All You've Ever Wanted In a Relay or Switch Tester

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Commercial pressures drive us all.

- Low-cost high-power relay and switch life-testing required – an in a very flexible manner.

- Pressures to drive down costs.

- With the cost of the humble PC continually falling, everyone expects to pay less and less
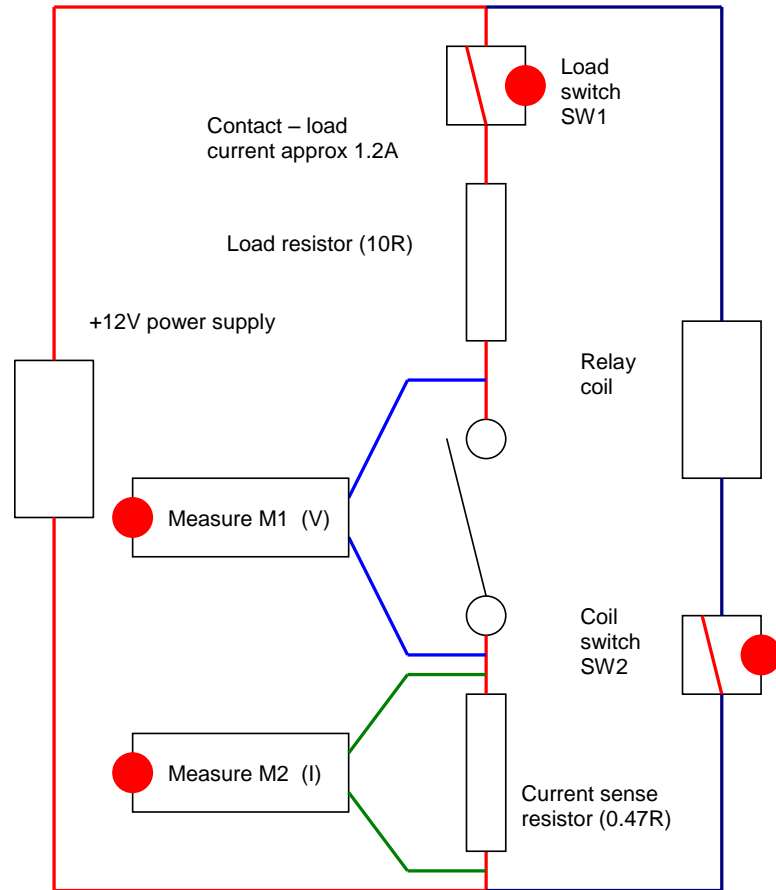
The design goals for a new test architecture.

- Uncomplicated electrical environment.
- Minimal hardware.
- Operates over a wide cycle rate range.
- Copes with high or low power devices.
- Measures contact resistance & stick voltage
- Tests against failure limits.
- Produces logged data and reports.

First thoughts – a simple life-test requirement.

- The relay is enabled and disabled by a semiconductor switch SW2
- The load can be enabled or disabled by semiconductor switch SW1
- Contact voltage is measured by a voltage measurement input channel M1
- Contact current is measured by a voltage measurement input channel M2.

Contact – load current approx 1.2A

Load switch SW1

Load resistor (10R)

+12V power supply

Relay coil

Measure M1 (V)

Coil switch SW2

Measure M2 (I)

Current sense resistor (0.47R)

Denotes a software-controlled resource

A 'concept vehicle' for a new test platform.

Measurement unit (up to 4 per system)

