The DIII-D tokamak relies on a facility wide timing network to synchronize machine operations. The first generation system was designed around cascaded CAMAC delay units feeding a custom timing network encoder. This system has become increasingly difficult to maintain and repair and the needs of DIII-D experiments are beginning to exceed its capabilities. To address these issues, a new second-generation system was designed with a modular architecture in a VME form factor which facilitates the future addition of features and output channels when required, while maintaining backwards compatibility with the original system. As part of the base design, modules for event triggers, multiple programmable sequences, first generation Bi-Phase serial outputs, fiber optic outputs, and event recording are provided. Each module is implemented with a form of programmable logic, either a CPLD or FPGA, which allows for future modification if needed. The system also has the capability of complete remote management, allowing for custom timing chains on a per-experiment basis. The feature set and design of this second-generation timing system is presented.

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