



*Entergy*®

ESFAS SINGLE POINT VULNERABILITY (SPV)  
ELIMINATION  
TECHNICAL SPECIFICATION CHANGE REQUEST  
WATERFORD 3  
NOVEMBER 16<sup>TH</sup> , 2017

# ESFAS SPV Elimination Pre-Submittal Meeting Introductions

John Jarrell – Regulatory Assurance Manager

Maria Zamber - Regulatory Assurance

Jason Laque – Project Manager

Miguel Barreto – Design Engineer

Griff Finkenaur – Entergy Contract Support

William Steelman – Entergy Contract Support

# ESFAS SPV Elimination Pre-Submittal Meeting

## Agenda

- ESFAS Design
- Adverse Condition – Single Point Vulnerability
- Resolution – Modify the MSIS and CSAS Circuit
- Technical Specification Change

## ESFAS Design

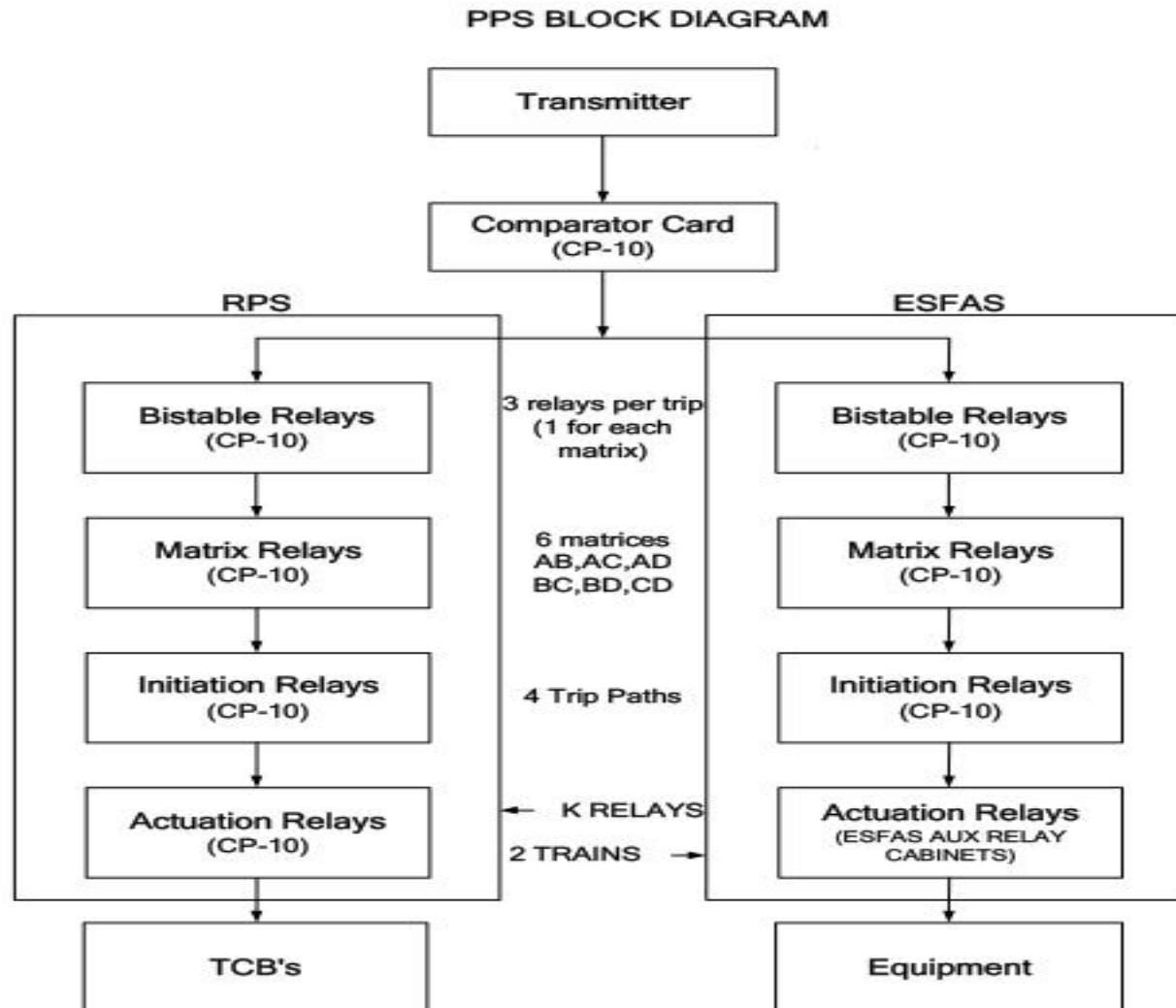
- Engineering Safety Features Actuation System (ESFAS) is part of the Plant Protection System (PPS)
- The PPS can be broken down into two subsystems;
  - Reactor Protection System (RPS)
  - Engineering Safety Features Actuation System (ESFAS)
- The ESFAS generates actuation signals for the ESF and ESF support systems to mitigate the consequences of accident conditions.

