2 stage Marx Generator

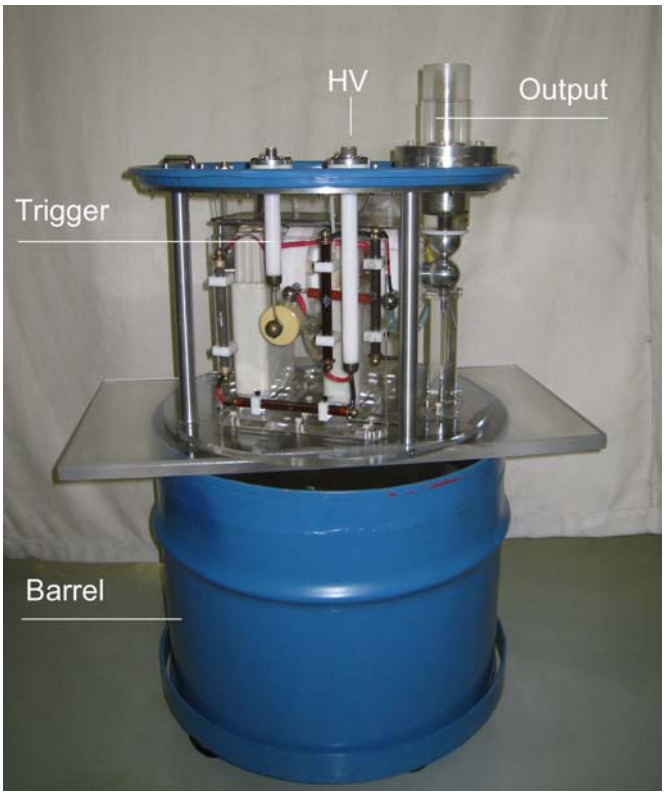

Figure 1. Photograph of 2-stage Marx Generator.

Normally the generator is in the barrel of 22" (=56 cm) diameter and it is immersed in transformer oil. Trigger pulse of 30 kV activates the generator.

Experimental conditions

- Experiments are carried out with 2-stage Marx Generator.
- Capacitor of 0.04 μF, 100 kV is placed in the stage.
- Four electrodes spark gaps pressurized with synthetic air are used in each stage
- The peaking circuit could be added at the output
- Charging voltage of 34 kV/stage was used in Figs. 2 to 4.
- For 34 kV per stage charge, the generator stores 46 J.
- At 60 kV per stage, the maximum energy that the system can store is 144 J.

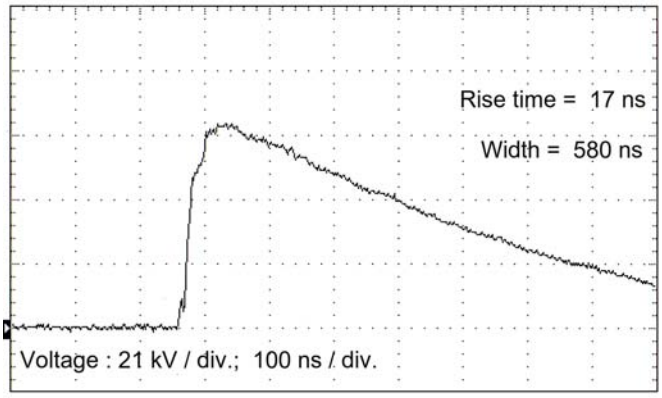

Figure 2. Voltage waveform obtained with the Marx Generator and with 50 Ω termination.

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Experimental results

- B-dot (single loop) probe is used. Diameter of the loop is 14 mm. Area inside the loop is 113 mm^2. The probe is placed at the distance of 1.65 m.

- Data shown in Figs. 3 and 5 are recorded with 3 GHz oscilloscope.

- The concept used to get RF source is similar to that described in the paper: "HPM generation in atmospheric air" that was presented at the 2010 Megagauss Conference.

