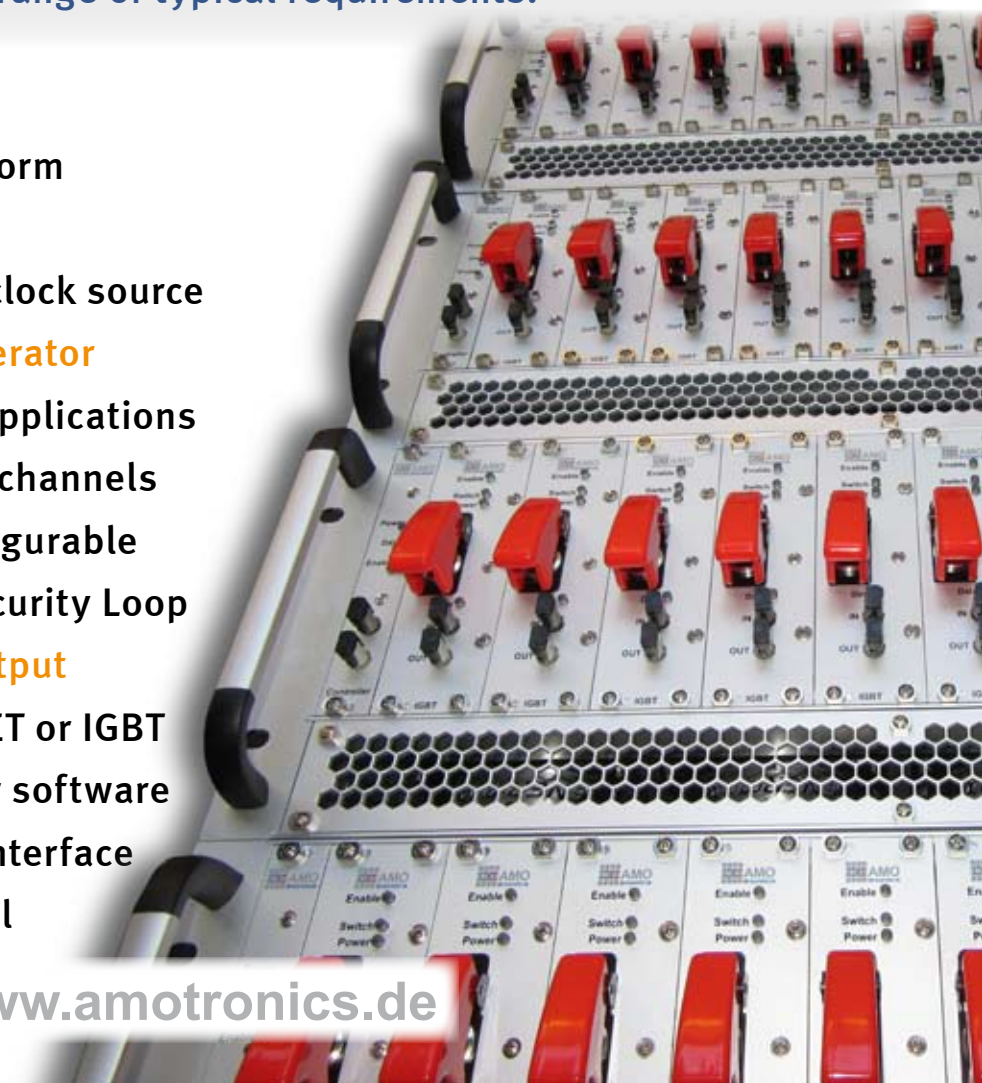
NEW

SATURN SEQUENCE TIMER

for PRECISE TEST CONTROL

The Sequence Timer family from AMOtronics is a scalable real-time test control system. It allows precise and reliable control of test facilities and units under test. The NEW Cycle Timer and Pattern Generator Software offer both, easy-to-use graphical configuration and, if needed, flexible individual programming. Electrical testing laboratories at any voltage level benefit from the precise timing and fail-save design.
A selection of high power output modules with RELAY, MOSFET or IGBT switches support a wide range of typical requirements.