## ESFAS Design

The following is a list of the ESFAS signals:

- Safety Injection Actuation Signal (SIAS)
- Containment Isolation Actuation Signal (CIAS)
- Containment Spray Actuation Signal (CSAS)
- Main Steam Isolation Signal (MSIS)
- Recirculation Actuation Signal (RAS)
- Emergency Feedwater Actuation Signal for SG 1 (EFAS-1)
- Emergency Feedwater Actuation Signal for SG 2 (EFAS-2)

# ESFAS Design



# Adverse Condition

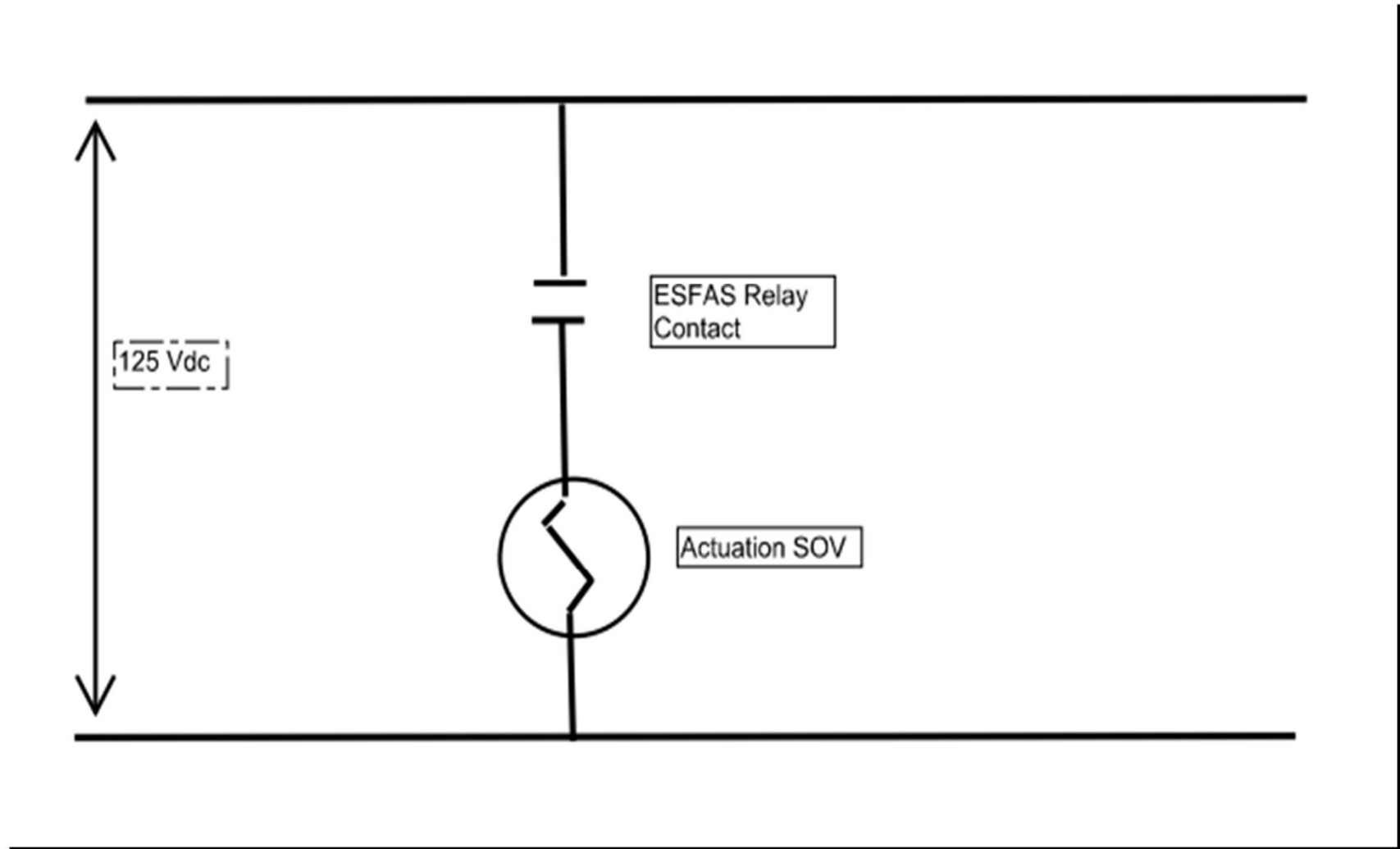
- The following ESFAS signals have SPV identified in their circuitry (1 out of 1 Logic):
- Main Steam Isolation Signal (MSIS)
  - K305A or B and K313A or B Actuation Relay failure will close Main Steam Isolation Valve (MSIV), Feedwater Isolation Valve (FWIV), Feedwater Regulating Valve, and Feedwater Startup Regulating Valve
  - Closure of a single MSIV will result in asymmetric steam generator transient (ASGT), resulting in a CPC high differential cold leg temperature trip and a loss of thermal margin.
  - Closure of both MSIVs will result in a complete loss of the secondary heat sink requiring a reactor trip on high pressurizer pressure.

## Adverse Condition

- Containment Spray Actuation Signal (CSAS)
  - K114A or B Actuation Relay failure will close Component Cooling Water (CCW) flow to the non-critical loop .
  - This will result in loss of Component Cooling Water (CCW) flow to the Reactor Coolant Pumps (RCPs) and the Control Element Drive Mechanism (CEDM) cooling coils. Loss of seal cooling to the RCP can result in serious RCP seal damage with the potential for a small break LOCA.



