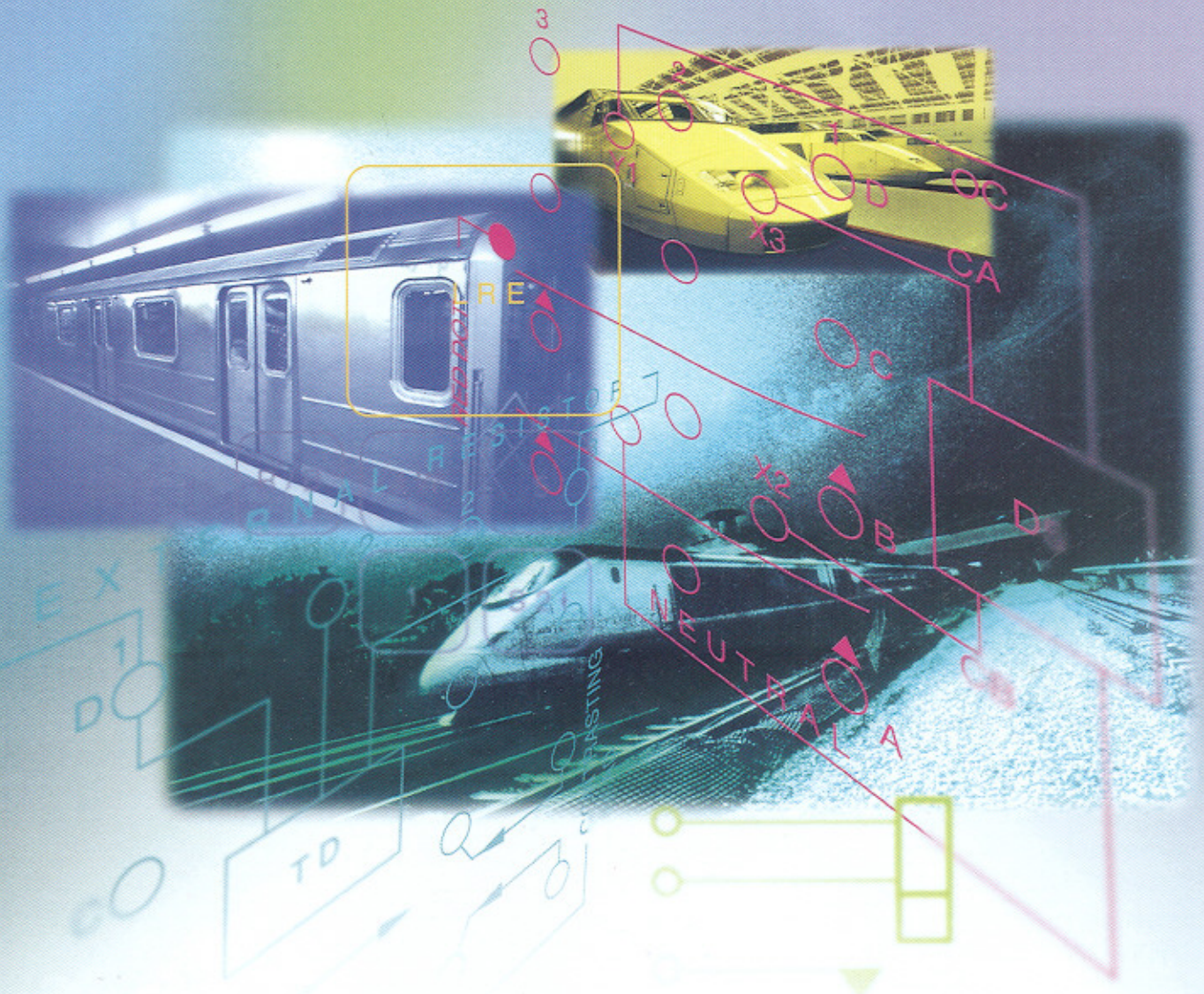


Advancing technologies for rail applications

Esterline

Leach International S.A.®

Leach International, a leader in the design and manufacture of electrical switching and control devices for transportation and high-end industrial applications, introduced its first relay in 1919.

Since that time, innovation and technological advancement have positioned Leach in a leadership role. Its relays are used under the most severe environments in sophisticated ground and air transportation systems worldwide. Leach relays have become industry standards, as evidenced by thousands of miles of revenue service.

