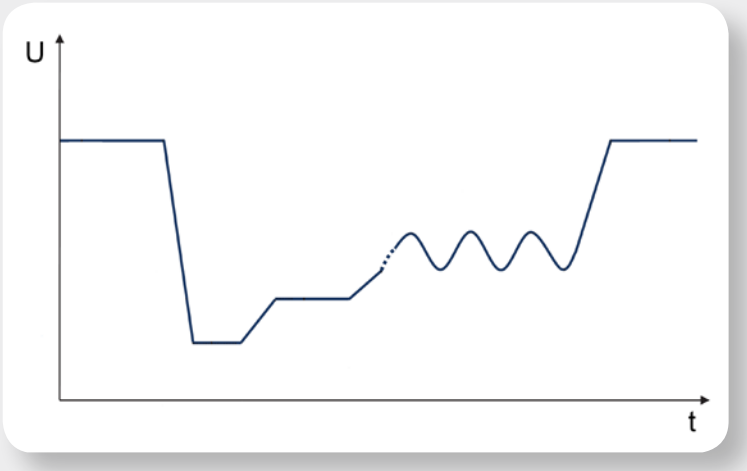
GOSSEN METRAWATT

HIGH PRECISION TEST SIGNALS

GENERATED BY MODERN
DC POWER SUPPLIES



Modern DC Power Supplies Generate Precise Test Signals

In order to incorporate highly demanding functions into passenger vehicles and trucks, electrical and electronic components and modules must be subjected to a broad range of tests and analyses during the R&D and production phases. These evaluations are important in order to be able to make well-founded decisions regarding quality assurance and readiness for series production.

In the automotive industry it must be assured that testing is conducted predominantly under realistic conditions of use, thus making it possible to guarantee error-free, safe functioning in advance.
Test conditions such as the environment in which testing takes place, the test signal and the test procedure must meet the demands of highly variable operating states, in order to simulate the various conditions in the vehicle as perfectly as possible.

In the field of automobile manufacturing, motor controlled, electronically regulated and monitored devices include complex airbags, ABS, headlight technology and driver assistance systems, as well as electronically regulated components in doors, windows and in the roof. This great multiplicity of function modules has to be tested as reliably and securely as possible, in order to assure quality during series production later on. In order to ensure that different impedances within the onboard electrical system don't cause any problems for subsequent series production, test signals and modifications of standard test pulses have to be developed which are typical for the onboard electrical system.

Standards and Transients Pulses

Test signals are specified in special ISO and SAE standards (Society of Automotive Engineers), in order to cover distinctive functions and conditions of use. In addition to these, test signals are also specified by the manufacturers, for example in the LV standards. Transient pulses within the automotive electrical system are caused when loads or inductances are switched. They're described in ISO 7637 (pulses) for the purpose of testing for interference immunity.
Depending upon how the device under test has been wired into the electrical system, it may be impaired by various pulses.

Pulse 2b, the engine shutdown pulse – mentioned here as an example – is caused when the automotive electrical system is switched off while the alternator is still turning. It generates a voltage, although it's not an overvoltage, but rather just a short-term onboard electrical system voltage. Another common example is the simulation of the engine cranking (characteristic starter motor curve – for example as specified in manufacturer's standard LV 124). The electrical system breaks down due to the large amounts of energy required by the starter motor. Local conditions also cause this pulse to occur under various ambient conditions – for example ambient temperature and the viscosity of the motor oil which influence the engine starting process.

The calibration center at GMC-I Messtechnik is specialized in assuring the highest levels of precision.

Testing with Automotive Test Setups

In their totality, the pulses generally indicate which categories of tests will be set up in the automotive field, and which have to be implemented by means of laboratory power supplies in the testing, R&D and production phases. Three categories of test setups have been established for the various pulses:

- Tests with high-frequency test signals with rise times in the microsecond range
- Tests in the medium dynamic range for which rise times in the millisecond range are required
- Tests in a semi-static operating state in accordance with battery voltage tolerances

Fast, high-frequency pulses are measured with the help of a special mechanical switch, a simulated automotive electrical system and an oscilloscope. The test setup is precisely described in ISO 7637, and must be strictly adhered to because results are otherwise not reproducible. Static pulses or those in the medium dynamic range are ascertained in a similar fashion with an electronic switch, a simulated automotive electrical system and an oscilloscope. In particular within this working range, power supplies from GMC-I Messtechnik such as the SYSKON P series power supplies fulfill the requirements specified by the automotive industry.

Modern Laboratory Power Supplies

Modern laboratory power supplies are designed in switch mode technology in order to achieve greater levels of efficiency and to reduce weight and size. However, switching controllers require an appropriate filter with an output capacitor in the output circuit. The capacitor, whose rating may be several thousand microfarads depending upon power, directly determines the dynamic performance of the power supply's power output.

In comparison with the load current, an adequately high charging current must be permissible in order to achieve short response times from lower to higher output voltages. Accordingly, this charging current influences the dimensioning of the entire power section, right on up to the supply's AC input. Rapid discharging (for output voltage reduction) at the power output must be assured as well, for example when simulating a voltage dip in the onboard electrical system. Due to the fact that we cannot always assume that adequately high load current will be available, discharging must be accomplished by the power supply itself. Discharging via an integrated dynamic load or current sink can be implemented in order to accelerate the process. This concept is used for the SYSKON P series.

