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# A 100kV, IGBT switched, spark gap trigger generator

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The lack of availability of small, fast, switches such as krytrons ( e.g. EG&G KN 6) and thyratrons (e.g. E2V FX2530) makes the design of high voltage spark gap trigger units problematic. This paper will describe a 100kV trigger generator which is switched using a high voltage, high current IGBT switch. A capacitor, charged up to 5kV, is discharged with the IGBT into the primary of a high gain autotransformer, the secondary of which is connected to the output of the generator. The transformer is wound with copper and mylar foils on to an amorphous metal glass core which is carefully gapped to avoid core saturation.

One of the advantages of this all-solid-state generator is that it can easily be triggered by a TTL input pulse and the throughtput delay and jitter of the generator is well characterised. Hence it is then very easy to synchronise a pulsed power system, triggered by this generator, to any diagnostic measurements that may need to be made.

Output pulse rise-times from the trigger generator are typically below 150 ns and a simple pulse sharpening circuit can added to the output circuit of the pulse transformer which can reduce the rise-time to durations which are short enough to promote multi-channelling in rail-gaps. Basic circuit and transformer calculations will be described which explain the trade-off between voltage gain from the primary to the secondary circuits of the transformer and the rise-time of the output pulse.
*paul.smith@firstlightfusion.com

**Authors:** Mr BURKE, Clive (First Light Fusion); SMITH, Paul W. (First Light Fusion)

**Presenter:** SMITH, Paul W. (First Light Fusion)

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