

REINHOLD ENVIRONMENTAL Ltd.



2011 APC Round Table & Expo Presentation

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**Electrostatic Precipitator Operations
Trapped Key Interlocks
July 11, 2011
Sean McGuinness**



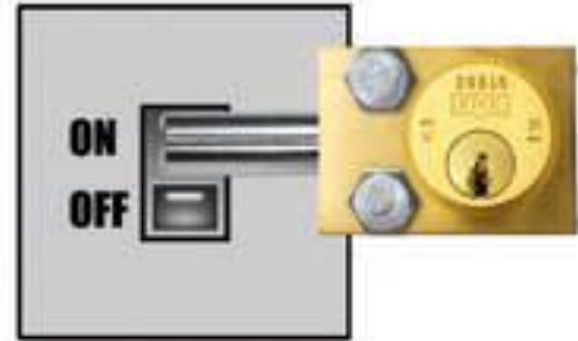
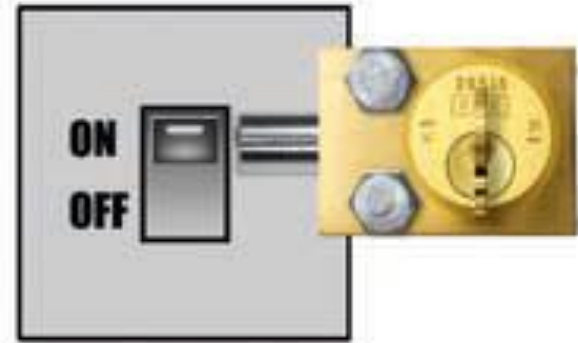
Topics

- Trapped Key Interlock Systems
- What is a Trapped Key interlock?
- Why interlock an Electrostatic Precipitator?
- How do interlocks operate?
- Where are interlocks used on the ESP
- Typical ESP interlock schemes
- Common interlock styles
- Question & Answers



What is an Interlock?

- An interlock is a safety device applied to two or more moveable parts, preventing or allowing operation of one part, only when another part is locked in a pre-determined position.



Key Interlock Types

- Pin & Tumbler: Mostly made out of brass
 - Use “House Style Key”



- Dowel & Pin: Brass and Stainless Steel versions
 - Use bulkier style key
 - Gasket



- Letter or Figure style: Brass and Stainless Steel versions
 - Use bulkier style key
 - Gasket



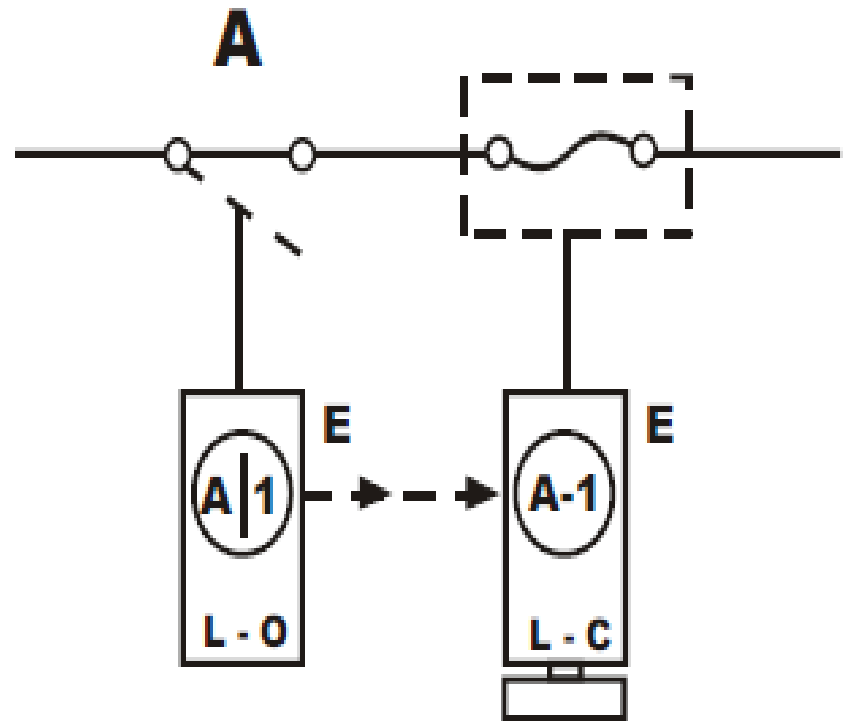
Why Interlock an ESP?