- Modular hardware platform
- 8..192 channels
- Internal real-time 10ns clock source
- Synchronization to generator frequency for rotating applications
- Electrical or fiber-optic channels
- Safe operation via configurable Qualifier Inputs and Security Loop
- Optional high power output modules: RELAY, MOSFET or IGBT
- Easy-to-use Cycle Timer software
- Flexible programming interface
- Optional Remote Control

www.amotronics.de

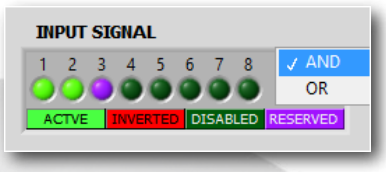
CONNECTIONS

for INPUTS AND OUTPUTS

With the scalable SATURN Sequence Timer family the development of a modern and reliable versatile instrument for a broad range of applications succeeded. The new Sequence Timer offers a set of extra ordinary features. It is available as a stand-alone device or integrated into a SATURN Transient Recorder System to allow parallel recording and analysis of measurement and control channels.

KEY FEATURES

- **8..192 Inputs / Outputs to precisely control tests from small to large scale**
  - **Up to 64 channels in main chassis**
  - **Plus up to 128 additional channels in separate chassis, connected via fiber-optic**
- **8 Qualifier/ Marker inputs with logic functions (OR / AND) for initiating the start procedure**
- **Dual operation mode:**
  - **Internal clock (strictly time based)**
  - **Synchronization with external reference signals, e.g. generator frequency (analog sinus / digital zero crossing / digital pulses)**
- **Optionally integrated with SATURN data acquisition system**
- **Programmable Break Pattern for emergency stop and defined fail safe state**
- **Different media types combined in one chassis: electrical, optical and power outputs**



INPUT PANELS

Selectable fiber-optic or electrical input panels and the software configurable functions allow manifold combinations for flexible use.

- Qualifier & Marker signals can be defined and combined with logic functions (AND/ OR) to initiate the Sequence Timer START procedure, optionally protected with final user confirmation.
- The dedicated SECURITY LOOP input is a mandatory input to be closed for operation.
- Digital inputs offer precise synchronization to generator rotation with variable pulse count sensors at various frequencies.
- Common data acquisition of digital control inputs/outputs and analog test signals (from DUT) can be selected in a combined SATURN data acquisition and Sequence Timer system.

OUTPUT PANELS

Several different output panels and functions transfer the Sequence Timer control signals to the test facility and device under test (DUT).

- In groups of 8 signals, the engineer can select the best combination from both, electrical and optical signals with different types of connectors and functions in one system.
- By integration of SATURN data acquisition and Sequence Timer in one system the DUT test signals and the control output signals can be measured internally in one step, 100% synchronized.
- The NEW Sequence Timer family offers a full set of equipment for interfacing the fiber outputs directly to the device under test (DUT).

Input and Output Connection Overview

Connector	No. of Channels*	Media	Distance	INPUT	OUTPUT
ST (50-62.5/125µm)	64x (+ 128x)	Multi-Mode Fiber	<300m	DC .. 50MBd	DC .. 50MBd
POF / Versatile Link	64x (+ 128x)	Plastic Optical Fiber	<50m	DC .. 50MBd	DC .. 50MBd
BNC	64x (+ 128x)	50 Ohm coaxial cable	<10m	TTL	TTL 100mA MOSFET driver
Winsta®	64x (+ 128x) ON/OFF 32x (+ 64x) 3-State	1.5mm² power cable	-	-	10A Relay ON/OFF 10A Relay 3-state (e.g. -24V .. 0V .. +24V)
4mm safety banana	32x (+ 64x)	electrical cable	-	-	10A MOSFET (400V peak, open collector)

(*) channels in the main chassis, the number in brackets is the additional channel count in separate chassis, linked via fiber-optic cable

OPTICAL COMMUNICATION

for ISOLATION AND LONG DISTANCES

For interfacing electrical signals to optical inputs or outputs of the Sequence Timer AMOtronics provides diverse options. Any SATURN input and output panel can be installed in the Sequence Timer main chassis as well as in a Test Cell 19” rack cabinet, connected via a single optic-fiber.

High Power Output Modules

Challenging switching requirements can be satisfied with special IGBT power switches. Installed in a 19” rack they can be placed in a test cell or generator room and are connected to the Sequence Timer outputs via fiber-optic cables. Each switch provides a feedback signal for monitoring. The rack is equipped with an fiber-optic common output-enable signal. This allows safe testing of the real-time pattern generation by observing the output LEDs without actually causing a switch operation.
Local push buttons with protective safety covers allow manual test switching.

- Peak power: 40A
- Peak voltage: 600V

Signal Conversion Boxes for Signal Input and Control Output

A set of conversion boxes, powered via battery or 5VDC, convert optical fiber signals into electrical switching signals or vice versa.
The >24V tolerant BNC inputs forward signals (e.g. from a SPS) via fiber to the Sequence Timer qualifier or marker inputs.
The electrical 3.3V TTL outputs can be used for instance to trigger oscilloscopes, high-speed cameras, radar flashes or any other equipment.