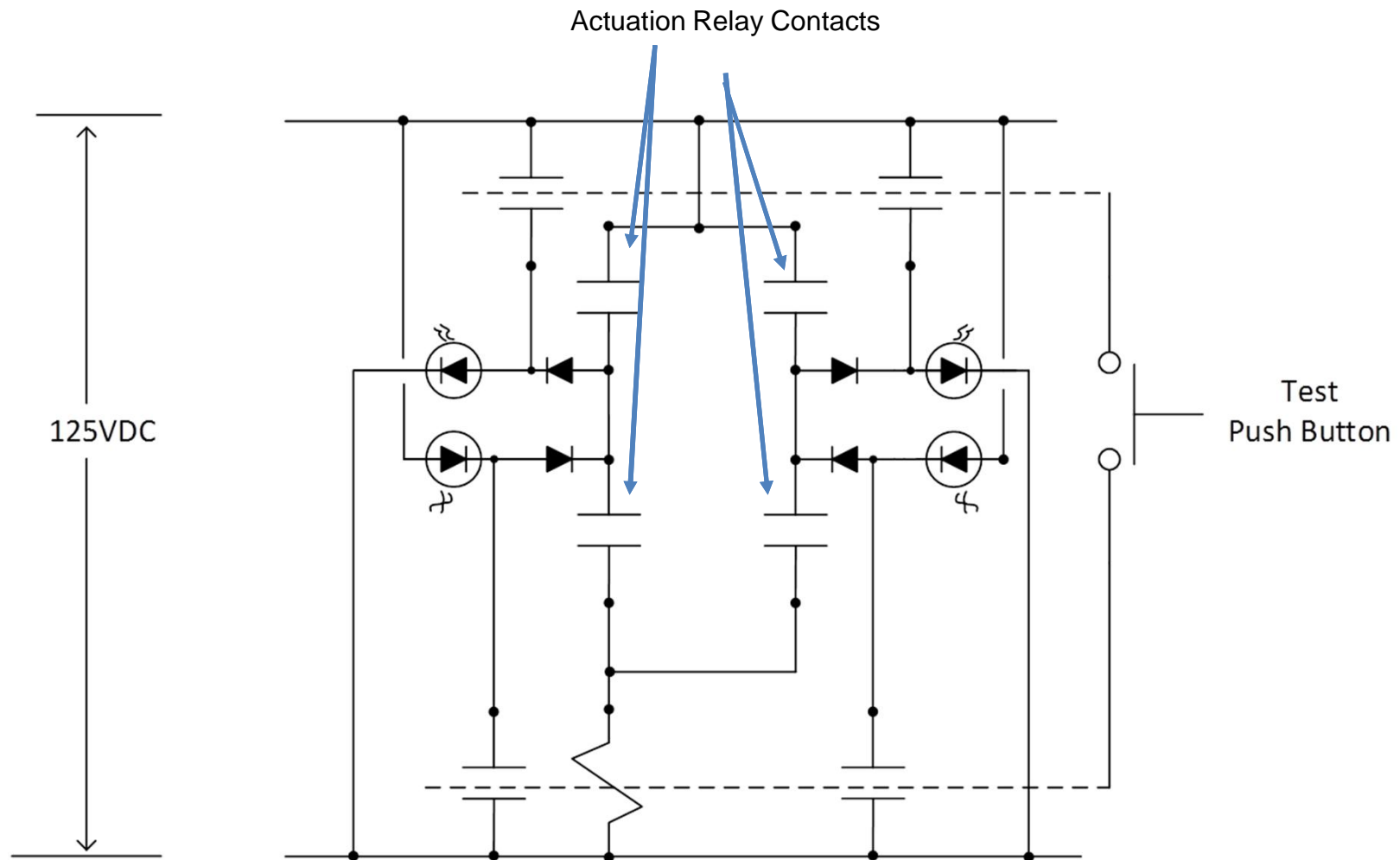
# 1 out of 1 Logic



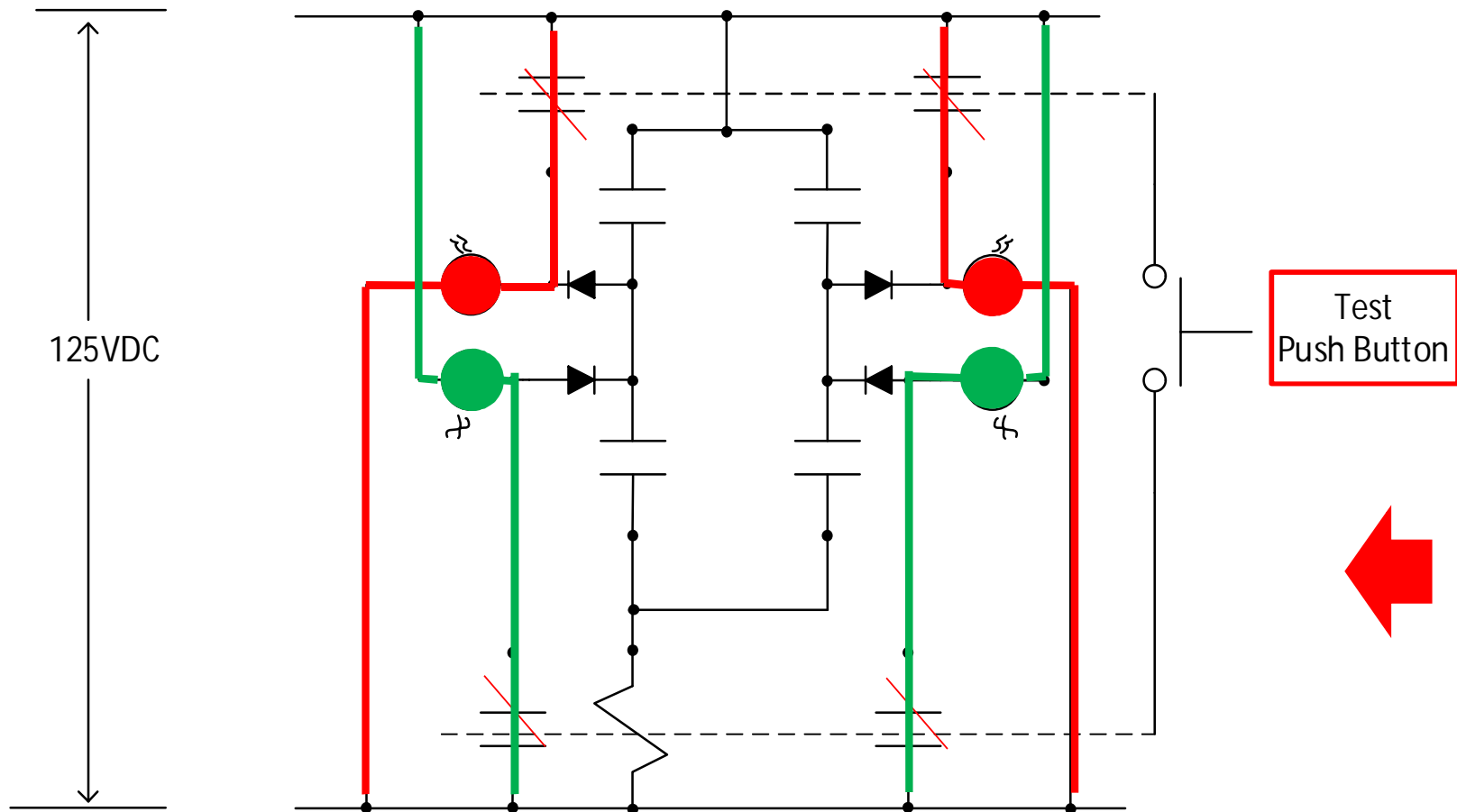
## Resolution – Modify the MSIS and CSAS Circuit

- Revise the ESFAS Actuation Circuit from a 1 out of 1 logic to a parallel 2 out of 2 logic.
  - Removed the SPV from the circuit
  - Parallel 2 out of 2 logic meets the Reg Guide 1.22 requirements