System card and front-panel display
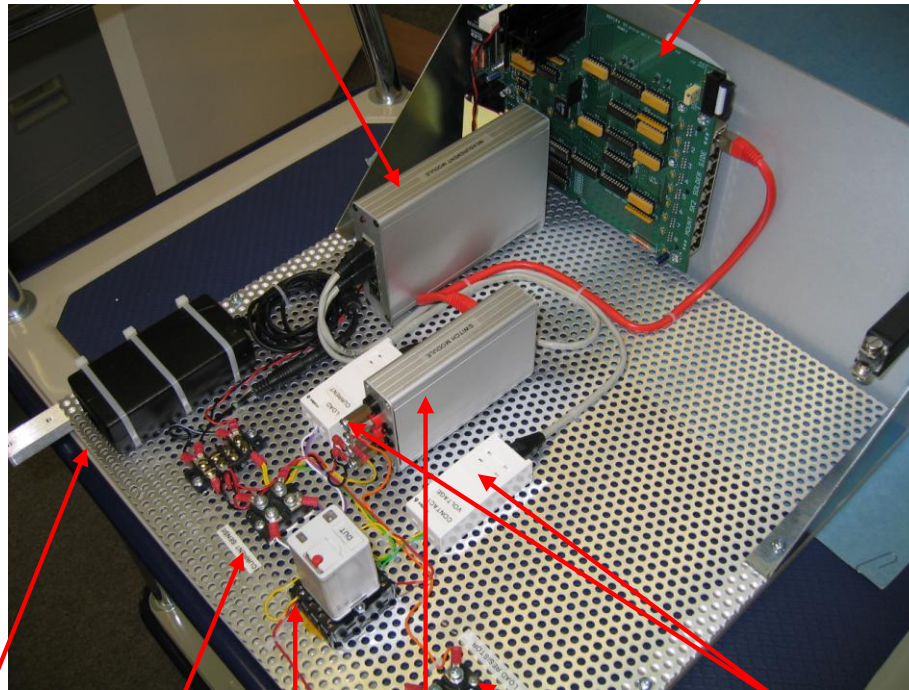
12V power supply

Relay under test

Load current sense resistor
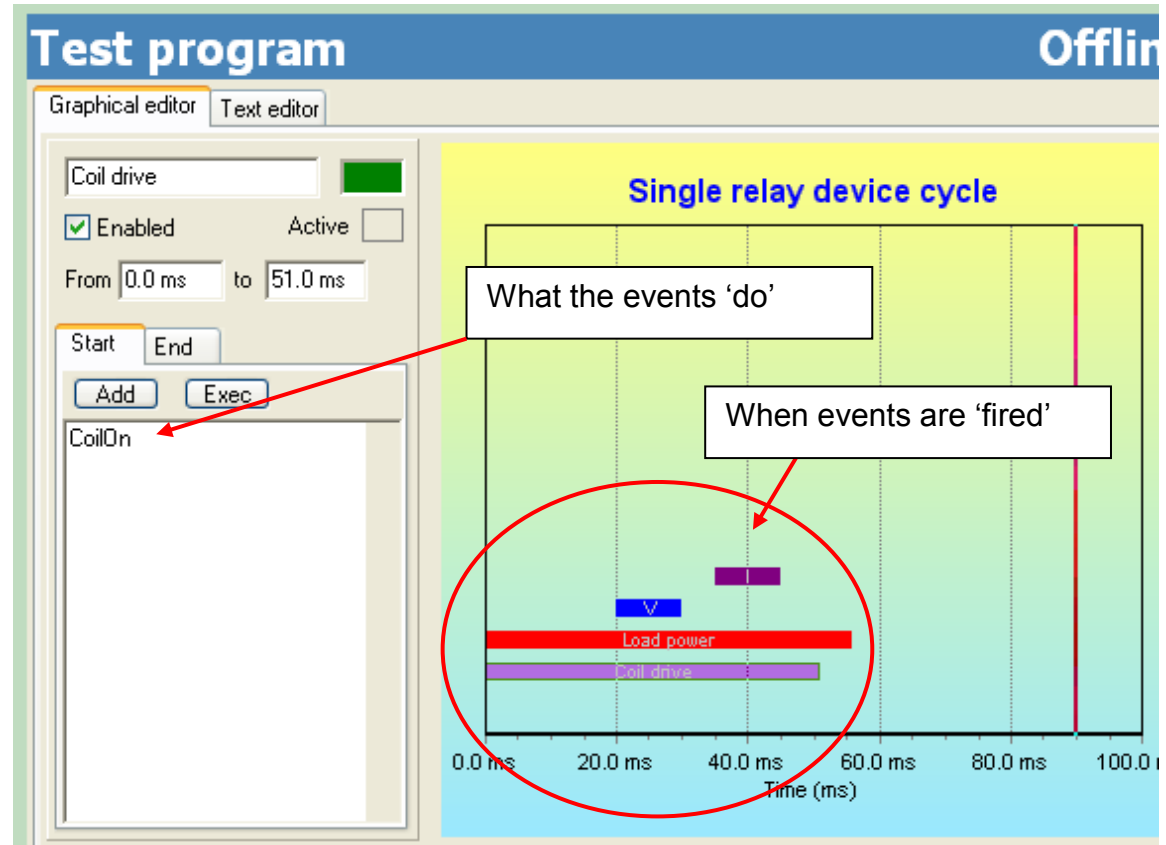
Coil and load dual switch

