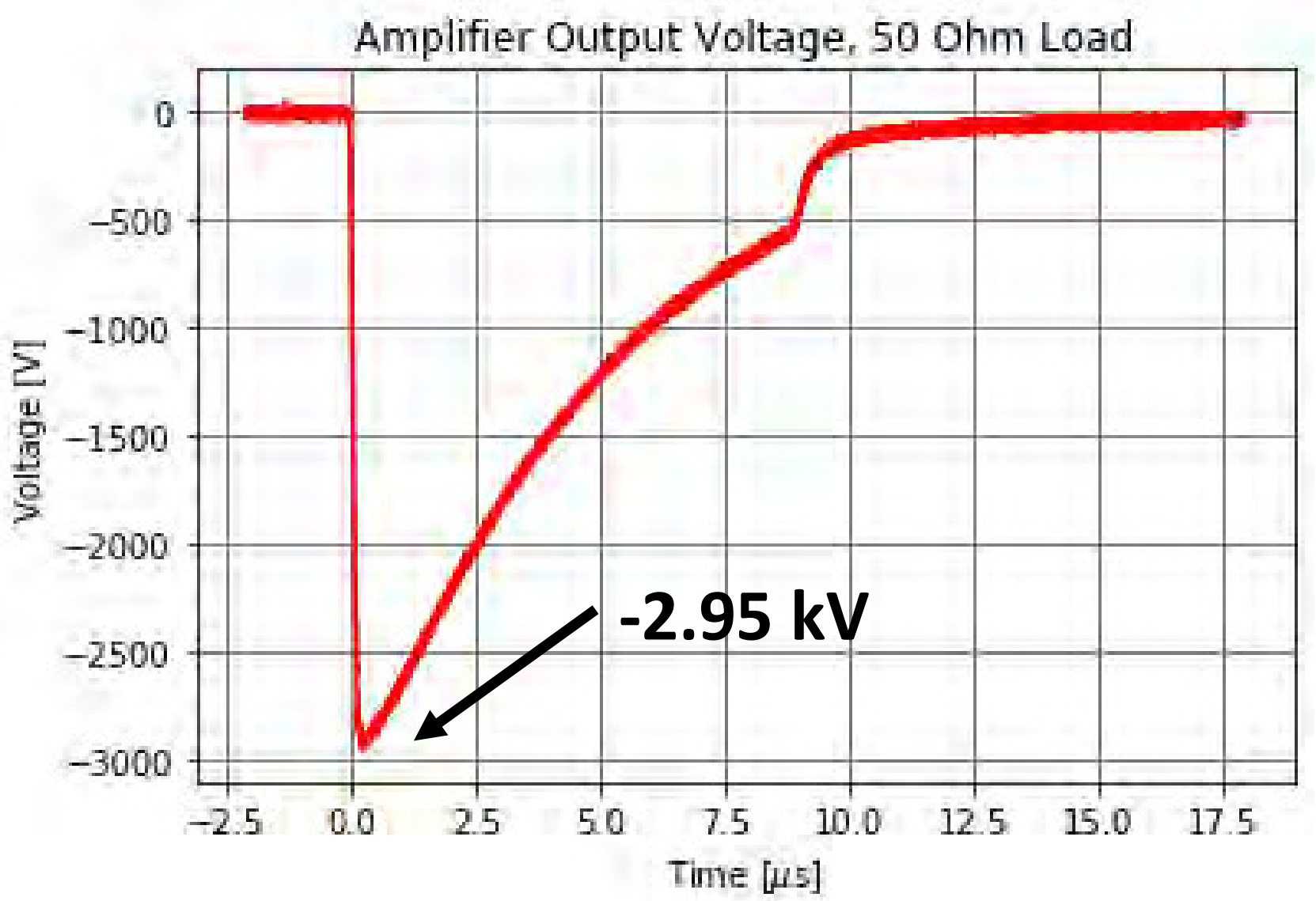
Fischer Custom Communications, INC. [Online]. Available: www.fischercc.com/