- Preserve safety in your sequential operations
- Eliminate access to energized or charged equipment
- Prevent improper grounding of T/R's
- Avoid exposure to nuclear source detectors



How do Interlocks Operate?

- Interlocks operate on the principle that the key can be removed only when the locking bolt is in a predetermined position, thereby indicating that the equipment is in a predetermined state.



Where are Interlocks Used on the ESP

- Power Feed to ESP (Breaker, MCC, AVC)
- Transformer Rectifier Ground Switch (T/R)
 - Dual Bushing Splitter Switch
- Nuclear Level Detectors
- Key Exchange Boxes
- Doors – Side, Duct, Roof, Insulator, Coffin, Penthouse, etc.



Manufacturer's Interlock Provisions

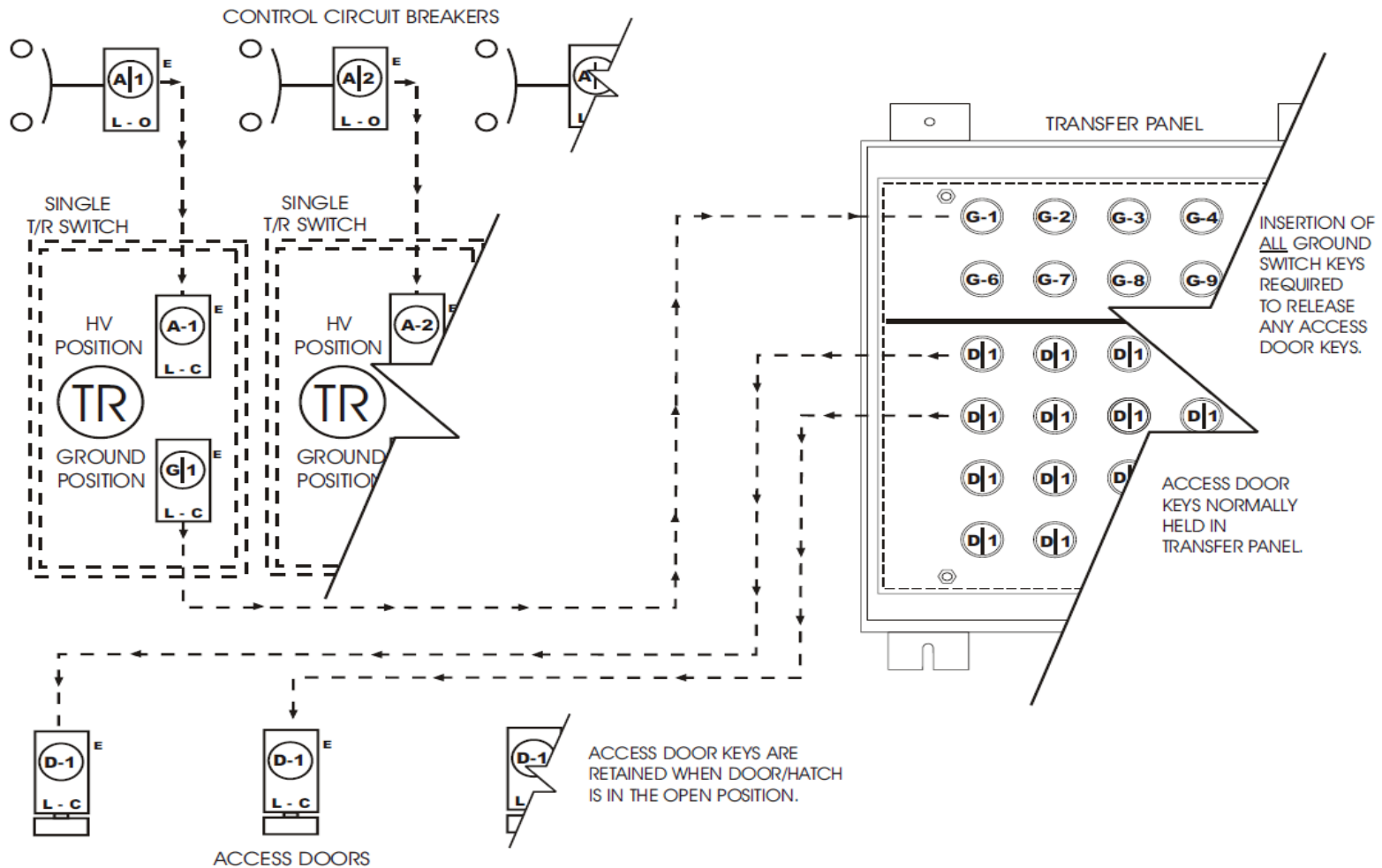
- ESP Equipment
 - Power Control Equipment
 - Transformer Rectifier
 - Doors
- To lock ON or OFF
- If no mounting provision ask interlock supplier.