Connector	Link Speed	Media	INPUT	OUTPUT
HFBR / Versatile Link	DC .. 50MBd	Plastic Optical Fiber (POF) (980/1000µm) Hard-Clad-Silica (HCS) (200/230µm)	BNC – TTL <100V	BNC – 3.3V TTL level, max. 100mA
ST	DC .. 50MBd	Multi-Mode Glass Fiber (50/125µm; 62.5/125µm)	BNC – TTL <100V	BNC – 3.3V TTL level, max. 100mA

Unique Optical Switching Matrix

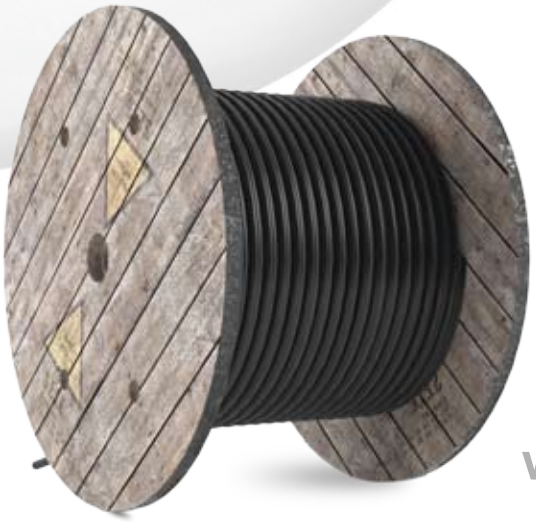
KEY FEATURES

- **Minimized installation effort and reduced cable costs**
- **Software controlled routing for high-speed fiber links (2GBit/s)**
- **Synchronous de-multiplexing of 64 individual Sequence Timer control signals from one SATURN fiber**
- **Selectable connections between Control Rooms and Test Cells.**
- **Supports both, links to Sequence Timer (control) as well as SATURN Satellites (data acquisition)**

Fiber optic matrix routing for vast test areas

In large test sites and for distributed setups installing individual fiber cables per signal is a challenge. Therefore AMOtronics offers both, **bundling of control signals** and **flexible signal multiplexing**.

The Sequence Timer (SEQ) is equipped with dual 2GBit/s high-speed fiber link ports. With only **one SATURN standard fiber cable** synchronously **64 digital SEQ I/Os** can be forwarded from the Control Room (CR) to the Test Cell (TC), where synchronous de-multiplexing allows to access the 64 individual I/Os again as optical or electrical signals. As available for the main chassis, any Sequence Timer output panel can be installed in a 19” rack cabinet to switch electrical loads or provide fiber-optic signals.



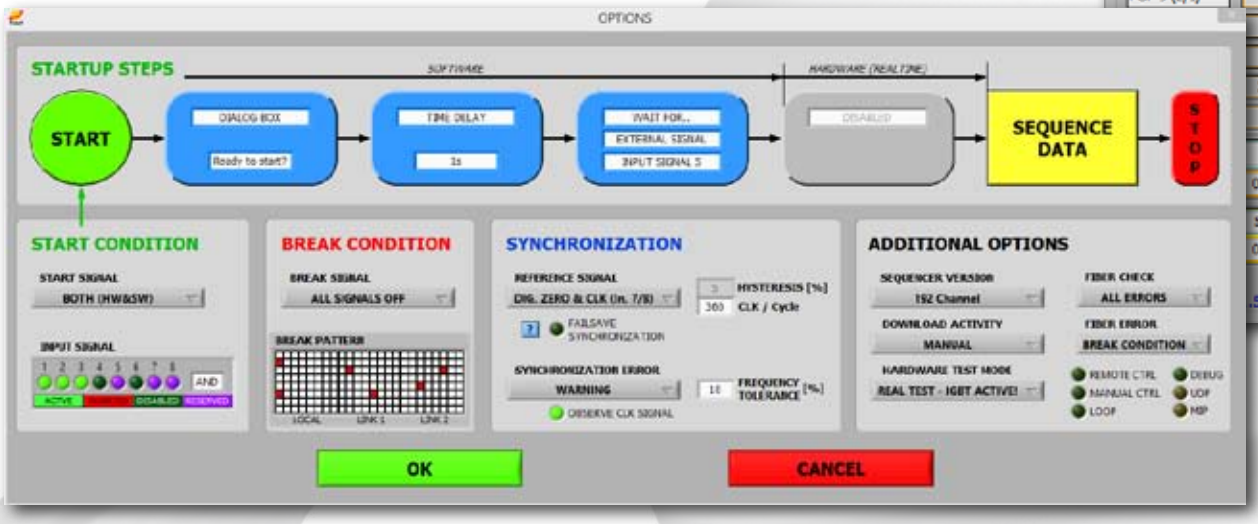
Even more flexible fiber installations can be realized with AMOtronics’ **Optical Matrix Switch**. Up to 8 fiber link ports can be used to route 2GBit/s high-speed signals in a matrix, **fully software controlled**. Each port supports bidirectional data transfer to flexibly connect control signals or measurement Satellites from Test Cells to one or more Control Rooms. The Matrix Switch allows to easily manage even complex setups.