Marx Trigger Test Setup

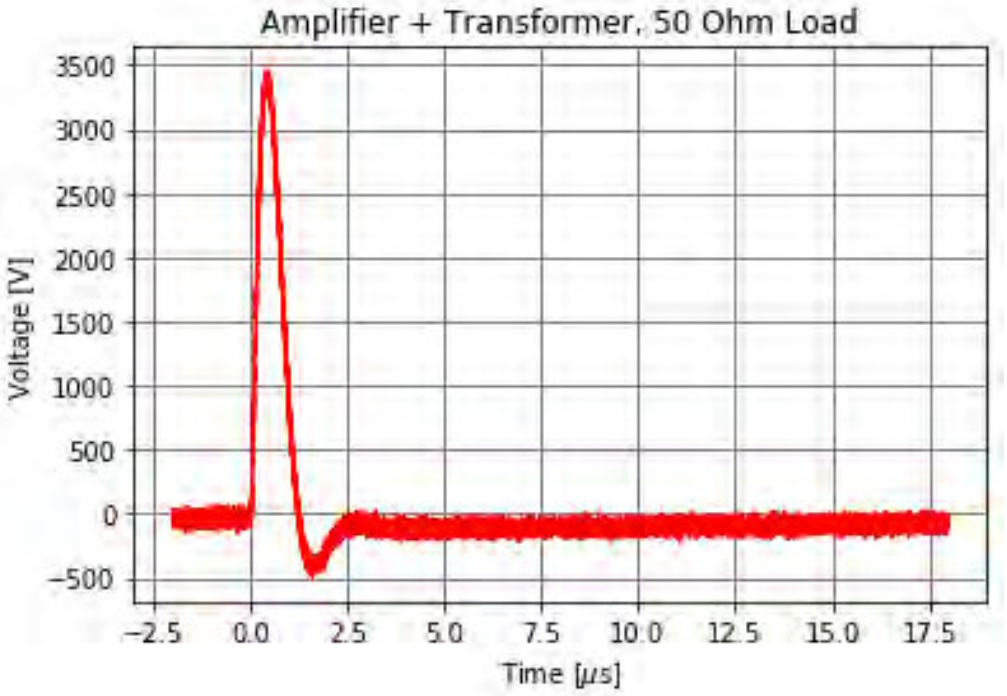


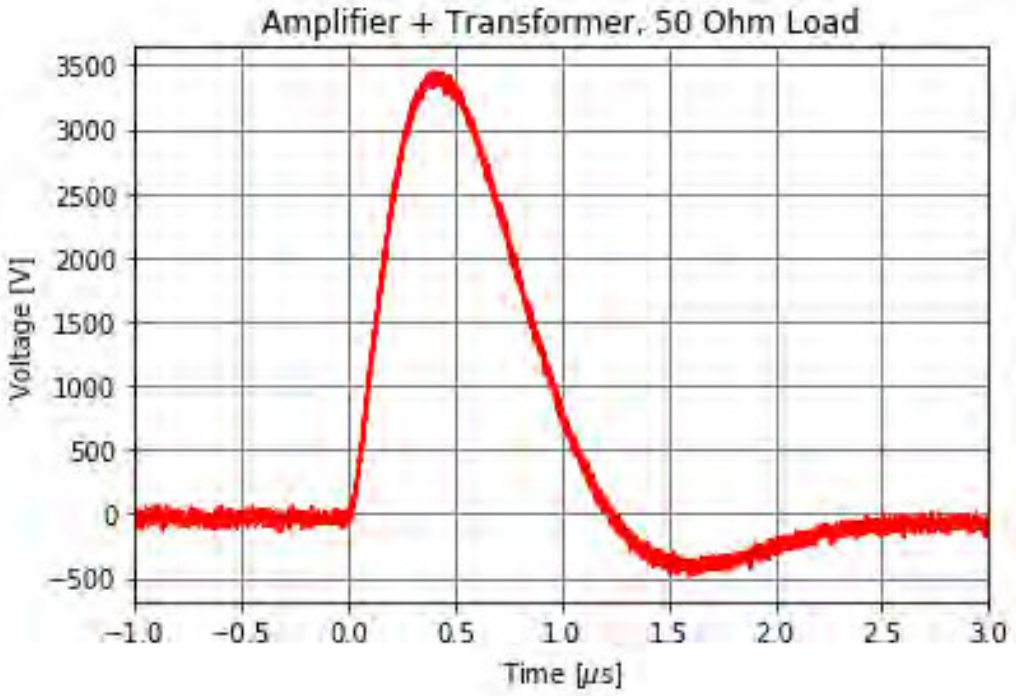
- 100 V needed to drive pulse amplifier
- Pulse amplifier documentation reports 2.5 kV negative pulse output
- 7:1 transformer brings up pulse amplitude to 17.5 kV
- Purely resistive load used, will test with a spark gap that is holding voltage soon