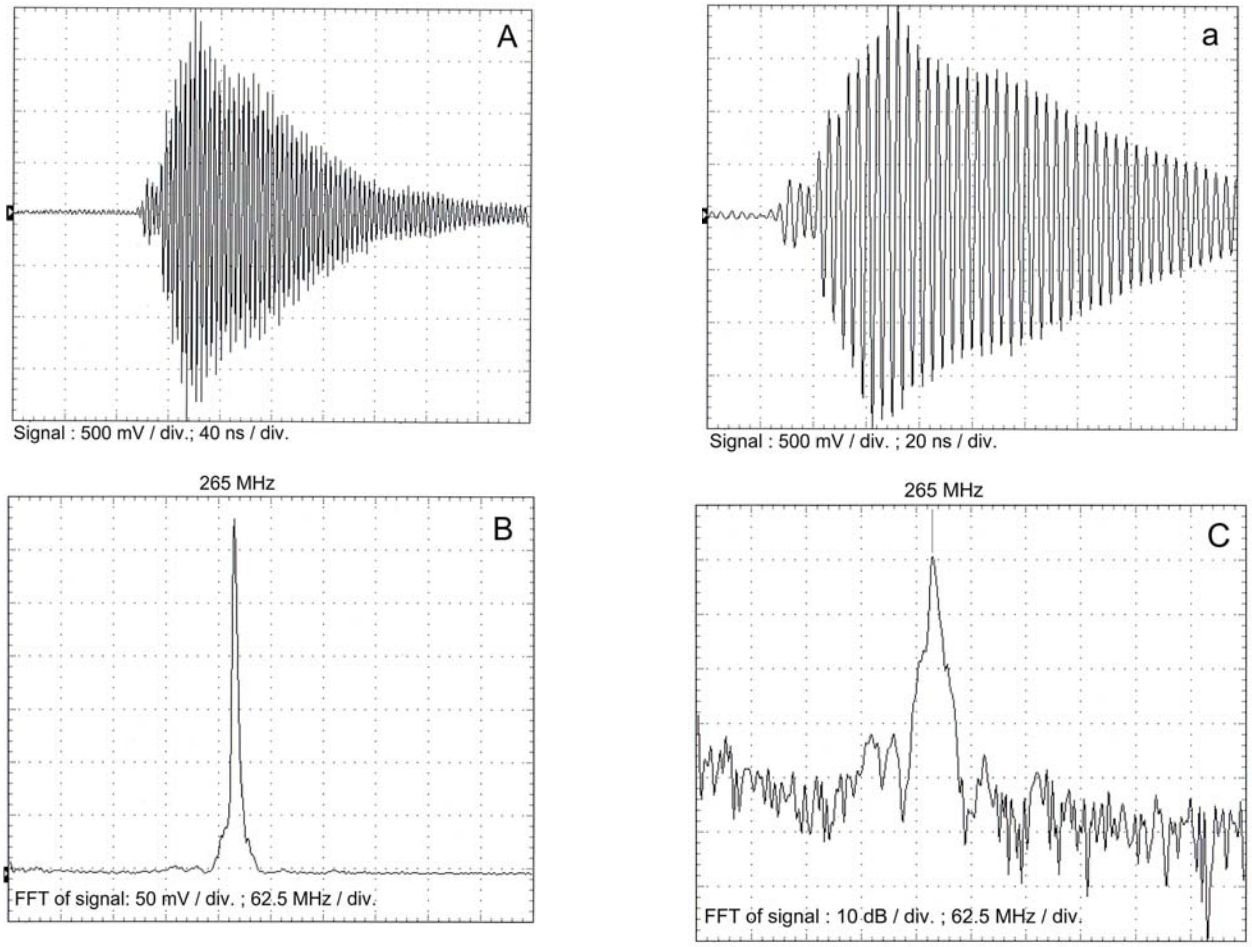

Figure 3; Experimental data**; Frame A:** Signal recorded at the time scale of 40 ns per division. **Frames B** and **C** are the FFT of the signal, shown on the linear and logarithmic scale. **Frame a:** is the signal of the frame A, but expanded on the time scale of 20 ns per division

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Note

- There are some variations from shot to shot in the amplitude of the pulse and the shape of the pulse. Some spikes have been recorded periodically. For example we have initially the spike in the signal in Fig.3, Frame A. This spike is absent in Fig.4, frame "a" and the amplitudes at the top are of the same intensities. In some other shots the spike have been recorded after the flat portion of the pulse.

