Prototype to Production

The Evolution of the SolidGround GIC Blocker

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In coordination with: ABB Automation and Power World

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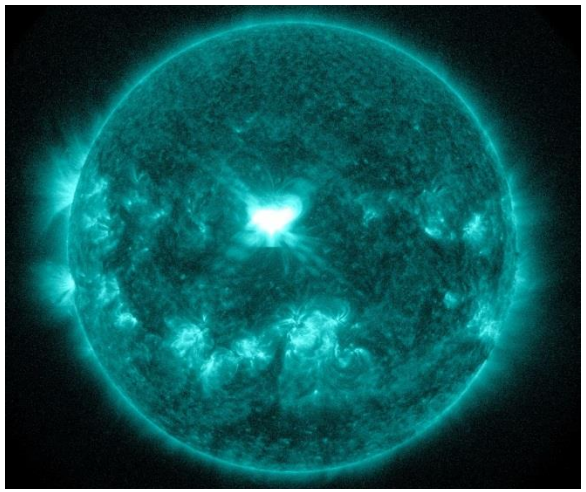
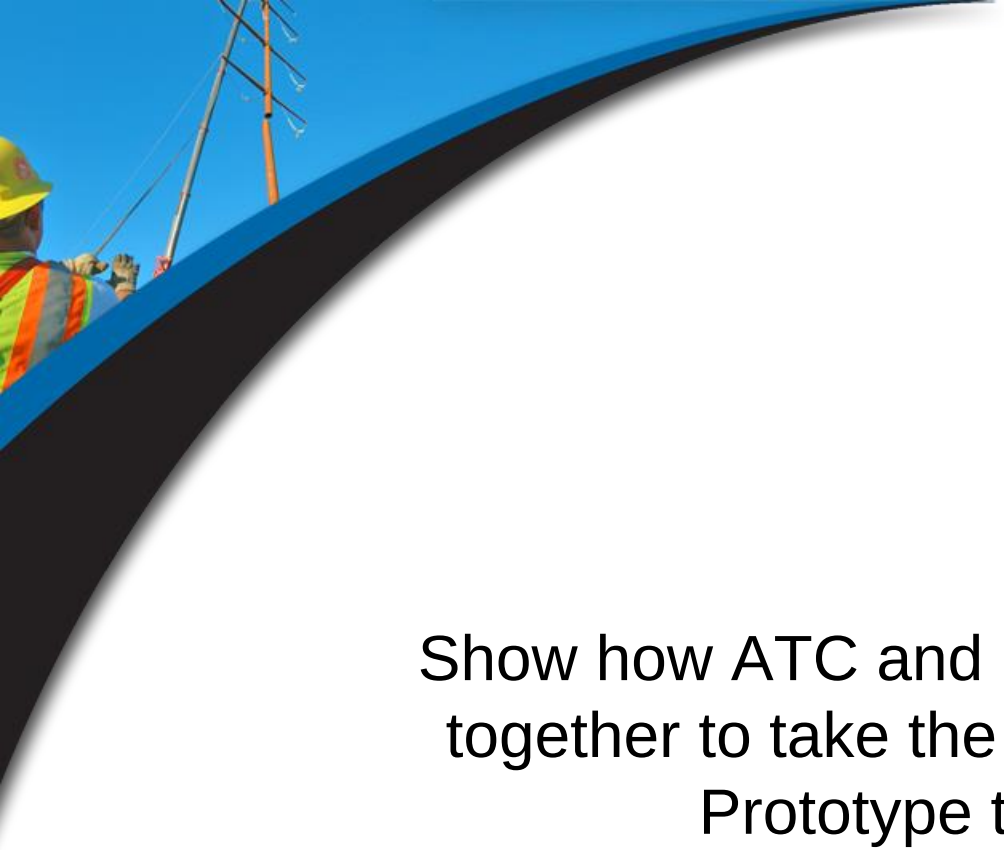
Huge solar storms to hit Earth this weekend

Date posted: Fri 12 Sep 2014



•There will be disruption to radio, TV and satellite signals, with possible degradation of GPS tracking accuracy and even electrical power line fluctuations.