- Add a LED Test Fixture with a LED to illuminate when a ESFAS Actuation Relay Contact closes.
  - Provides indication of failed relay
  - Provides safe means to test quarterly without need for intrusive maintenance using meters for voltage and continuity checks

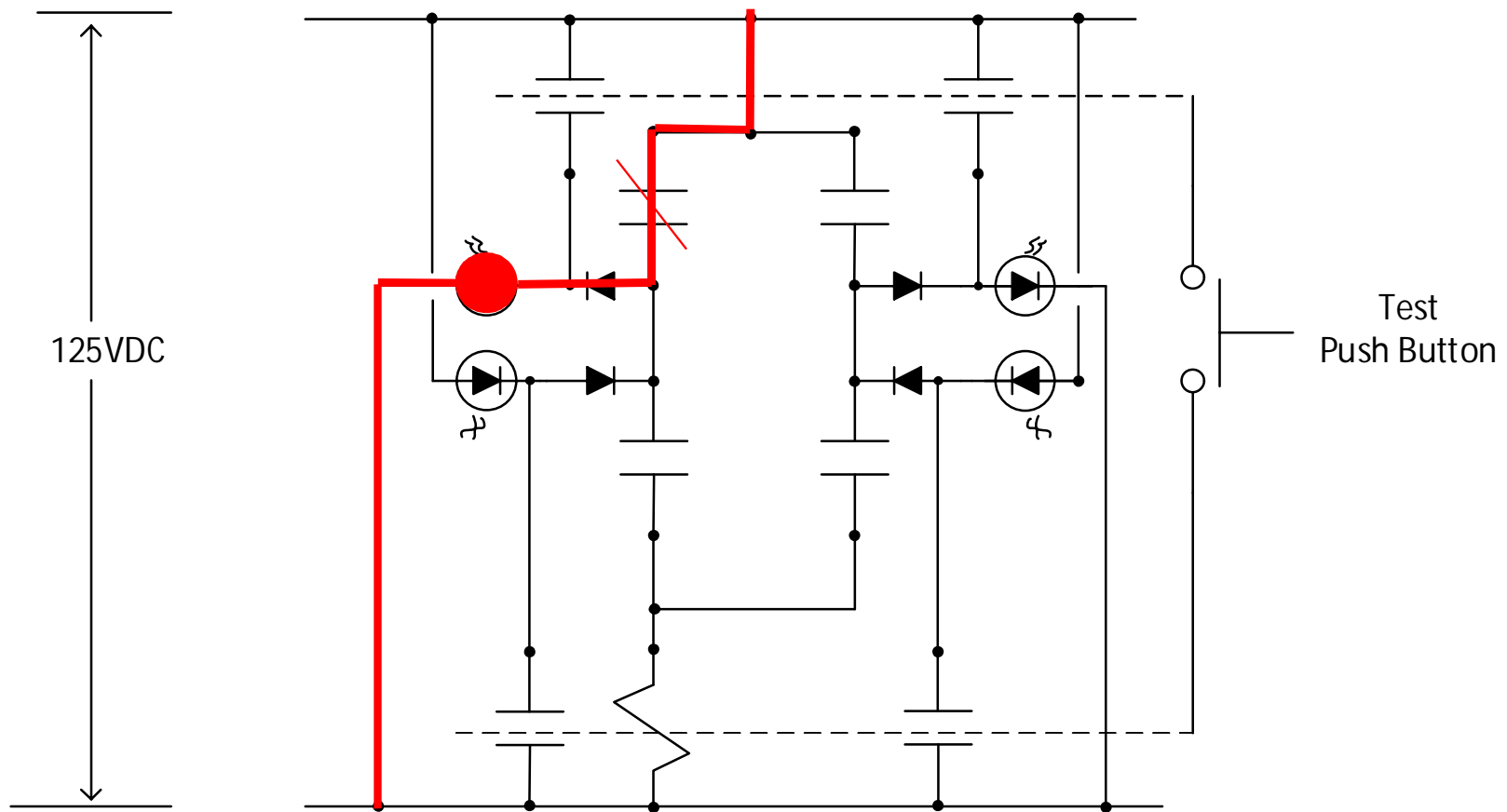
# Resolution – Parallel 2 out of 2 Logic