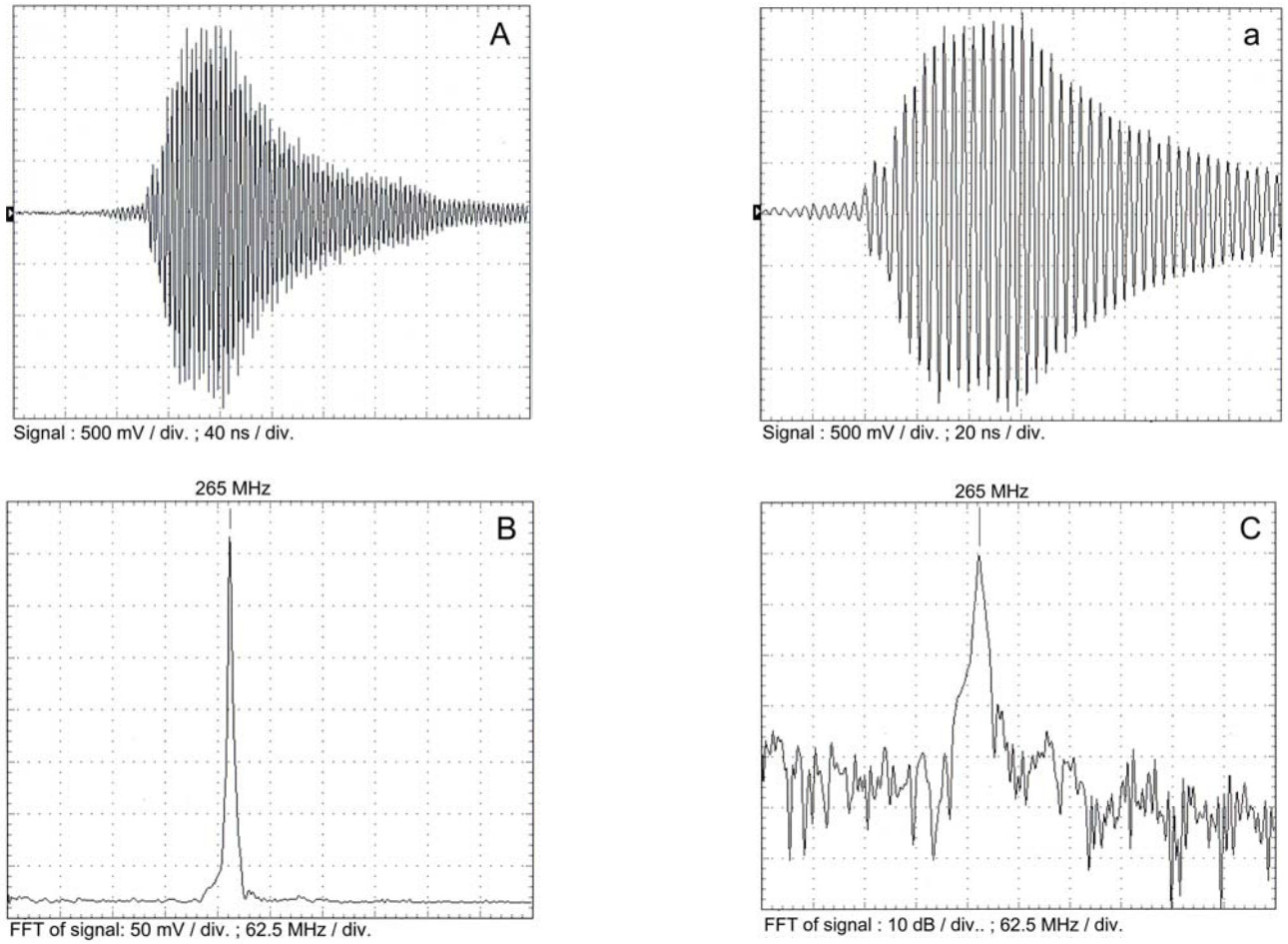

Figure 4; Experimental data**; Frame A:** Signal recorded at the time scale of 40 ns per division. **Frames B** and **C** are the FFT of the signal, shown on the linear and logarithmic scale. **Frame a:** is the signal of the frame A, but expanded on the time scale of 20 ns per division

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Note

- Two shots are given in Fig. 5 to show the evolution of RF generation. In shot A the pre-pulse is of short duration, i.e. four oscillations, whereas in shot B we have the gradual build-up of 24 oscillations.

- If the pre-pulse would contain two frequencies of the oscillations, this will cause the main RF pulse also to experience the frequency shift.

