

# ENGINEERING DESIGN AND PACKAGING CAPABILITIES FOR RAIL

Leach International is a leader in the design, development and manufacture of electrical switching devices for transportation and high-end industrial applications. Founded in 1919, Leach components are used in the most severe environments of ground and rail transportation systems worldwide.

All Leach relays and components can be custom packaged as assemblies or panels and are ideal for controlling headlights, doors, interior lighting, heating, air conditioning, brakes and propulsion systems.

Also, they are used in passenger information systems, traction and automated train control systems, communications-based control and grade crossing warning systems.

## SAFETY, SECURITY AND RELIABILITY

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

Leach's patented Balanced-Force<sup>®</sup> Relay design prevents bounce problems by applying the same amount of force to the armature for both the energized and de-energized states. This is done by using a permanent magnet for actuation as shown in Figure 1. Also, there is no return spring to become weakened. The result is consistently high contact pressure to reduce bounce, less arching, less contact erosion, and no contact weld. Due to their unique design, these relays can be mounted in any axis.

Harsh railroad environments are one of the principle causes of relay failure. Dust and iron filings from brakes and tracks can penetrate into a relay's plastic can, attracted by the coil's magnetism.

Leach's components, hermetically sealed in metal cans filled with nitrogen gas, are not subject to these contaminants and pollutants. They also withstand the temperatures of harsh environments and have the ability to endure high vibration (20G) and shock (200G). Most components are manufactured under ISO-9001 certification.

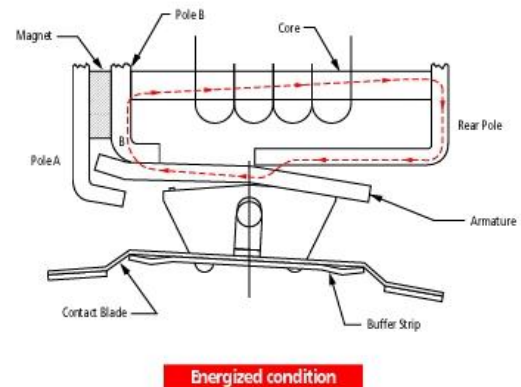
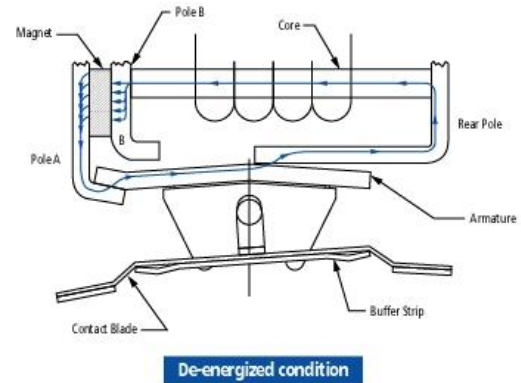


Figure 1: Balanced-Force<sup>®</sup> Relay Design

## VERSATILITY AND COST SAVINGS

By combining hermetically sealed relays and printed circuit board technology, Leach International is revolutionizing power distribution technology. This approach has several advantages:

- *Reduced wiring* – circuitry replaces wiring;
- *Design flexibility* – PCB acts as a “component holder” and may include not only relays but also diodes, LEDs, resistors, transistors and micro-processors;
- *Future upgrade capability* -- retains the availability of relay contacts for future applications. (Often only two or three contacts of a four-contact relay are actually used yet all the contacts are systematically output via the printed circuit board's end connector. This provides greater flexibility for on-the-spot implementation of future modifications. For example, fixing a

- single wire to a connector will add an extra function to a circuit);
- *Component condition status* -- ability to display condition of the relay coils by using LEDs mounted on the edge of the circuit—provides immediate information as to whether or not a relay is “live;”
- *Ease of maintenance* – relays can be removed and replaced easily through the use of integrated sockets.

## **MICROPROCESSOR-BASED DOOR CONTROL SYSTEM**

The Microprocessor-based Door Control System developed by Leach International utilizes the latest proven technology in digital control and solid state devices, together with the key security features of high integrity relays (compact, hermetically sealed, 20G vibration, 100G shock).

This system is compatible with many standard networks and can be monitored, controlled and remotely configured through the network. Flexible architecture allows this system to be adapted easily to existing installations with minimal or no change to existing wiring. A total of 23 (expandable to 55) configurable I/O signals provides for ease of interface with any new or existing door system. Other benefits include:

- Replacement for existing controllers or new design
- Significantly increased reliability
- Maintenance diagnostics to reduce Mean Time to Repair (MTTR)
- Trend failure reporting
- Very short repair times, and
- “Integration readiness” capability for advanced future vehicle monitoring systems (VMS)
- Self-adjusting under any power condition
- Proven technology and performance

## **COMPREHENSIVE PRODUCT LINE**

From half-size crystal can relays to power contactors and SSPCs, and custom equipment, Leach provides the variety of products to ensure the reliability, ease of system assembly and maintenance.