T/R and ESP OEM's Mounting Provisions

- New ESP or Aftermarket
- All T/R and ESP Models
 - NWL
 - Stock
 - Stein
 - B&W
 - Buell
 - Lodge Cottrell FLSmith-Airtech
 - GE
 - Joy
 - Hamon
 - Siemens Wheelabrator
 - AirTek (Environmental Elements)
 - Southern Environmental
 - Alstom
- Key Interlocks are also used on a Baghouse





Precipitator scheme with single output transformer rectifiers.

Advantages

- Similar to “lock-out” ...fix mounted
- Trapped Key allows for integration of a shut-down procedure into the design of an ESP
- Sequential Key exchange forces a safe condition before access is permitted to any potentially hazardous area
- Avoids incorrect shut-down
- Eliminates operator error
- Reduces downtime



Power Feed Interlocks

- Circuit Breakers, AVC, MCC



Transformer Rectifier

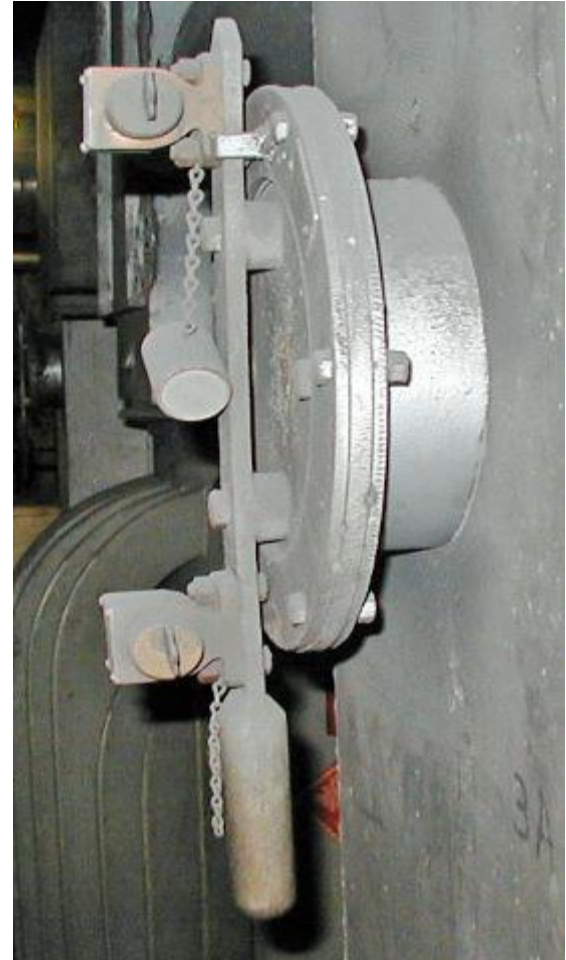
- T/R Ground Switch



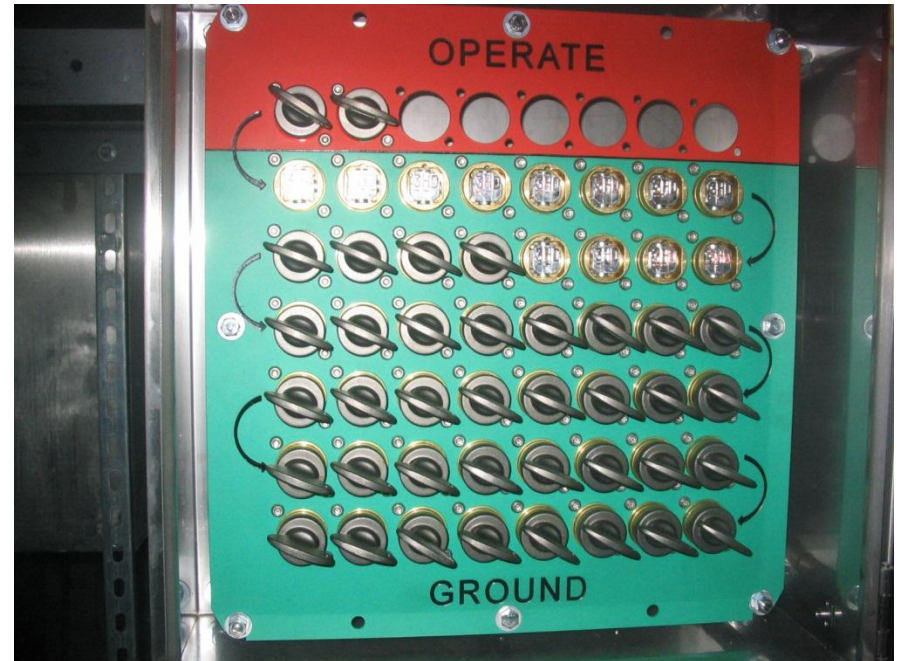
T/R Ground with Splitter