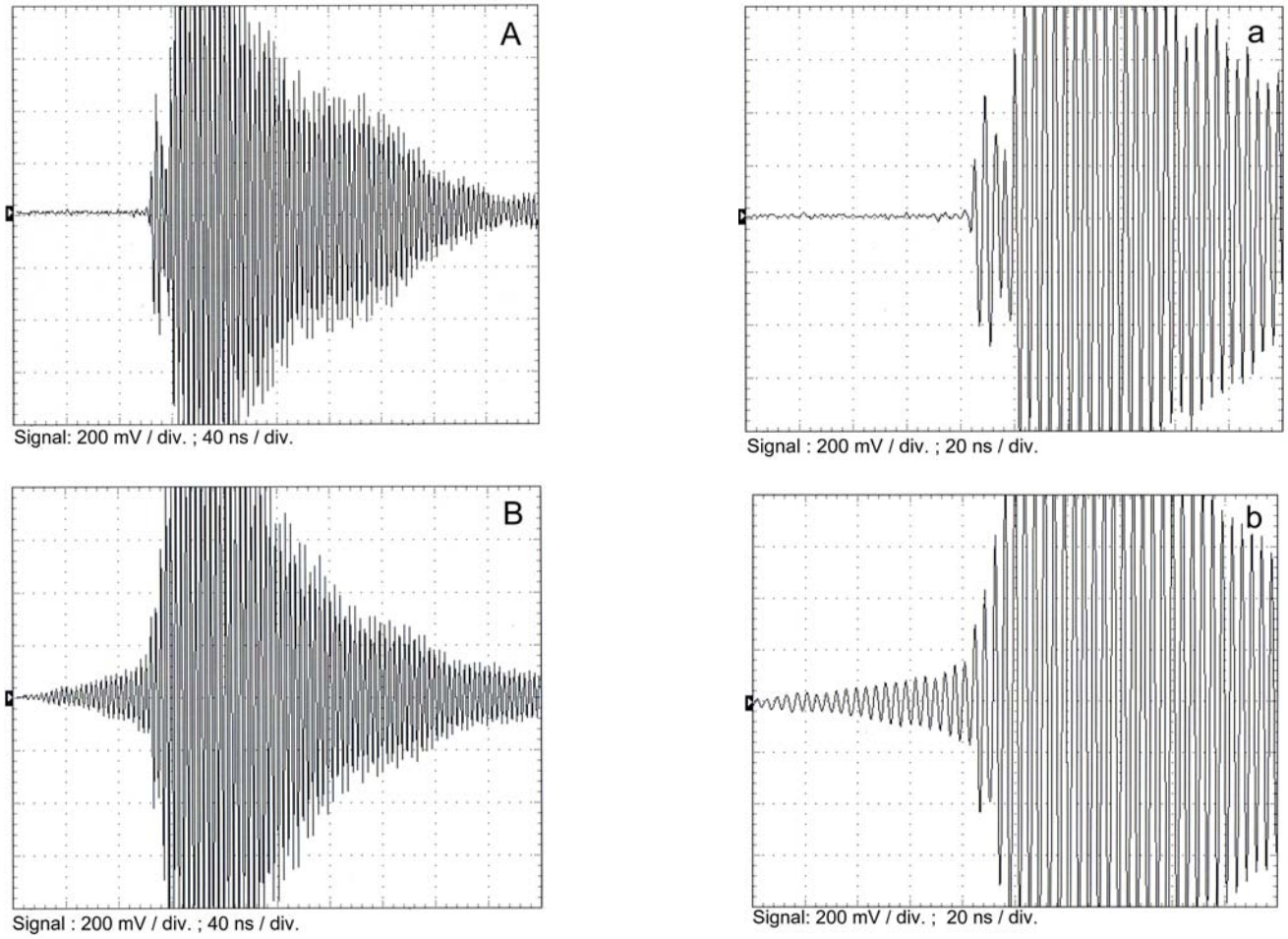

Figure 5; Experimental data of two shots A and B. **Frames A and B** are recorded at the time scale of 40 ns per division. **Frames a and b** are the signal of the frames A and B, but expanded on the time scale of 20 ns per division. The amplitudes of the pulses would not have been chopped if the signals were given on the 500 mV / division scale.

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