### ***Component products include:***

- **Subminiature relays and sockets** – micro Amps to 50 Amps, milli-volts to 110VAC, hermetically sealed for severe

- environments (20G vibration, up to 200G shock) and critical circuits
- **Power contactors** – 30 to 1000 Amps (DC) for primary power control; sealed and unsealed models; “smart” contactors for modern electrical distribution systems.
- **Timing, monitoring and protection devices** for current voltage, frequency and phase; fixed, adjustable and programmable time delay relays.
- **Solid state switching devices** for advanced power distribution systems; computer controllable, FET-based, solid state power controllers with integral protection and device/load status; infinite switching life.
- **Switches, keyboards, panels** – lighted and push-button switches and indicators, designed and manufactured to stringent rail and aerospace configurations; custom engineered designs to specific user requirements.

Leach Solid State Power Controllers (SSPCs) and Solid State Relays (SSRs), designed specifically for today’s modern computer controlled systems, are ideal for high-reliability applications and are used on Leach’s door controllers to ensure safety and security. Among the benefits of SSPCs are:

- Remote control on/off and reset capabilities
- Simplified and reduced car wiring
- Ability to interface directly with on-board computer systems
- Higher reliability than electromechanical products
- Unlimited load switching life.
- Lower life cycle costs and higher profitability for users

### ***Custom packaged assemblies and equipment include:***

- Microprocessor or relay-based door controllers
- Relay panels for traction control
- Speed indicators
- Custom subway relay racks
- TGV Line Replaceable Units (LRU)
- Central control boxes
- Single/multi-channel load controllers

## **LEACH PRODUCTS IN TRANSIT AROUND THE WORLD**

Leach is a design leader with proven performance. Many of the world’s finest rail

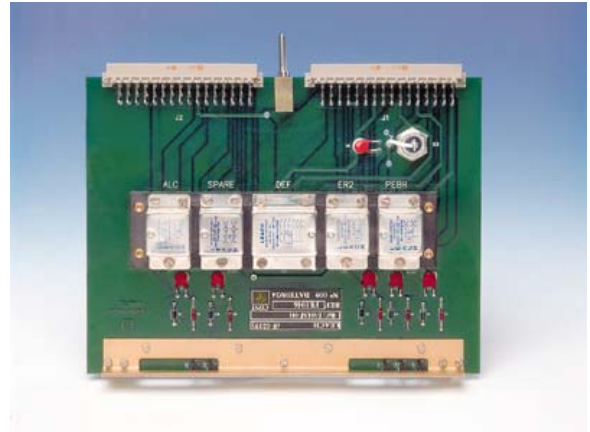
transportation systems use Leach products. Included are: TGV-France; Metro – Paris, Athens, Caracas, Mexico City, Kuala Lumpur; Underground – London; BART – San Francisco; MTR – Hong Kong; AVE – Spain; Eurostar; R142—New York City, and many others.

Local representation on a global scale makes Leach a convenient source for all power switching and control requirements – whether it is for custom assemblies, equipment or innovative components.

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### **Traction Control Board**

*Featuring hermetically sealed relays mounted on a keyed uni-frame base.*



### **Custom Subway Train Relay Rack**

*For quick connection/disconnection and assembly/disassembly; compact size, lightweight, and low maintenance.*

### **TGV Line Replaceable Unit (LRU)**

*Featuring hermetically sealed relays, LED panel with real time relay function and performance information; removable racks for convenient in-shop maintenance.*



### **Microprocessor Door Control Panel**

*Available for new or retrofit systems, the Leach microprocessor-based door controller utilizes the latest proven technology in digital control and solid state devices.*



### **Rail Speed Warning Display**

*LED display with 8 large digits, brightness control and full EMI protection.*



### **Subminiature Relays and Sockets**

*Mil-qualified AC and DC versions from low level to 50 Amps, hermetically sealed for severe environments*



### **Solid State Power Controllers**

*Computer controllable, FET-based, solid state power controllers with integral protection and device/load status, infinite switching life for advanced power distribution systems.*



### **Modular Relay Rack**

*The complete relay switching rack, containing individual modular relay boards, can be easily configured by the user. Available in both 3U & 6U standard 19" formats.*