Objective

Show how ATC and EMPrimus/ABB worked together to take the SolidGround unit from Prototype to Production.

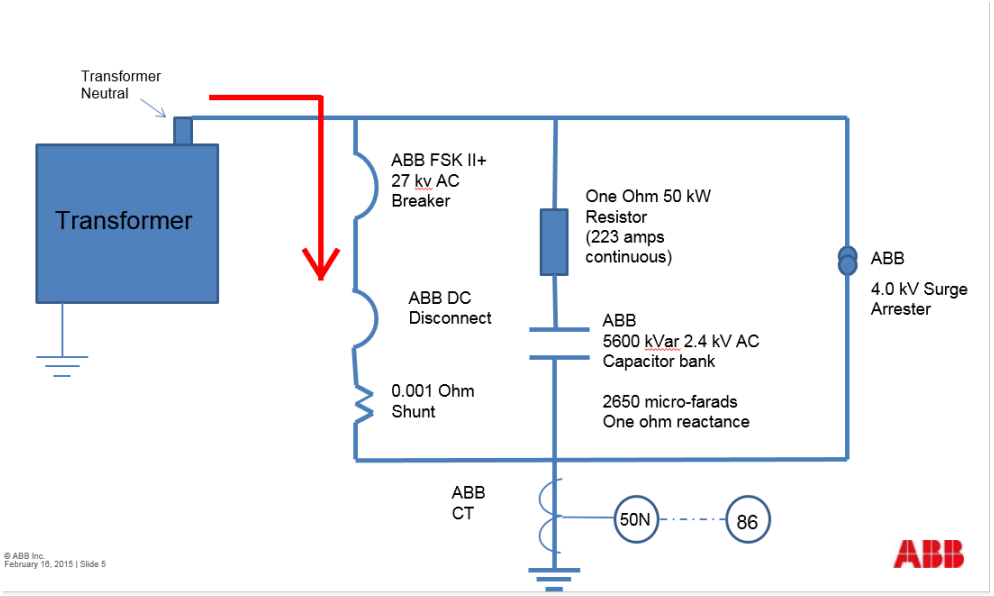
Presentation Overview

- Conceptual design
- Critical development
- Construction deployment

Conceptual Design

Design Principles

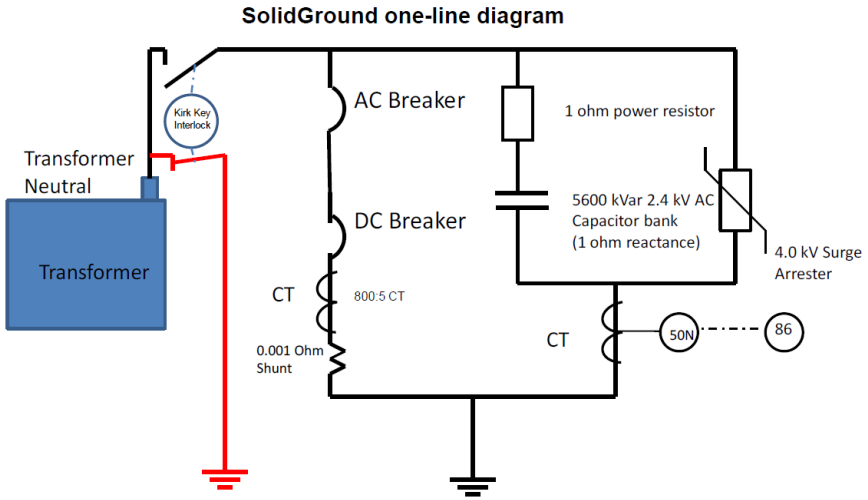
- Block GIC using a capacitor
- Protect transformer N-G with an arrestor
- Control with a PLC