Contact voltage and current breakout connections

Contact load resistor

Fundamental programming principles – event based.

- 'Time slots' control the time positioning of events groups.

- Events control the actual hardware switching and measurement.

- The effect is much like a player-piano with punched music rolls.

A rich, multitasking command set.

Time	Command	Purpose
0 ms	CoilOn	Turn coil on
20 ms	VContactStart	Start contact voltage drop measurement
30 ms	VContactStop CR:=VContact/1.2	Stop contact voltage drop measurement and calculate contact resistance
50 ms	CoilOff	Turn coil off
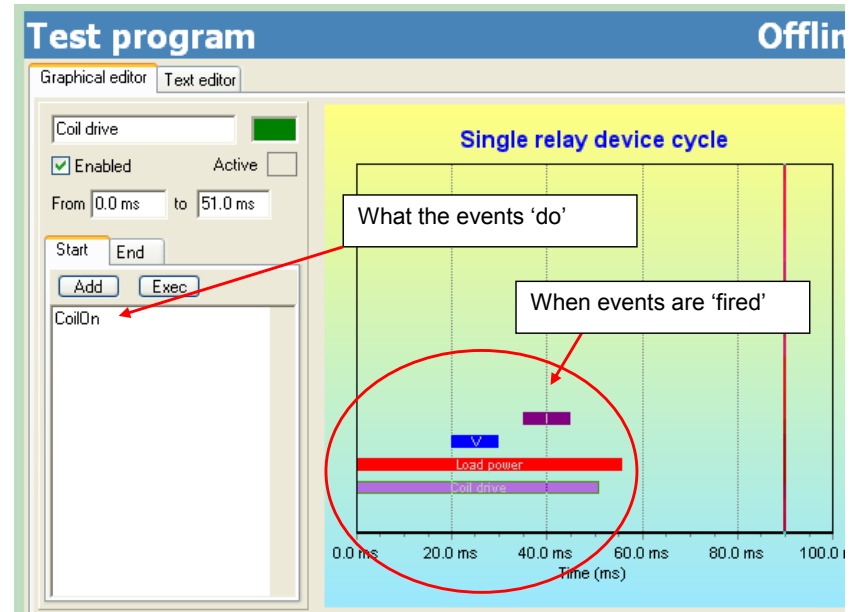
The Reflex 51 test component range was born.

- A general-purpose control system core.

- A number of switch modules capable of a range of DC and AC switching.

- Measurement signal conditioning modules.

- Mechanical housing that would suit both rack-based and stand-alone implementations.

Reflex 51 system presentation is flexible – chassis or case.

The Reflex 51 system interfaces directly to the device environment.

High-power switching module

Measurement signal conditioning module

Isolated cabling to the measurement system

Flexible device interface module mounting.

- Behind chassis front panel
- Within chassis on standard fixing centres
- DIN-rail locally or remote
- DIY

Solid-state switches for coil and load circuit.

- Quad isolated switch in one box

- Up to 30A or 400V per channel

- Parallel to achieve up to 120A

- H-Bridge drive variants.

Very high switch powers using SSR or MOSFET module.

