



Problem, concept, solution...

Aircraft Ground Fault Detection & Isolation

The Ground Fault Interrupter (GFI)— *An Advanced Solution to Ground*

The

Problem: Aircraft have become more electrically complex and, as existing aircraft age, the problems with electrical wiring and wire harnesses become more significant, particularly with respect to the possibility of electrical ground faults. Faults of this type can result in significant damage to wiring and equipment. Conventional aircraft electromechanical protection devices, such as circuit breakers, are not usually capable of detecting and isolating ground faults fast enough to minimize this damage.

Concept: Leach International's method of ground fault isolation uses a fundamentally simple and well-proven technique. The total electrical current flowing to the load is compared with the current that returns from the load. A difference between these two values indicates that the current is returning to the source through an unexpected path, i.e. a ground fault.

Solution: To readily provide ground fault protection, Leach International has developed ground fault sensing contactors that have the capability of detecting and isolating ground faults, giving added protection for wiring and equipment.

The Leach International Ground Fault Interrupter (GFI) feature has been incorporated into its "H" contactor, a popular product used extensively in aircraft and military electrical systems.



H Type Contactors

Fault Damage

GFI Feature in an H Contactor

Product Specifications

This 3PDT device, rated for 60 Amperes, is compact and lightweight. Using miniaturization techniques and specialized magnetic material, Leach has incorporated the GFI into the assembly with minimal impact to its size. This device protects ungrounded 3-phase AC loads by vector summing their currents in the core of an internal current transformer. When a ground fault above a prescribed threshold level and time duration is detected, the GFI relay is tripped and the main contacts are opened to interrupt the fault. Ground fault currents as low as $\frac{1}{2}$ Amperes are reliably detected with this method. A single multi-layer PCB contains all protection circuit components (other than the current transformer).

The normal release time of the H-type contactor (greater than 20 mS) would not be acceptable for this application. Substantial damage to the wiring or aircraft equipment could occur within this longer time frame. To address this issue, Leach, with the aid of a proprietary circuit design, has reduced the trip time of the contactor to less than an acceptable 8 mS without any degradation in its performance.

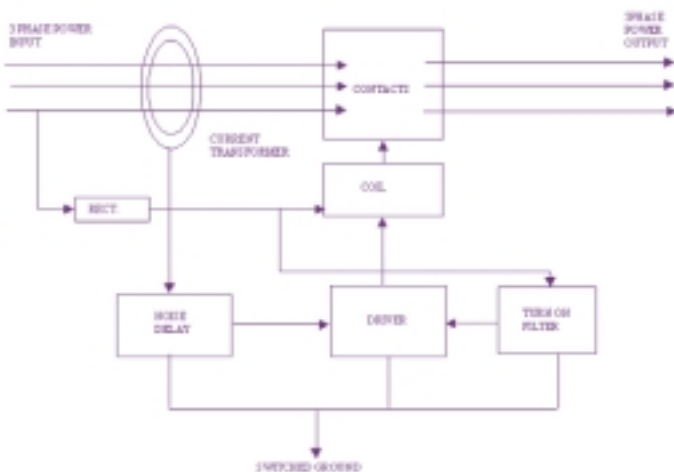
Simplified Retrofitting

The interface and footprint of the H contactor is unchanged, allowing direct replacement of existing parts with units featuring GFI. Use of existing wiring minimizes upgrade time and cost. The height of the unit is

increased only by .40 inches and its weight is increased by 2 ounces.

GFI circuitry can be incorporated into the majority of Leach International products, including smaller relays.

For additional information on Leach International ground fault detection and protection capabilities for your application, contact any Leach International office.



System block diagram

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