

# Float Power Systems & Controls

## **DC Ground Fault Analyzer & Locator Instrument**

### **GFAL - A & B**

**(A Samcoeng Product)**

#### Introduction:

The GFAL-A/B is a battery operated hand held portable instrument that utilizes a DC tracing signal created by an interrupted resistance and the DC ground fault resistance, with a 12 seconds cycle as means of locating low and high impedance DC ground faults without interruption of service.

There are three major components that make the GFAL-A/B instrument:

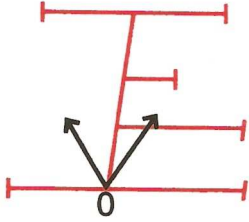
The GFAL-A (Fig. 1) is the interrupter unit (IU) will connect to the DC distribution system it will create a DC interrupted tracing signal by utilizing an internal resistance and the ground fault resistance.

Also this unit is use to analyze the DC distribution system under test. E.g. DC Alarm, ground fault from the polarities and AC contamination in the DC distribution system.



Fig. 1, GFAL-A

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The GFAL-B (Fig. 2) is the hand held unit (HHU) is a microprocessor base design unit that process the signal from the test probe, the magnetic sensor assembly (MSA)

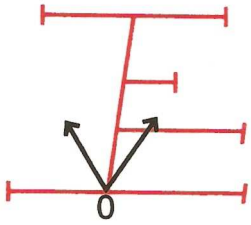


Fig. 2, GFAL-B with the MSA

The magnetic sensor assembly (MSA) test probe wraps around the conductor(s) under test and detects the magnetic field produce by the tracing signal. There are 2 sizes of sensors, the standard MSA (Fig. 3) and the small sensor S-MSA (Fig. 4)

The MSA can wrap-around one or multiples conductors at the same time and also can wrap-around magnetic and non-magnetic conduits to test for the tracing signal inside the conduits.

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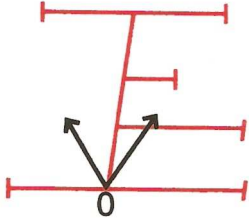


Fig. 3, Large Magnetic Sensor (MSA) around a conduit that has several conductors



Fig. 4, Small Magnetic Sensor Assembly (S-MSA) around a single conductor

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## Synthesis of Operation:

If there is a DC ground fault in the DC distribution system the IU will connect to ground a resistor in the opposite polarity of the DC distribution system, this resistor has a range from 80 Kohm to 5 Kohm.

For 6 seconds the IU resistor will be on and for 6 seconds the IU resistor will be off. The IU resistor and the ground fault resistance cause an interrupted electrical current, the tracing signal.

The tracing signal has a decay exponential outline because of the **stray capacitance\*** of the DC distribution system.

Around the 5.5 seconds of the first 6 seconds ( $\frac{1}{2}$ ) cycle the HHU read the output of the MSA attach to the HHU that is wrap-around the conductor(s) under test. Let us call this part as X.

On the next 6 seconds, around 5.5 seconds of the second 6 seconds ( $\frac{1}{2}$ ) cycle the HHU will make another reading. Let us call this part as Y.

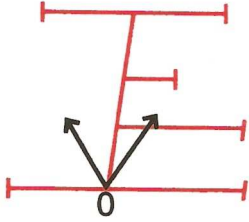
Subtracting X from Y will indicate if there is a DC ground fault in the branch under test, then the cycle will repeat.

**(\*) The stray capacitance** in the DC distribution system is the reason why instruments that utilize an AC tracing signals and/or a DC interrupted signal without account for the transient time they fail to locate median to high impedance DC ground faults because of confused readings, the stray capacitance in transient time create the same signal for the test instrument that a resistance ground fault.

## Benefits:

The GFAL-A/B performs the locating tasks without the use of AC signals. It can locate faults in systems that have high capacitive-reactive components and strong electromagnetic fields.

The GFAL-A/B does not require a shutdown of operations and it will identify the amount of fault on each faulty brunch of the DC system. The HHU will track the fault on the DC distribution system up to the point of failure without ever open a circuit breaker or a branch circuit.



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## Plant Reliability:

The instrument and the method to locate DC ground faults are essential for plant reliability and operation.

Should be a must to have today, because a DC ground fault in a DC Distribution System can trip a circuit breaker or a unit at any moment if another fault appears at the opposite polarity.

## Full operating specifications:

Sensitivity: 3ma of tracing signal for 24 to 270 VDC Distribution Systems

Will locate up to 8 Kohm in 24 VDC distribution system, 40 Kohm fault in a 130 VDC-distribution system and 80 Kohm in 265 VDC single or split-battery distribution system.

## Proven results of this new method:

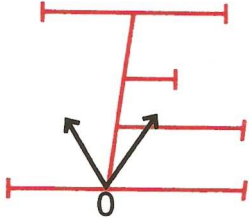
The GFAL-A/B method of operation has been proven to be successful in providing a solution to the problem of DC ground faults. It is been used in stations, substations, nuclear power plants and refineries.

## Conclusion:

Mostly of the above power plants, substations and refineries has previously purchased other DC ground fault locator Instruments; however they still having problems to locate DC ground faults.

With the GFAL-A/B instrument and the training material they no longer have the problem.

We belief this brochure explain a bit more how the instrument work, however if you need more information please feel free to contact us at anytime.



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Below is a partial list of USA customers that have benefited from the innovative method implemented by the GFAL-A/B.

- Three Mile Island, Nuclear Generating Station, Pennsylvania
- Comanche Peak, Nuclear Generating Station, Texas
- TXU Substation and Distribution, Dallas and Sulphur Springs, Texas
- St Lucie Nuclear Generating Station, Florida (2 Instruments)
- Palos Verdes Nuclear Generating Station, Arizona (The largest nuclear plant in the USA)
- Plant Hatch Nuclear Generating Station, Georgia (2 Instruments)
- Plant Vogtle Nuclear Generating Station, Georgia
- Georgia Power North and South Substations
- Diablo Canyon Nuclear Generating Station, California
- Substation, Transmission and Distribution PG&E, CA
- Wolf Creek Nuclear Generating Station, KS
- Brunswick Nuclear Generating Station, NC
- Plant Scherer, Georgia. (The larger coal plant in the USA)
- Substations City of Anaheim, California
- City of Garland , Texas
- Destect/El Paso. New Cogeneration Plant in Northern California
- Eddystone, PA
- Ninemile Point, LA
- Georgia Power North Substations, GA (12 Instruments)
- Plant Paradise KY (USA Government)
- Exxon Mobile Texas
- US Government generating plants and substations
- Arnold Air force Base, USA

## Global Customers in:

- Taiwan
- South Korea
- Saudi Arabia
- Indonesia
- Puerto Rico
- Slovenia
- Vietnam
- Australia

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