Safety and Reliability

Leach relays and contactors are designed for critical, fail-safe applications. Their unique, no transfer-on-weld design ensures that if one contact welds, no contacts will close to the opposite state.

The ability to withstand vibration and shock impact of up to 20QG enables the relays to operate reliably in the most demanding applications. In addition, Leach relays and contactors are hermetically sealed against contaminants, pollutants, and the temperature extremes of harsh environments. Contacts will not foul, so components can last for millions of cycles.

Leach rail products are produced on product lines qualified to military standards. They are manufactured and tested to the same exacting standards as those products used on commercial and military aircraft and space systems. Moreover, many of Leach's components are manufactured under ISO-9000 certification.

Versatility and Cost Savings

Leach Solid-State Power Controllers (SSPCs), designed specifically for today's modern computer-controlled systems, are ideal for high-reliability applications such as door controls and harsh environmental conditions and loads.

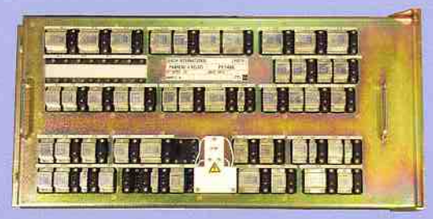
Housed in hermetically sealed metal packages, SSPCs are faster acting and have lower thermal dissipation than the electromechanical relays and circuit breakers they replace. Among the numerous benefits of SSPCs are remote control on/off and reset capabilities; simplified and reduced car wiring; an ability to interface with on-board computer systems; and the reliability of solid-state manufacturing. Their unlimited load switching life at high rates results in lower life cycle costs and higher profitability for users.

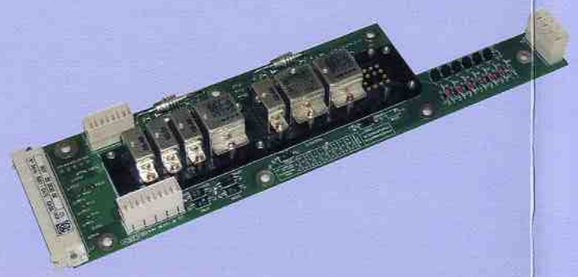
All LEACH components, including SSPCs, can be custom packaged as relay assemblies or panels. With its powerful CAD systems and many years of design experience, the LEACH research and development department can engineer and package components to the most demanding customer specifications. Custom-packaged equipment and Line Replaceable Unit (LRU) racks or panel configurations, incorporating LEACH International's dependable relays, time delays, contactors and SSPCs, are ideal for use in Positive Train Separation (PTS) and Automated Train Control Systems (ATCS), as well as communications-based control and grade crossing warning systems.

LEACH International produces one of the world's most extensive lines of power switching components - from half-crystal can and subminiature relays (including time delays) to power contactors and solid-state power controllers. By offering standard components housed in a variety of customer-selected assemblies, LEACH is able to provide customers with weight and space savings, ease of component assembly and ease of maintenance.

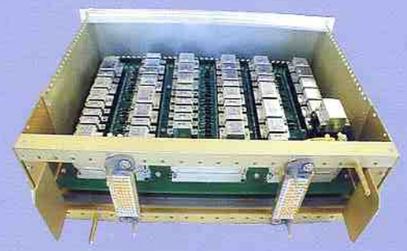
Local representation on a global scale, as well as an extensive network of distributors, make Leach a convenient one-stop source for all power switching requirements - whether the need is for custom packaging or innovative components.

By combining the hermetically sealed relay, commonly used in rolling stock, with the high technology printed circuit, LEACH INTERNATIONAL offers economical solutions adapted to the constraints of railway rolling stock.