Another possibility is to rapidly discharge the output capacitor by returning its energy to the intermediate circuit at the primary side via the power transformer. This concept prevents any further power loss within the overall system, and is implemented in all high precision 32N power supplies from GMC-I Messtechnik under the name of BET technology (bidirectional energy transport). In either case, influence on the thermal balance of the entire power component set-up must be observed. Beyond this, additional functions must also be observed and taken into consideration in the layout and dimensioning of the controller.

The Current Generation of Power Supplies

Programmable power supplies included in the SYSKON P series fulfill all of the requirements set forth by the ISO standard and the automotive industry within the medium dynamic range for power supplies. These state-of-the-art instruments represent the top quality range of DC power supplies for laboratory and system use in the automotive sector. The requirements and suggestions of users representing numerous application ranges were taken into consideration during the development stage.

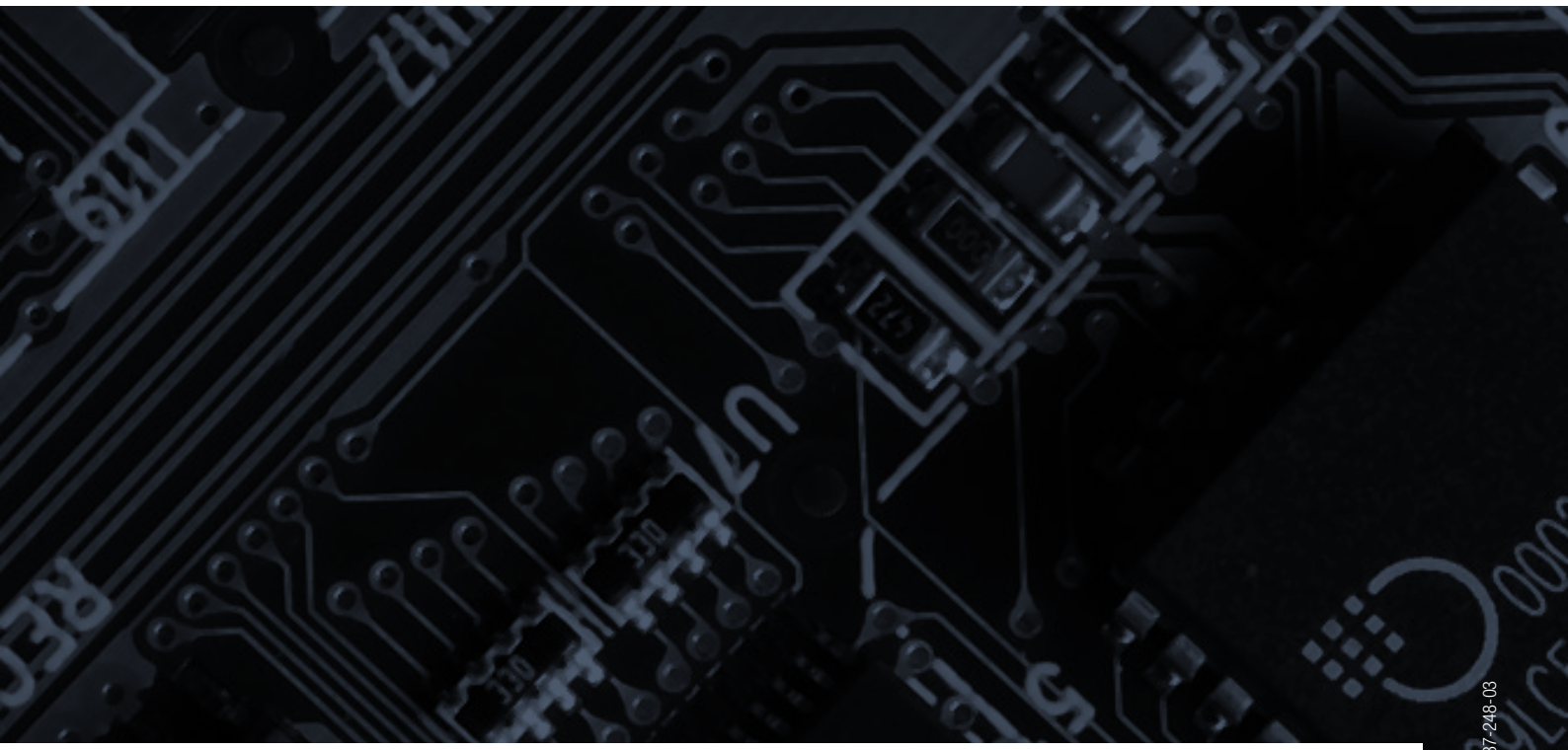
Further information and data regarding the power supply portfolio are available from the GMC-I website at:

https://www.gossenmetrawatt.com

Andreas Stollberg
Product Manager, Power Supplies

GMC-I Messtechnik GmbH
Südwestpark 15
90449 Nürnberg, Germany
www.gossenmetrawatt.com

Phone: +49-911-8602-717
Fax: +49-911-8602-80717
E-mail: andreas.stollberg@gossenmetrawatt.com



GMC INSTRUMENTS

GOSSEN METRAWATT

CAMILLE BAUER

GMC-I Messtechnik GmbH
Südwestpark 15 ■ 90449 Nürnberg ■ Germany
Phone: +49-911-8602-111 ■ Fax: +49-911-8602-777

www.gossenmetrawatt.com ■ info@gossenmetrawatt.com

Printed in Germany • Subject to change without notice • 2/6.18 • 3-337-248-03