

# *Pulse Forming Networks*

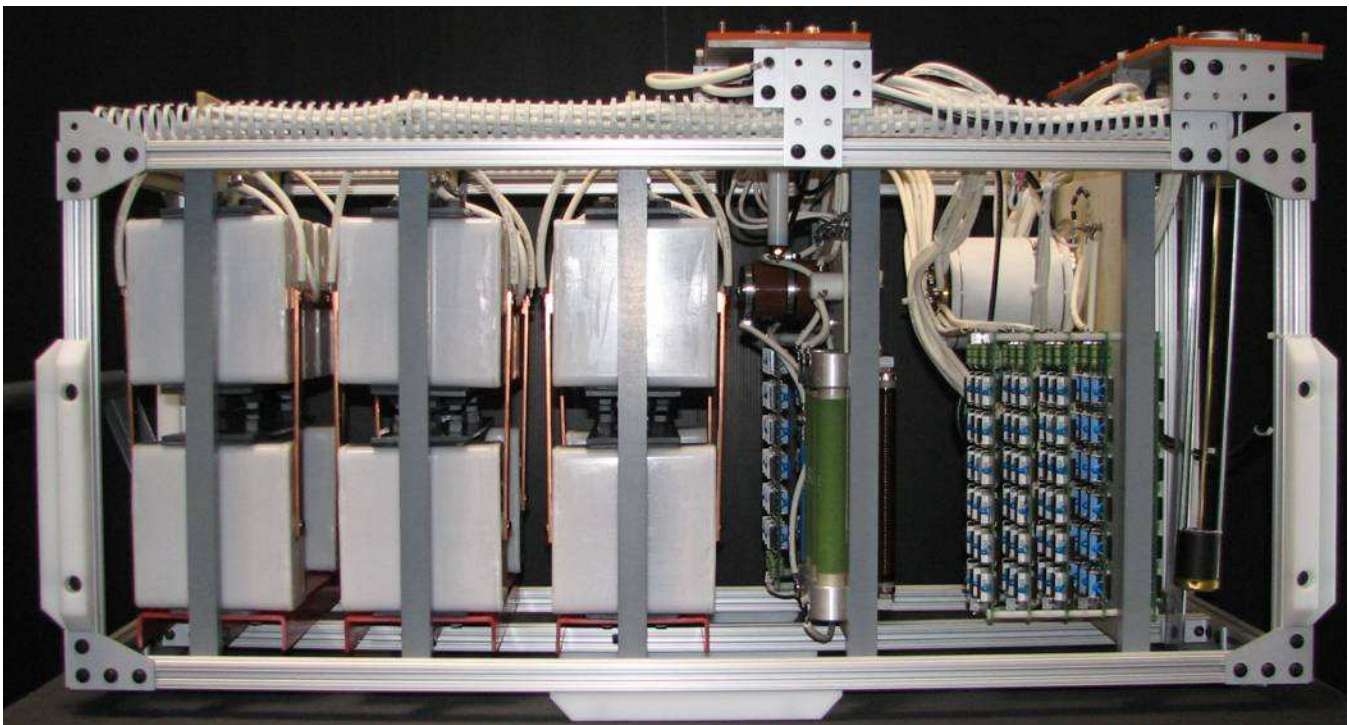
A Pulse Forming Network (PFN) stores electrical energy over a comparatively long time and then discharges the energy within a short duration achieving high peak powers. The output is typically a flat top rectangular pulse, but other pulse shapes can also be created depending on the application. The rise and fall time of the output can also be tailored for the specific application. The PFN is charged by a high voltage source and then the stored energy is rapidly discharged into the load via a high voltage switch; such as a spark gap, thyatron, or SCR. The load may be a high power microwave oscillator such as a klystron or magnetron, a flashlamp, or even an electromagnetic device. The PFN repetition rate may range from a fraction of a Hertz to over 10 kHz.

Our 20-plus year legacy of delivering reliable high voltage equipment and extensive experience in practical pulse generator applications traces back to North Star Research Corporation. We combine our expertise in high voltage pulse generator techniques with an understanding of the physics and engineering involved to exceed customer requirements. We tailor and adapt technology for customer needs by starting with a well-understood existing design; then using simulation and analytical analysis, we develop a new design with a proven base. Comprehensive testing is performed on every system to ensure the delivered system meets all critical performance requirements to achieve overall customer satisfaction.

***For more information about our products and services, please visit our web site at [www.appliedenergetics.com/highvoltage.asp](http://www.appliedenergetics.com/highvoltage.asp)***

## *Applications*

- Flash x-ray
- Radar
- Microwave tubes
- Flashlamps
- Lasers
- Particle accelerators.



# Pulse Forming Networks

## Advantages

Unique Type-C PFN configurations have been built that produce very short (0.2 to 1.0  $\mu$ s) pulses at impedances as low as 3 ohms overcoming conventional capacitor inductance limitations.

"Tailored" PFNs have been developed and delivered for use with variable impedance loads.

Equipment is designed to tolerate load arcs without damage to either the PFN, charging supply, or the load.

Fiber optic coupled control systems for isolation without performance compromise can be provided.

## Delivered Systems Include:

- 6000 Joule pulse energy driving 16 xenon lamps in series, 0.25 Hz rep rate, -35 kV charge voltage, <250  $\mu$ sec jitter, 3  $\mu$ sec pulse duration
- 300 Joule, 10 Hz, 500kV system for driving a microwave tube.
- 300 Joule pulse energy, 30 Hz rep rate, -31 kV charge voltage, 3.5  $\mu$ s pulse duration with flash-lamp simmer supply.
- 100 Joule pulse energy, 120 Hz rep rate, with series pre-ionization injection, 24 kW average power
- 100 Joule pulse energy, 10 Hz with external simmer circuit, retrofit of an existing laser system
- Plasma implantation 20kW, 60kV system.

## Specifications

Applied Energetics and North Star Power Engineering have built several PFN systems for various customers around the world. Typical output parameters are as follows:

Voltage output:	30 - 500 kV
Current output:	20 - 10,000 A
Pulse Energies:	100 to 6000 J
Pulse Widths:	3 - 100 $\mu$ sec
Repetition rate:	1 - 500 Hz
Power output:	5 - 30 kW

The ranges listed above denote the wide field of customization we are able to provide. Rise times are typically in the range of 5 to 10% of the pulse duration.

Computer based control systems are available for all PFN based pulse generator systems. PC controls are based on an inexpensive control card and fiber optic links.

Applied Energetics will gladly quote custom applications to meet customer requirements that deviate from standard product lines. Specifications and performance are subject to change without notice.



  
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