T/R Application



Key Exchange Panel



Level Detectors

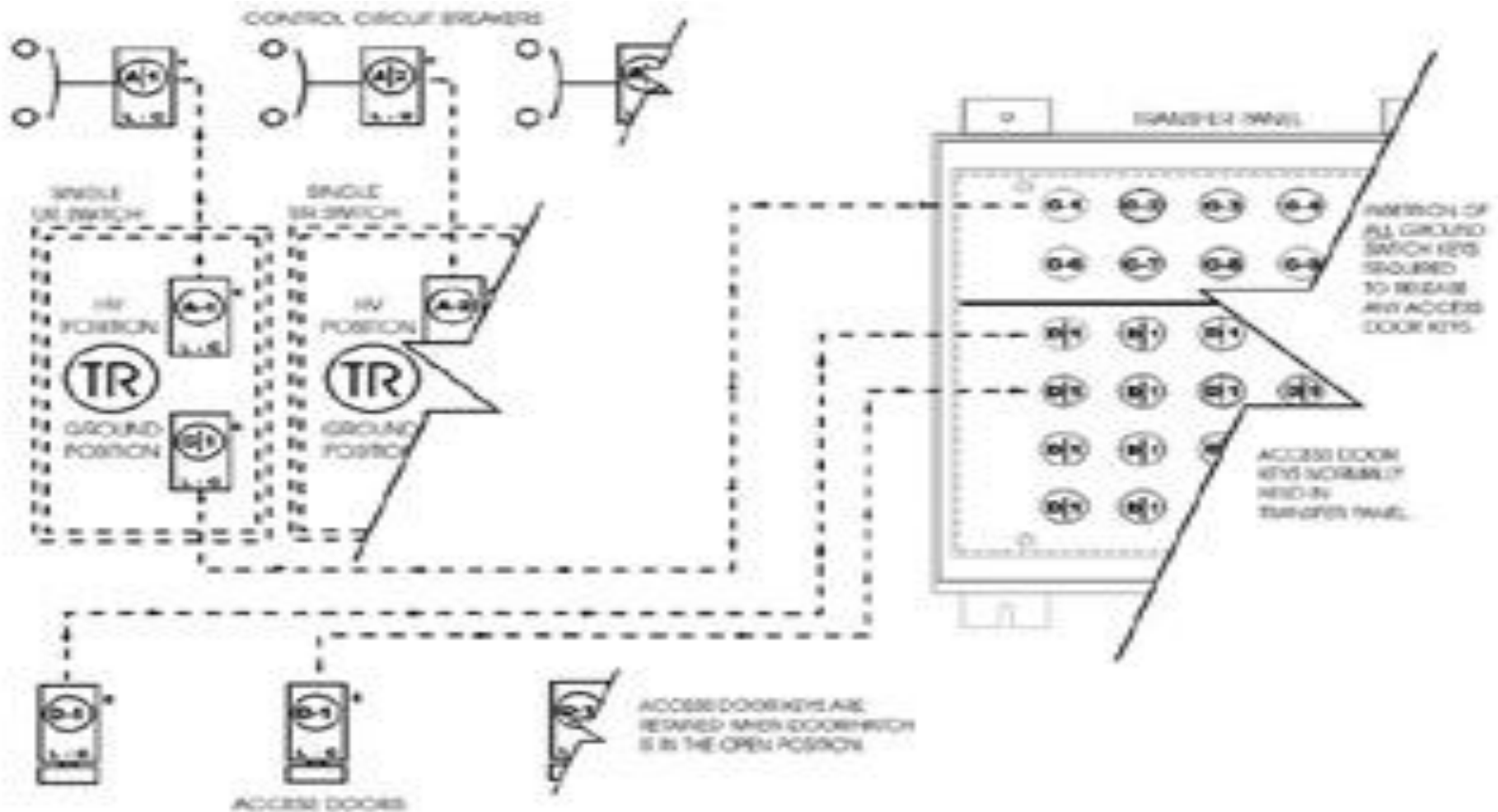


Door Interlocks

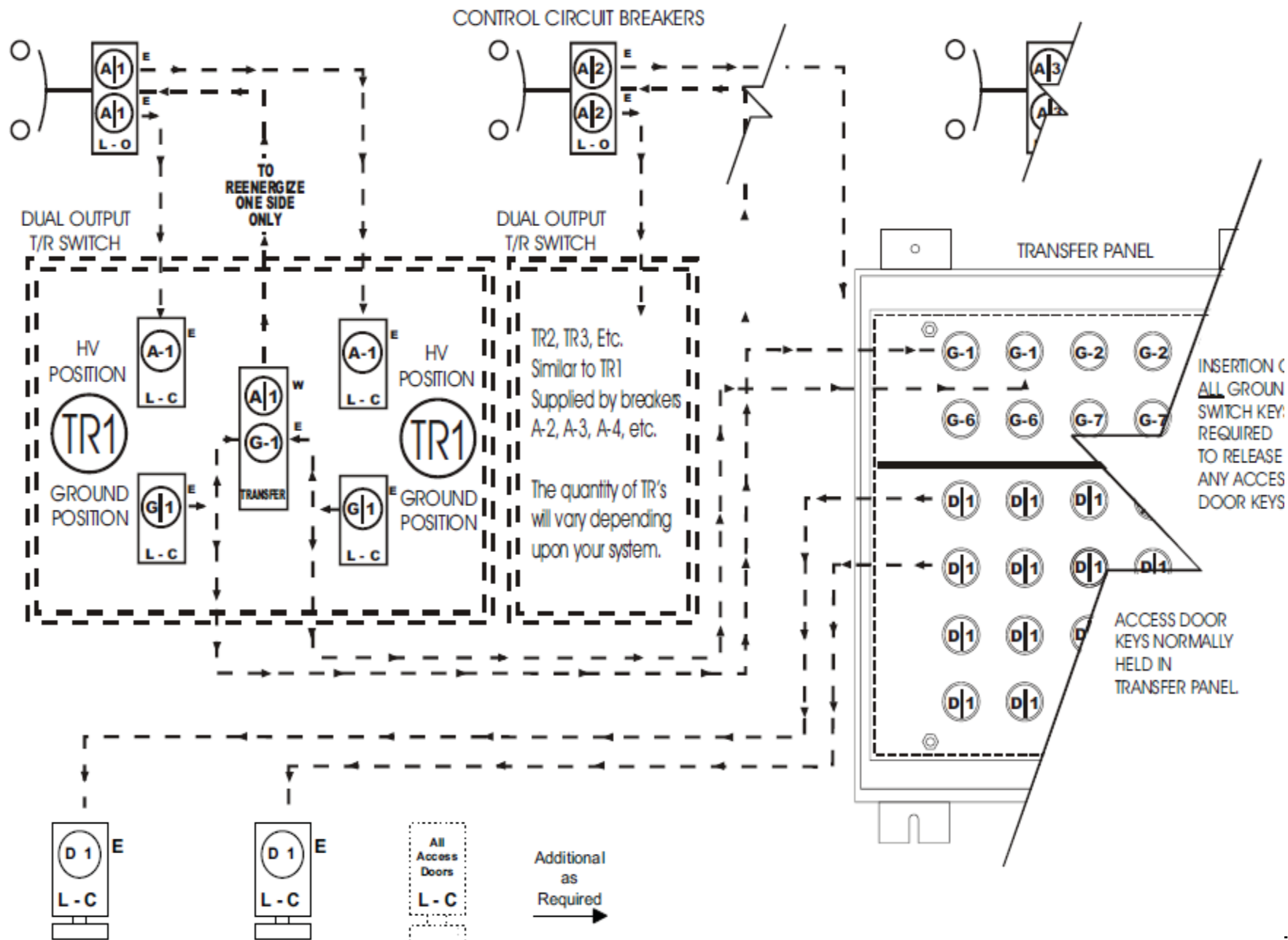




ESP with Single Output T/R's



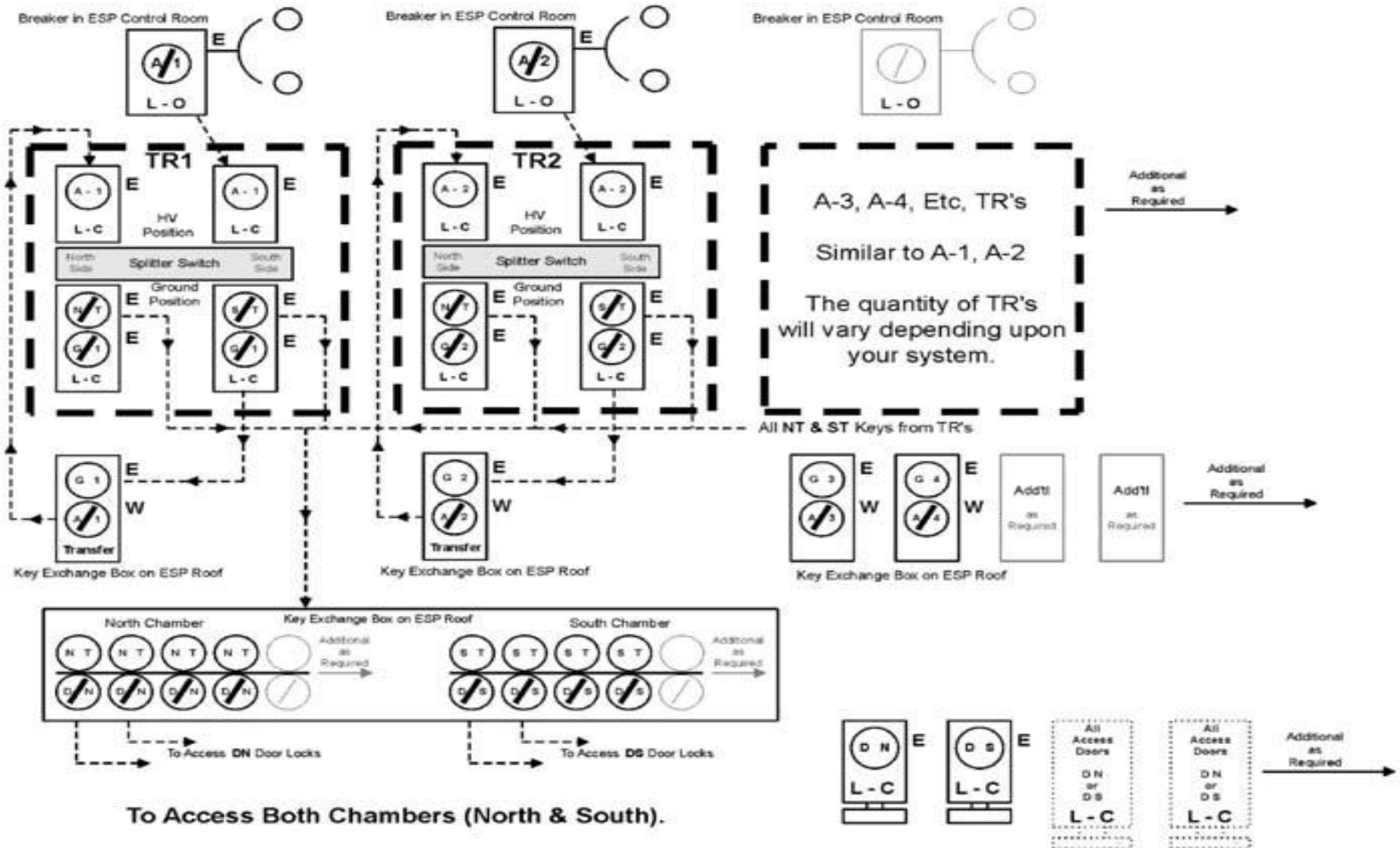
Rectifier scheme with single output transformer rectifiers.