Example: While 64 I/Os of SEQ1 are in use in TC1, in parallel 64 I/Os of SEQ2 control the test in TC2. The next test is scheduled for TC3 and TC4. One click in the **Matrix Arbiter Software** and the 64 I/Os of SEQ1 are switched to TC3 while 128 I/Os of SEQ2 can be used for TC4.

CYCLE TIMER

GRAPHICAL CONFIGURATION SOFTWARE

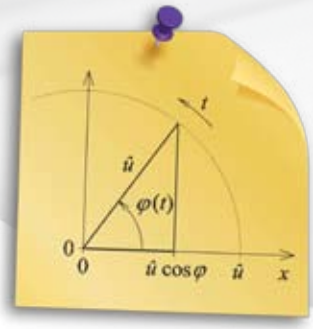
The Sequencer is configured and controlled by means of the SEQUENCER – CYCLE TIMER software. The software provides a comfortable graphical user interface. It allows to easily adjust the main options of the Sequencer, interactively generate the required signal output patterns, download the complete configuration onto the Real-Time Sequencer Processor Unit as well as observe and control the program execution.



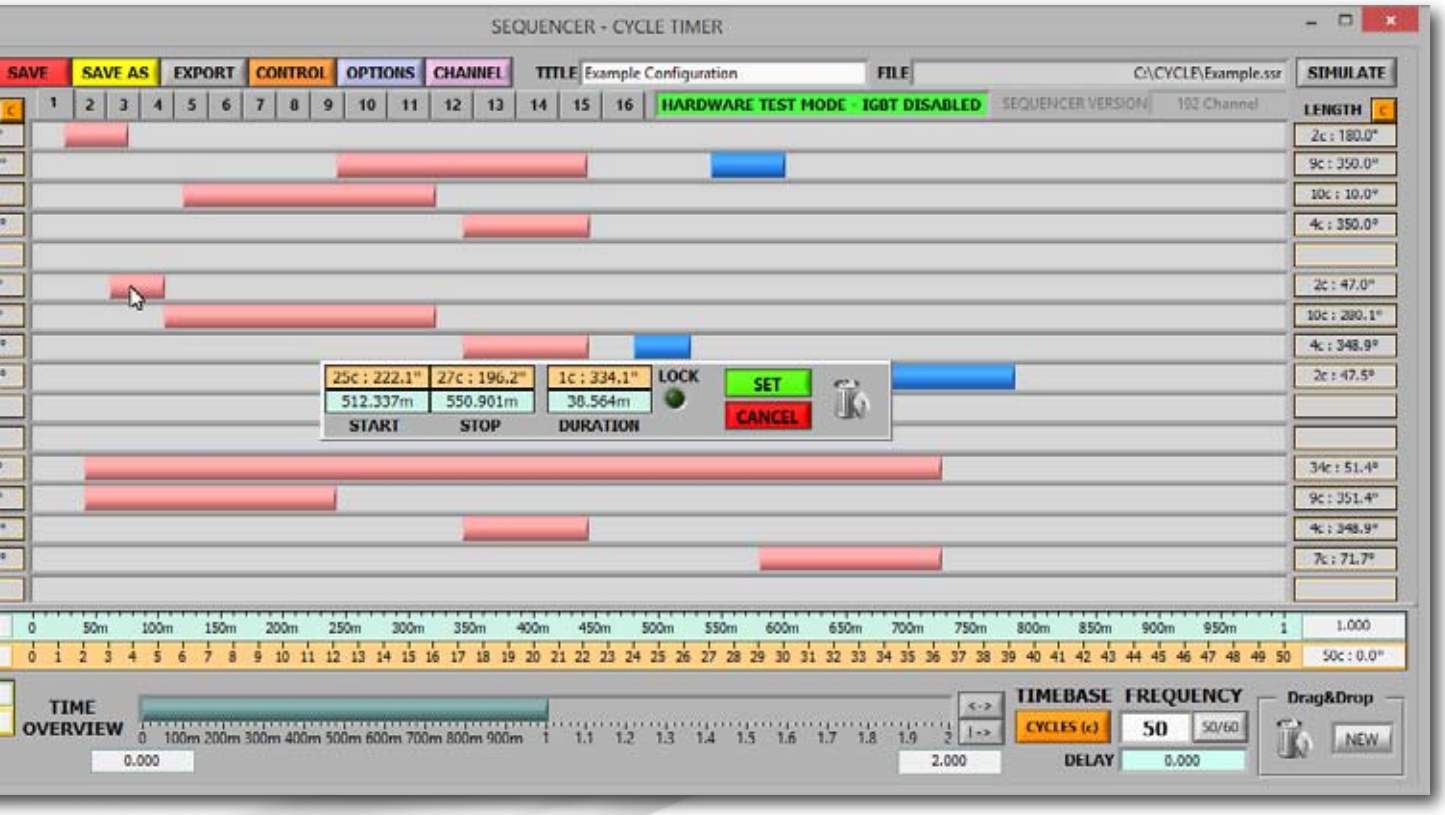
Internal Clock Mode

In this mode the generated output patterns are **strictly time-based**. The SATURN Sequencer offers a high precision internal clock source which allows a minimum **real-time step-width of 10ns**. Its reaction to input signals within only five clock steps makes it the ideal solution for applications which rely on precise and fast switching of the output signals at specific points in time.

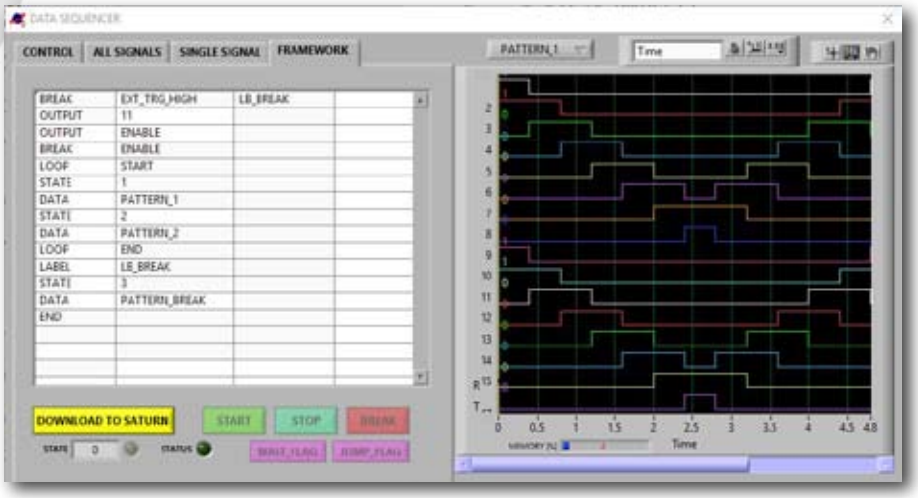
Cycle Mode