- Switch 'exciter' module designed to drive solid-state relays or MOSFET power modules.
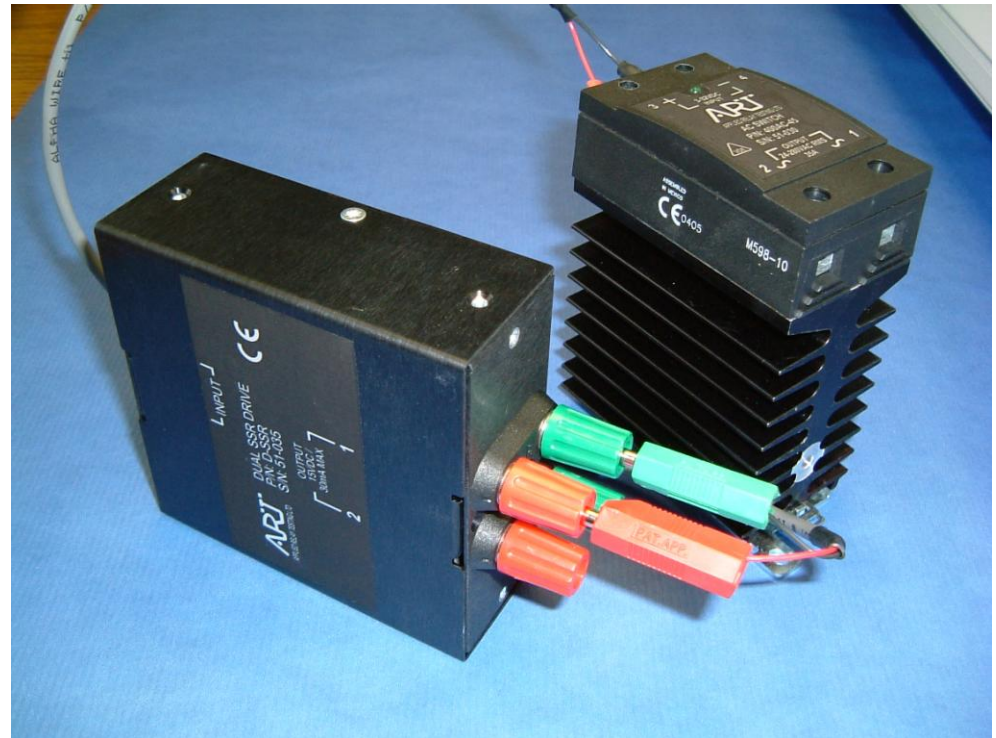
Reflex 51 'kit' concept encourages fast test development.

- Portable control system.
- Switch and measure modules.
- Relay test bench.
- Just add a PC!

Event-driven software brings the hardware to life.

Macro commands improve readability, reduce errors.