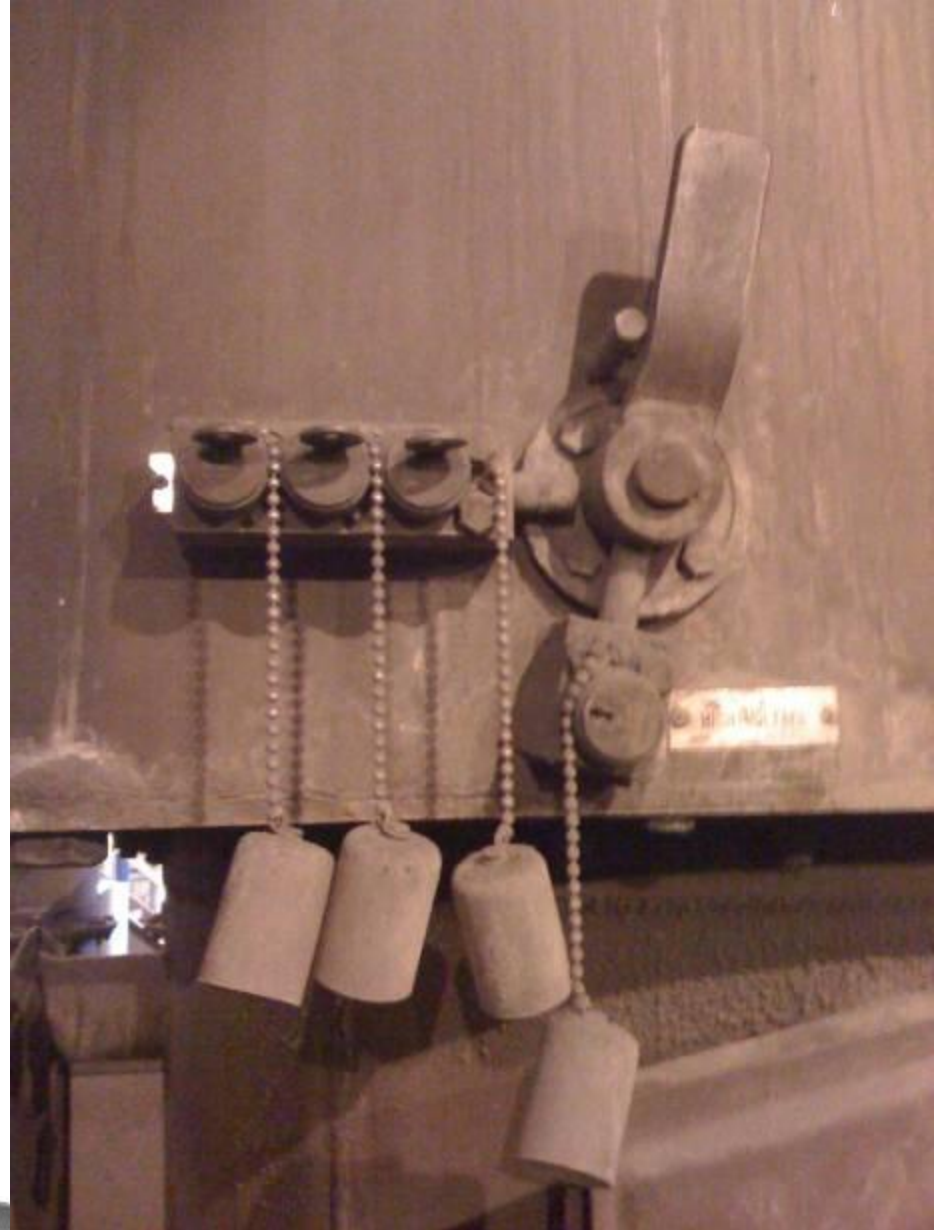


All ESP Access Doors, Hopper Doors, Etc.

ACCESS DOOR KEYS ARE RETAINED WHEN DOOR/HATCH IS IN THE OPEN POSITION.

Scheme 42B ESP with Dual Output T/R's

