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Abstract: A new circuit topology is proposed to replace the actual pulse transformer and thyatron based resonant modulator that supplies the 60 kV target potential for the ion acceleration of the On-Line Isotope Mass Separator accelerator, the stability of which is critical for the mass resolution downstream separator, at the European Organization for Nuclear Research. The improved modulator uses two solid-state switches working together, each one based on the Marx generator concept, operating as series and parallel switches, reducing the stress on the series stacked semiconductors, and also as auxiliary pulse generator in order to fulfill the target requirements. Preliminary results of a 10 kV prototype, using 1200 V insulated gate bipolar transistors and capacitors in the solid-state Marx circuits, ten stages each, with an electrical equivalent circuit of the target, are presented, demonstrating both the improved voltage stability and pulse flexibility potential wanted for this new modulator. (C) 2010 American Institute of Physics. [doi :10.1063/1.3461134]

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