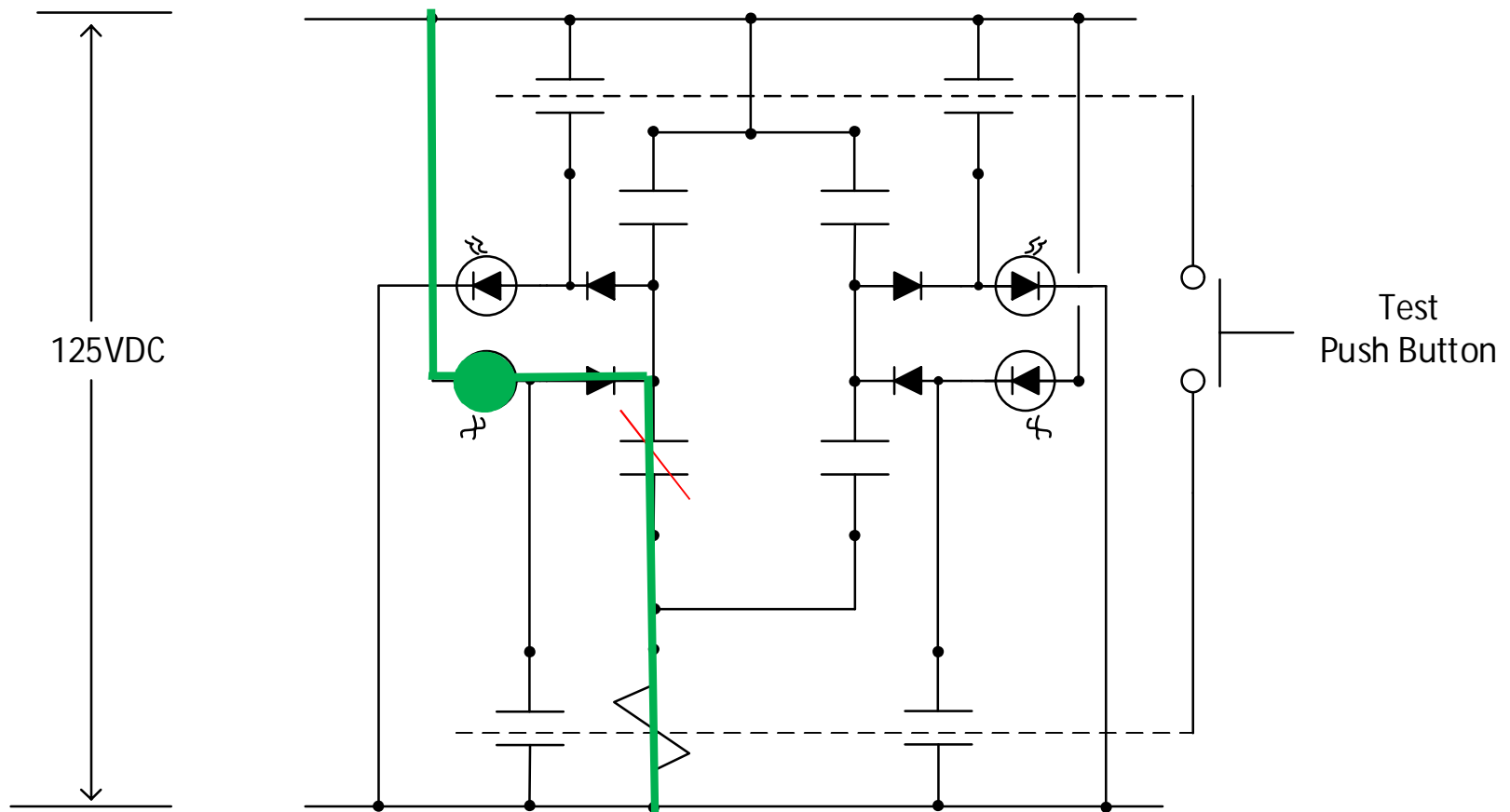
# Testing LED Lights



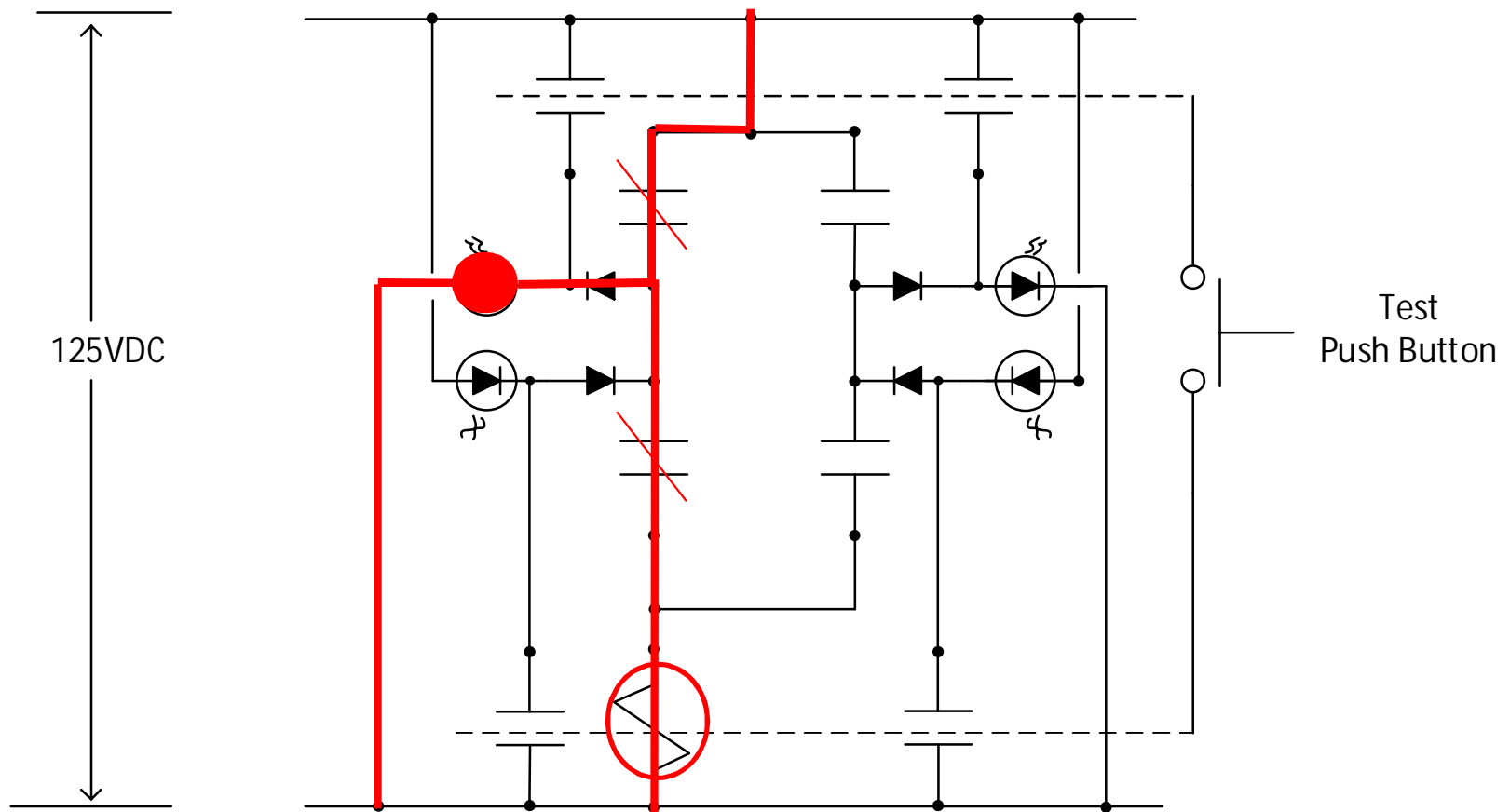