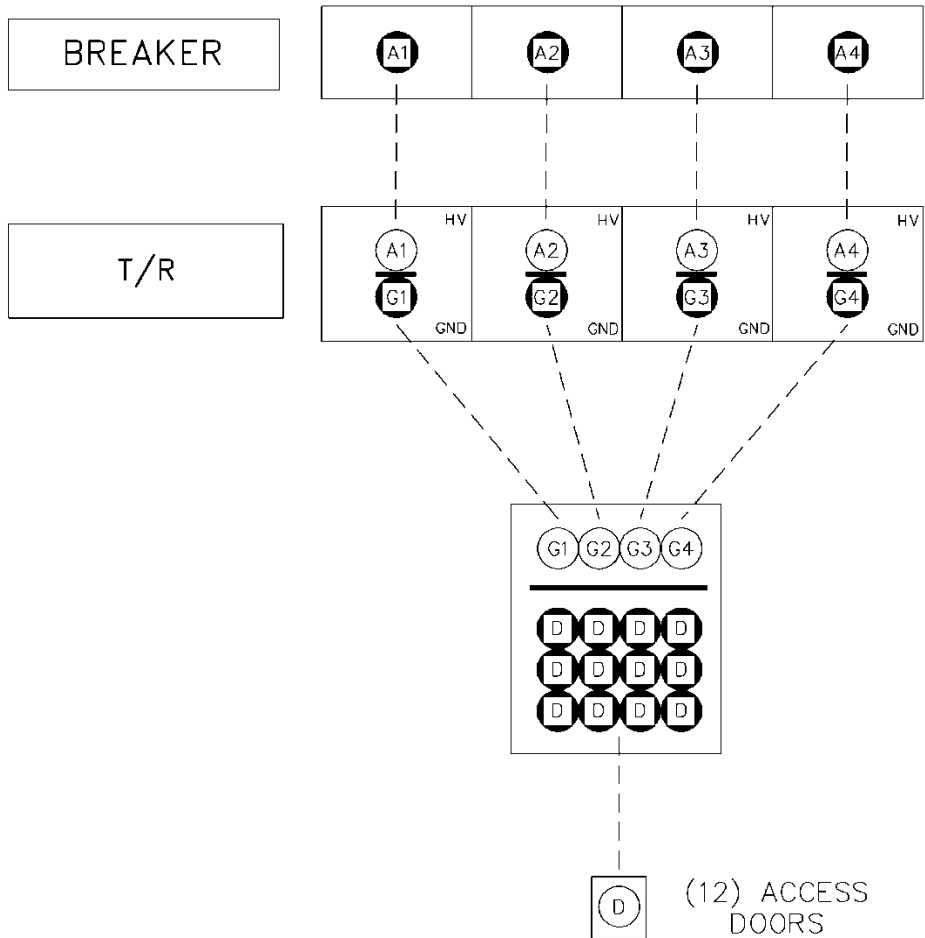




POP QUIZ

- LETS INTERLOCK AN ESP
 - 4 BREAKERS
 - 4 SINGLE BUSHING T/R SETS
 - 12 ACCESS DOORS





Questions and Answers