Pulse Amplifier Output Voltage, 50 Ω Load



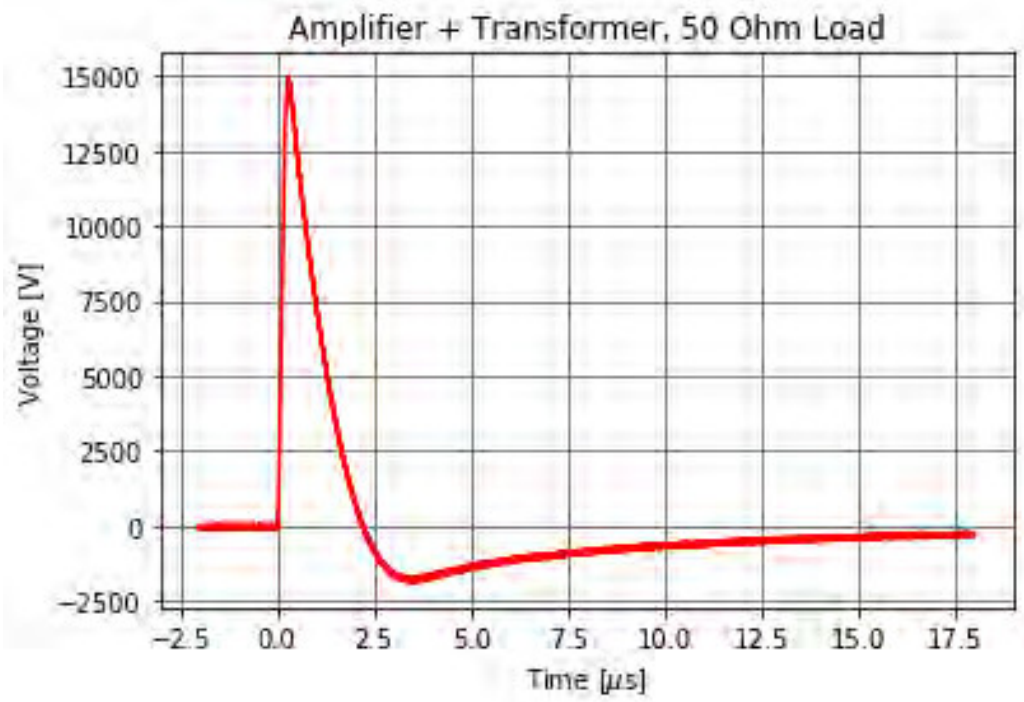
Amplifier + Transformer, 50 Ω Load

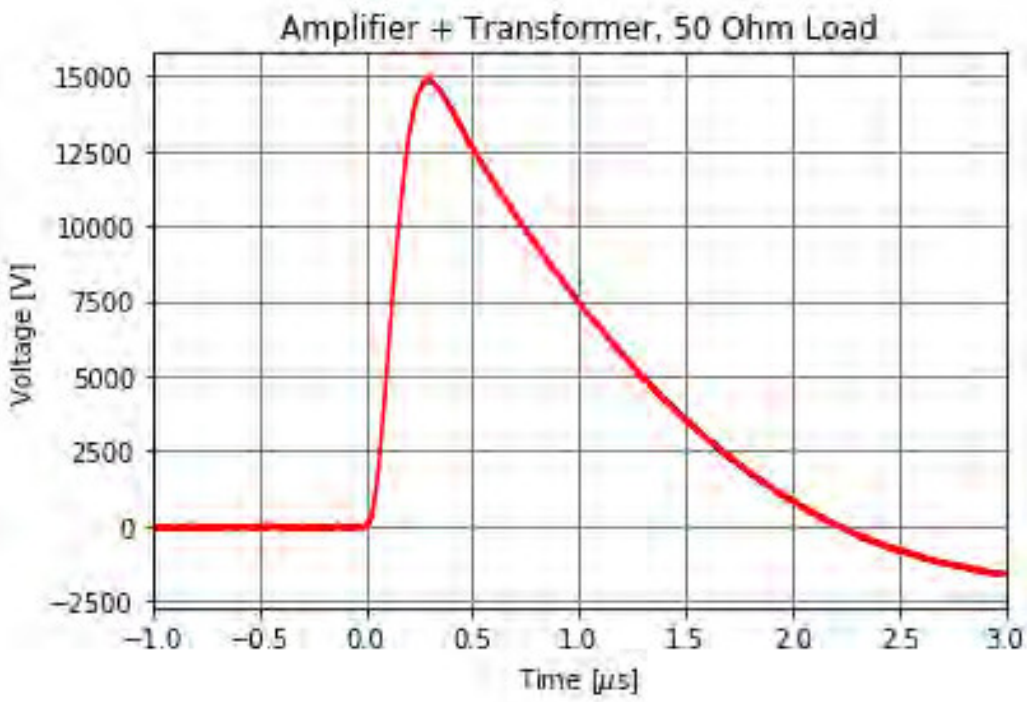




- Peak voltage just shy of 3.5 kV
- Load is too small, amplifier can't drive large current
- Increasing the load resistance will increase the load voltage amplitude

Amplifier + Transformer, 410 Ω Load





- Amplitude picks up to ~15 kV with a larger load
- Trigger system is functional still (good!)

Future Work

- Set up a calibration test stand for Rogowski coil to characterize its bandwidth
- Test Marx trigger system with a spark gap
  - Then test stage 1 and 2 of the Marx, parts are being machined this week
- CST simulations (very soon?)