# Testing of Actuation Relay



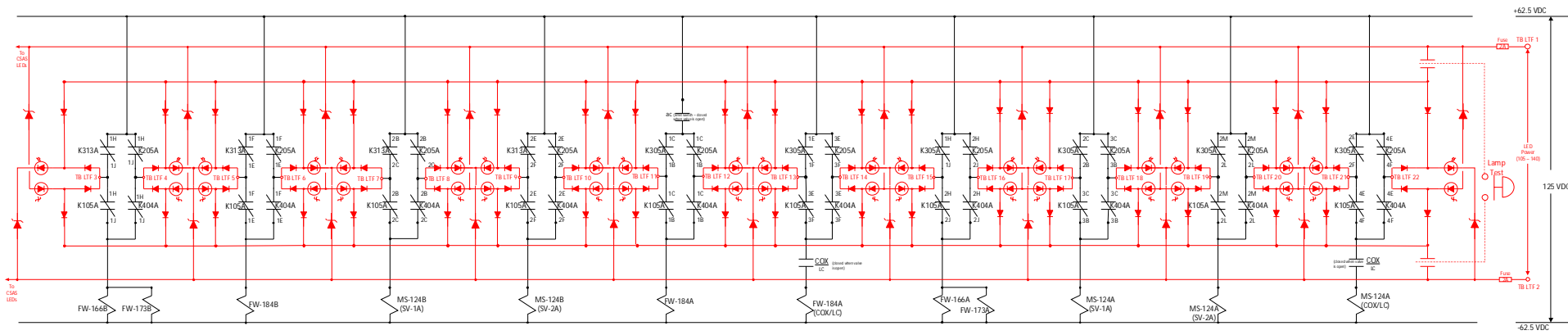
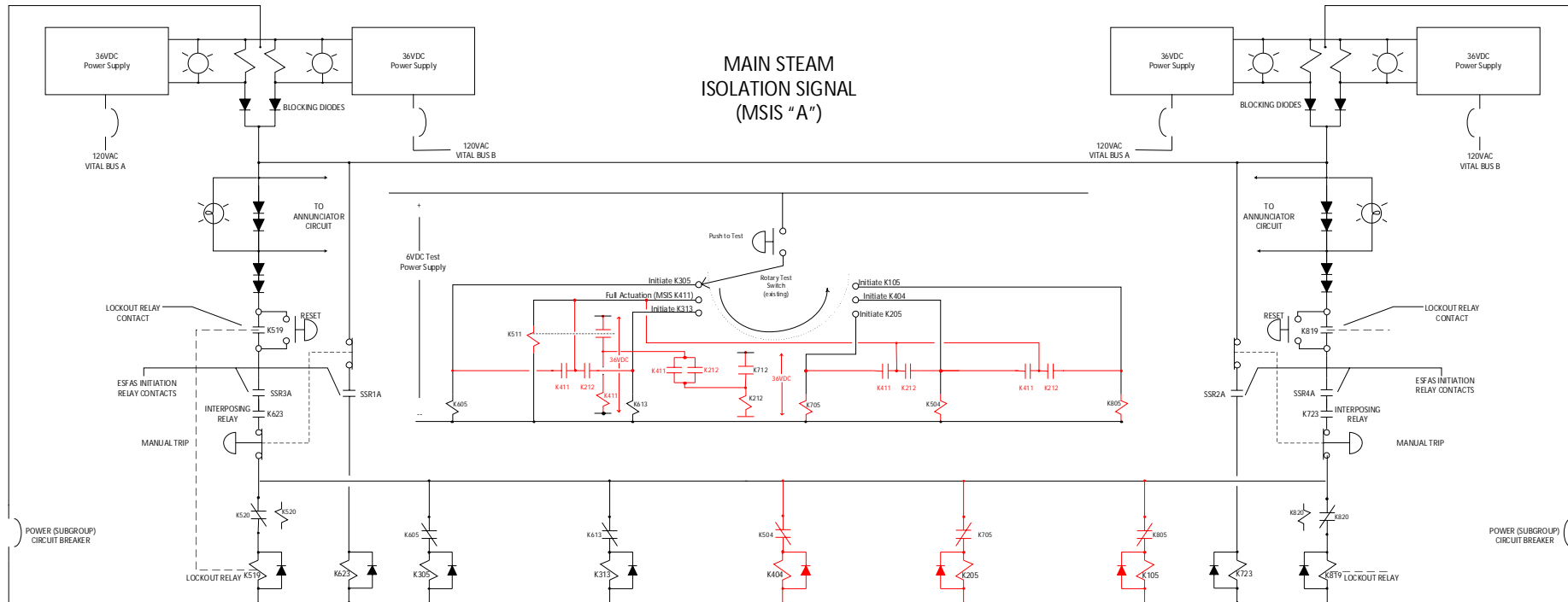