Example result output sheet – line chart..
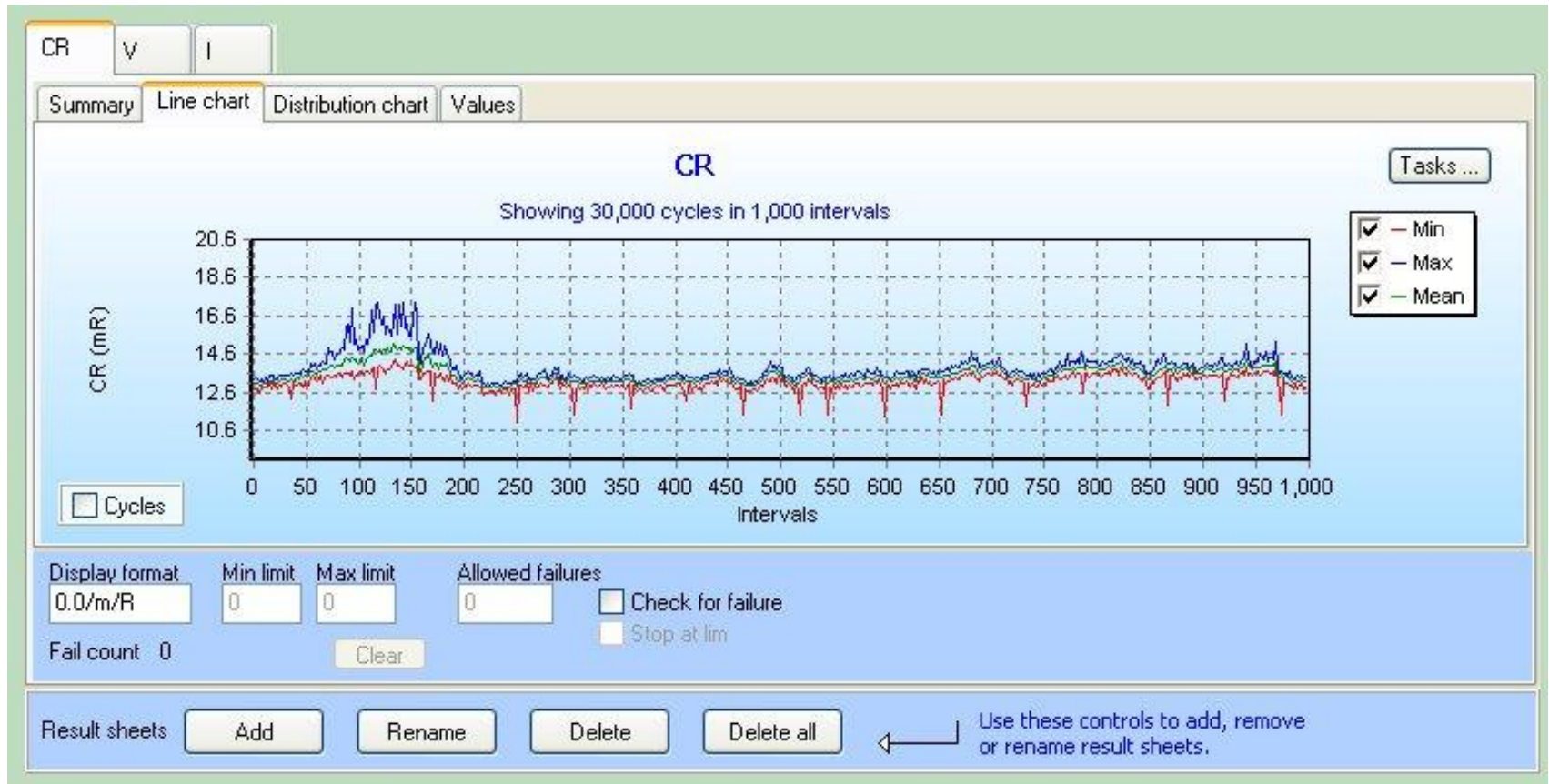
Example result output sheet – distribution chart.

Derived result parameters are powerful and free.

- If multiple measurements are already available, e.g. CRNO1 and CRNO2 then additional checks are possible for example on the difference CRDiff = (CRNO2-CRNO1)

- This permits more detailed 'quality' checks during testing with no overhead at all.

Measuring other device parameters during life-test.

- Relay performance during life may show up in other measurements than contact resistance.

- Measurements of device dynamics (timing) and operate / release voltage is desirable.

Measurement modules available with:

- Measured time to the first contact edge (operate or release time).

- Measured time between the first and last contact edge (bounce time)

- Counted number of edges (bounces).

- These values can be mixed fully with other voltage measurements.