Conceptual Design

Delivered Product

- ❑ Bypass switch
- ❑ Smaller symmetrical footprint
- ❑ CTs added



SolidGround™ Grid Protection Block Diagram

Critical Development

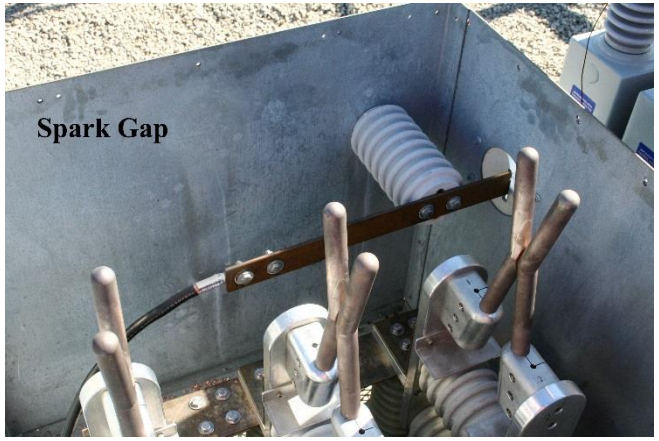
The Team

- Cross Functional
  - Back Office (Ops, Asset Mgt, Eng., PM, SP&C)
  - Field (Commissioning, Constr.)
  - Mix (Maintenance, M&C, EMPrimus/ABB)
- Synergistic
  - Mutual respect
  - Listening to understand
  - Breakthroughs

Critical Development

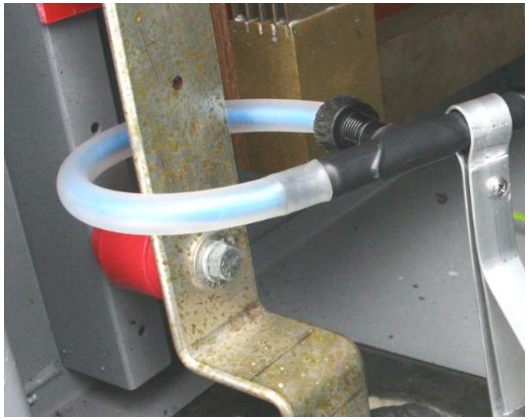
The Transformation

- Fail Safe Resilience
  - Spark Gap
    - Non consumable
    - Repeatable



  - Rogowski Coil

(N-G path proof)



Critical Development

The Transformation (cont'd)

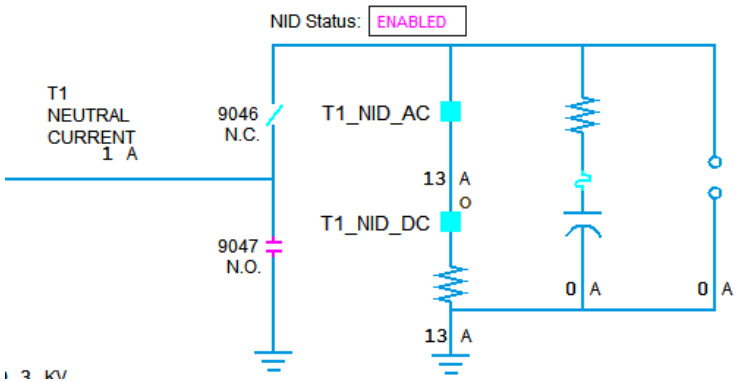
- Fault Tolerant Operation
  - Automatic
  - Status and alarms

Construction Deployment

- Site Preparation
  - Placement of the unit
  - Connections
    - Neutral (X0 to unit)
    - Grounds (to ground grid)
    - Control (to CH)

Construction Deployment

- System Integration
  - Strategic location
  - Operational
  - Maintainable



Date	Time	Description		Name
01/28/2015	14:57:21.185	R1 / R2 in Supervisory (SEL-451 OUT213)	Local	R1_R2
01/28/2015	14:57:46.057	R1	Open	SMPIC
01/28/2015	14:57:46.057	R1 43L/S	Local	SMPIC
01/28/2015	15:18:43.638	T1_NID_DC Breaker Open	Open	SMPIC
01/28/2015	15:20:00.672	T1_NID Maintenance Switch to NID	Open	SMPIC
01/28/2015	15:32:19.322	T1_NID CT1 Loss Of Transfromer Neutral	Alarm	T1_NI
01/28/2015	15:39:32.291	T1_NID Maintenance Switch to Ground	Closed	SMPIC
01/28/2015	15:45:29.379	T1_NID Enable / Disable	Disable	SMPIC

Questions?

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