# Testing of Actuation Relay



# ESFAS Actuation

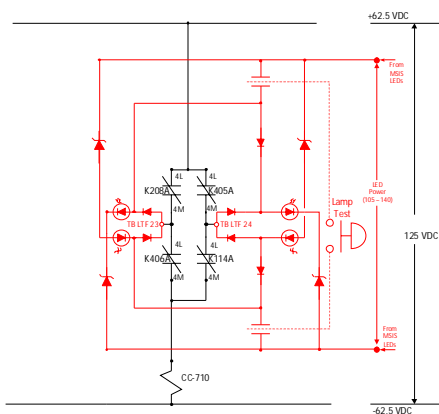
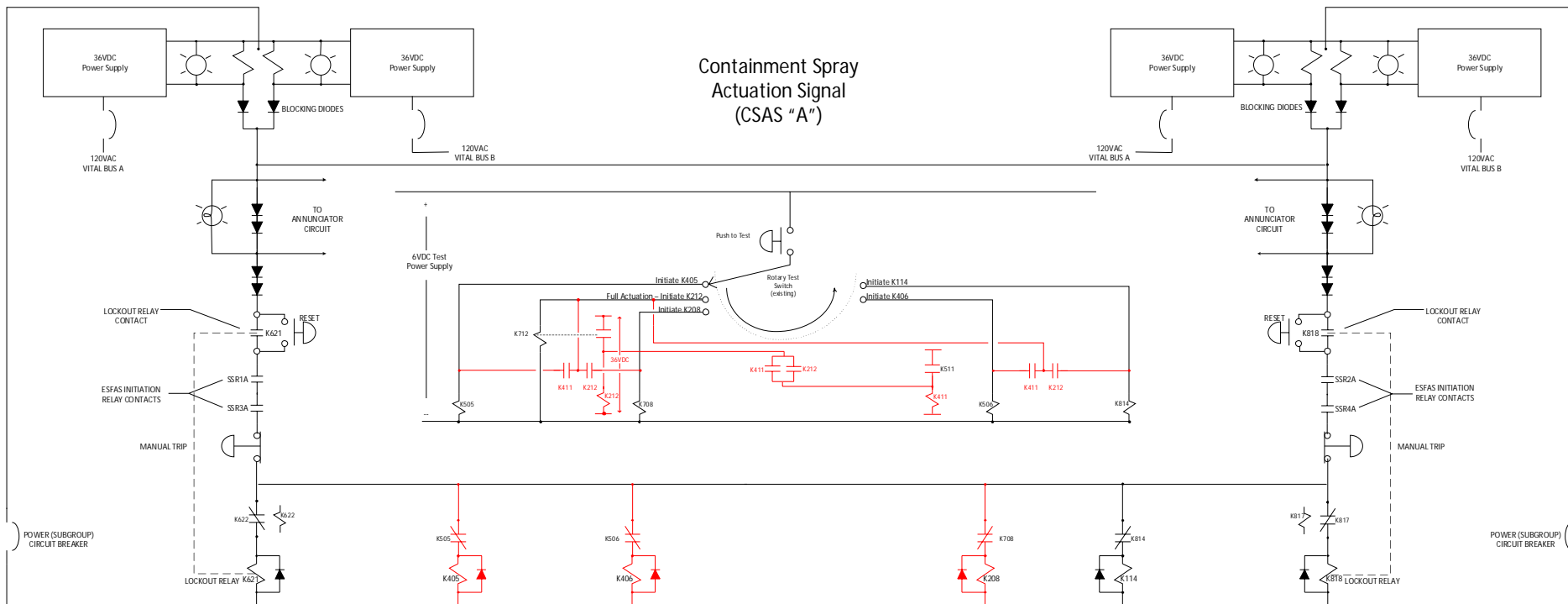