Precise synchronization to rotating generators at different frequencies is a key feature for **phase related testing**. The SATURN Sequencer supports both, **analog and digital reference signals** as external synchronization sources. The Sequencer Outputs can be switched at any phase angle of a defined cycle; for example at 8° before zero crossing of 5th sinus half wave.



PATTERN GENERATOR



The Pattern Generator provides an alternative software interface for **flexible programming**. A set of simple control commands enables the user to program complex pattern sequences with TRIGGERS, LOOPS, JUMPS and COUNTERS as well as BREAK conditions. This flexibility allows to solve even challenging control tasks.
With a single mouse click the software compiles the user-defined framework as well as the defined output patterns and downloads the code to the Sequencer real-time processor.

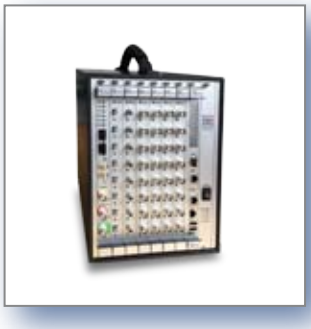
SEQUENCE TIMER

FAMILY GALLERY

Flat

max. 16 (+128)
control I/Os

Cube



max. 48 (+128)
control I/Os

19" Racks

max. 64 (+128)
control I/Os

ConversionBox

Fiber to electrical
or vice versa

19" SwitchRack

max. 10x IGBT
40A/600V

Specials ... ?

Get in contact for taylor made solutions!

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Tout ce qui se mesure s'améliore

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