

# New Ignition Technology

A new generation of digital ignition systems aids engine performance.

**D**igital ignition systems offer a wide range of improvements and opportunities for lawn and garden power equipment, and Prüfreflex was one of the first companies in the '80s to develop digital ignition systems for the small engines market and advance them for series production.

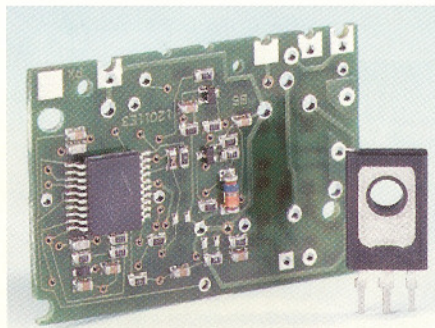
In the '80s, digital ignition modules were still rather large. Prüfreflex's first digital ignition system employed a crystal controlled digital capacitor discharge ignition module using an ASIC (application specific integrated circuit). By this application the number of RPMs could be digitally limited and the ignition timing adjusted. This could be programmed but the ignition timing was time controlled. Another characteristic of the system was the spark suppression at the reverse rotation of 2-stroke engines. These ignition modules were rather expensive, had high development and tooling costs and required large space for the application in any machine.

In the early '90s, new systems were introduced equipped with an ASIC and precision crystal controls. With this system, position-controlled and time-controlled ignition timing could be run according to the individual number of RPMs. Furthermore, recoil-free starts were possible, even with irregular machine rotation movement. The maximum speed could be programmed and the spark suppressed at the reverse rotation of the engine. The range of timing of the system was up to 50° in relation to TDC (top dead center).

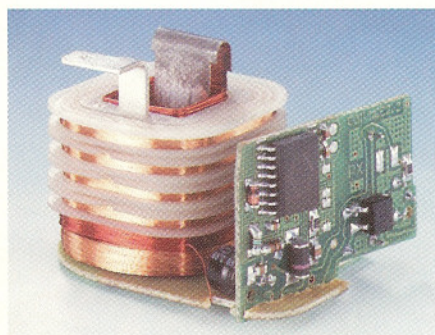
Another milestone in the '90s was the combination of digital and analog cells within the ASIC. This led to immense cost reduction and increased flexibility in setting up the required adjustment curves, due to the programmable cut-in speed and speed control. By the mid '90s the market of electronic semiconductors in the field of the standard micro controller made it possible to equip a small ignition module with more flexible functions at much lower costs.

## Micro Control Modules

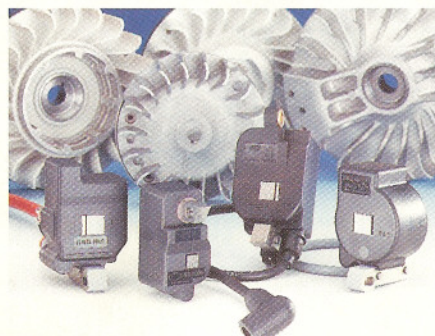
Today, there are numerous advantages to a standard micro controller ignition module. Above all, the long development periods and tooling costs have been dramatically reduced. The overall ex-



Mounting technology advances aid design.



More features are now built in.



Systems can meet any flywheel position.

pense for OEM customers as well as for Prüfreflex has clearly decreased, and more importantly, the time to reach series production has been reduced by 75%. Requests for adjustments by engineers can be implemented individually shortly before the start of the series production.

A standard micro controller based ignition module (CDIM) offers the following advantages:

- Control unit standard micro controller platform (Prüfreflex offers three platforms.);
- Precision crystal-controlled CDI ignition module;

- Position- and time-controlled ignition timing;
- Kickback free programmable start in accordance with the application;
- Free programmable idle and programmable maximum engine speed governor with retarding of timing or cutoff;
- Several free programmable ignition timing curves on a chip or mapping, and free programmable control exit, depending on speed, time and working condition;
- Spark suppression at reverse rotation of engine;
- Range of timing advance 0°-40°, up to 18,000 RPM;
- Cut-off with button function.

Prüfreflex ignition modules are designed to increase engine lifespan, optimize catalytic converters and increase performance up to 20%. Due to the European, EPA and CARB exhaust regulations, efforts to reduce emissions have become top priority. With today's micro controller ignition modules, emissions regulations and compliance are more easily reached. Furthermore, the use of intelligent 8- and 16-bit micro controllers opens up additional possibilities providing the user of lawn and garden or marine equipment with appealing comfort functions.

A big advantage of micro controller ignition modules is their small size. The intensive implementation of surface-mount technology (SMT) in the analog as well as the digital fields within the automotive and telecommunications industries has created financial and technical advantages for the magnetic ignition module.

Today's SMT techniques provide a production technology that can set new standards in addition to much lower material costs, minimal space usage and corresponding weight reduction. As a result, Prüfreflex is producing one of the smallest micro controller ignition modules on the market, adaptable to the customer's needs regardless of position or function of the requested flywheel.

With its accrued knowledge of the latest digital ignition technology, Prüfreflex has numerous patents that make both the company and its customers well-equipped to meet the challenges of optimizing engine performance by using the latest ignition technology and features.

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*This article was submitted by Prüfreflex.*