Measured operate time during life-test.
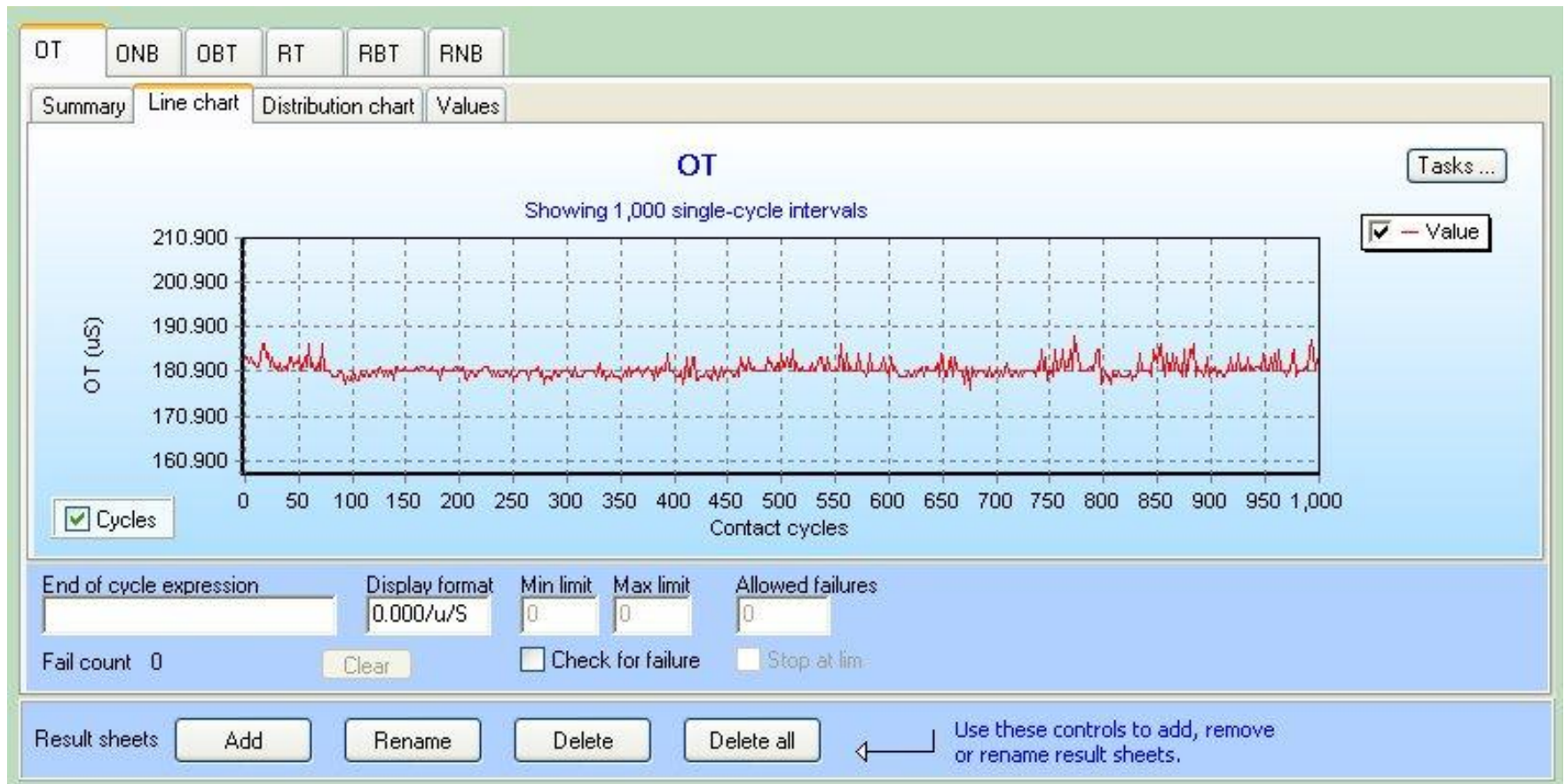
Measuring operate and release voltage during life-test.

- An operate and release coil-drive module can be used for interval tests of operate and release voltage during life.

- Results integrate perfectly as an additional result sheet.

- With timing measurement, device is now fully characterised during life.

To conclude..

- We have shown the new Reflex 51 test architecture that uses compact, re-usable low-lost modules that can be built into a variety of test solutions.

- Parametric testing can now be fully integrated within life-tests.

- Life-testing is now possible at very low cost to exactly your requirements for switch and relay testing.

ART

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Thank you.