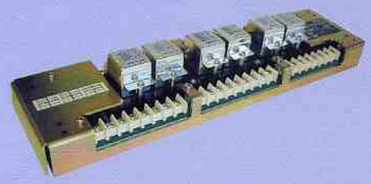




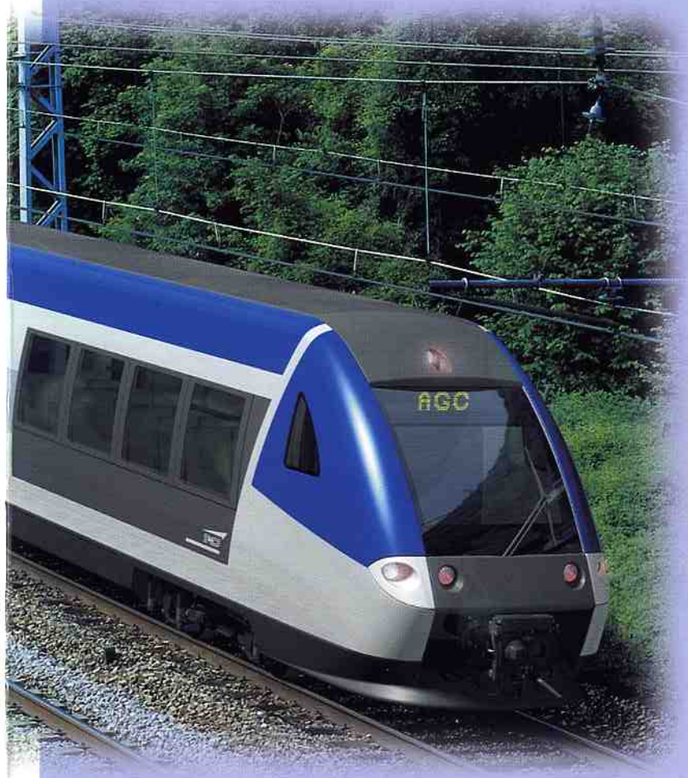
Compactness :
- No more wires
- High density component layout
- Weight and space saving



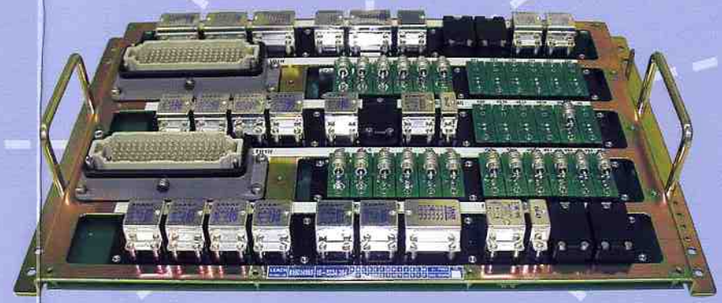
Maintenance :
- Components mounted on a base plate (relays, diodes, surge suppressor modules)
- Easy replacement of a complete piece of equipment
- Interchangeability of equipment



Reliability/Safety :
- No risk of wiring errors
- Constant quality and performance during series phase
- Equipment supplied is 100% tested



Combining electronics and switching :
- Relays, timer units, surge suppressors
- Display functions (LEDs, indicator lights, displays)
- Diode logic
- Integration of electronic functions (detection, measurement)

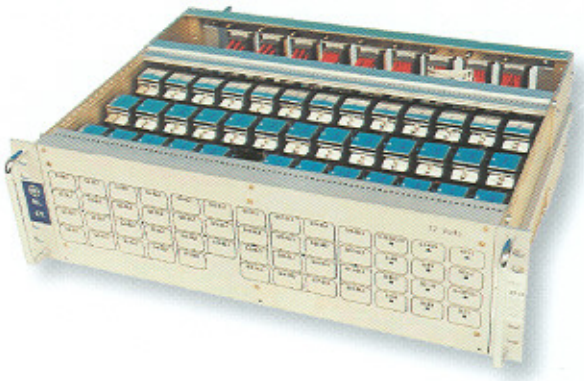


Testability :
- Access to relay contacts on front panel
- Accessible test connector
- Quick repair tools
- Automated test benches supplied

Adaptation to customer constraints :
- Tailor-made mechanical interfaces and connections
- Resistance to harsh environments
- Compatibility with the electricity network
- Complies with generic and rolling stock-specific standards

Flexibility of modification :
- Integration of spare bases available on connectors
- Layout can be modified without redesigning the printed circuit
- Addition of customised functions

Economic advantages :
- No more wiring or related operations
- Optimised mechanics
- Simplified logistics (single reference)
- Rationalisation of the number of panels
- Improved adjustment time
- Reduction in costs of non-quality



Solutions for Power Switching and Control

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Many of the world's finest rail transportation systems use Leach products. Included are :

TGV - France *Subway - Philadelphia* *Metro - Athens*

Eurostar - Chunnel *Metro - Kaula Lumpur* *Metro - Caracas*

AVE - Spain *Metro - Paris* *NYCTA - New York*

Underground - London *BART - San Francisco* *SNCF - France*

TLV - Korea *MTR - Hong Kong* *Metro - Mexico City*