## Proposed Design (MSIS)

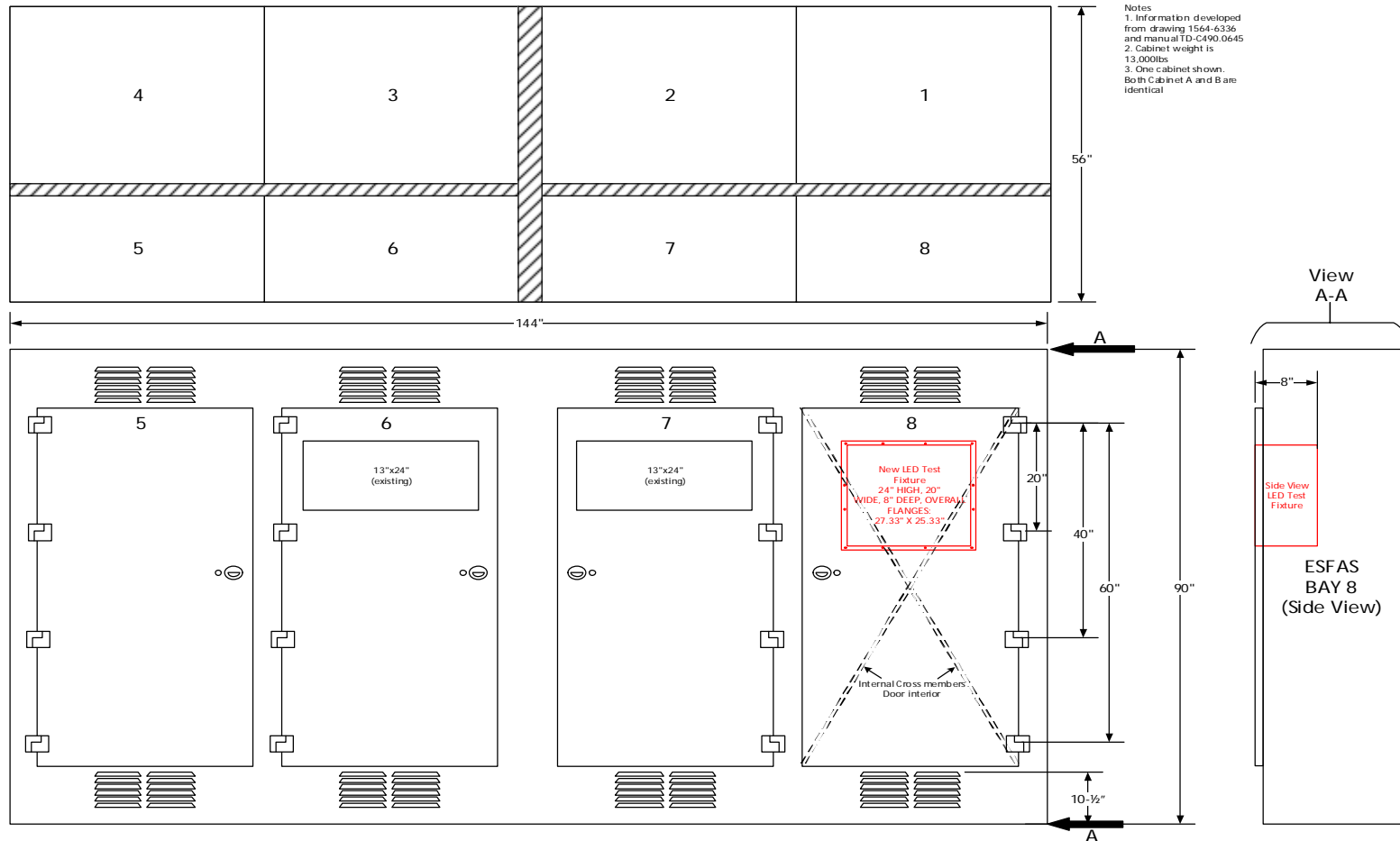




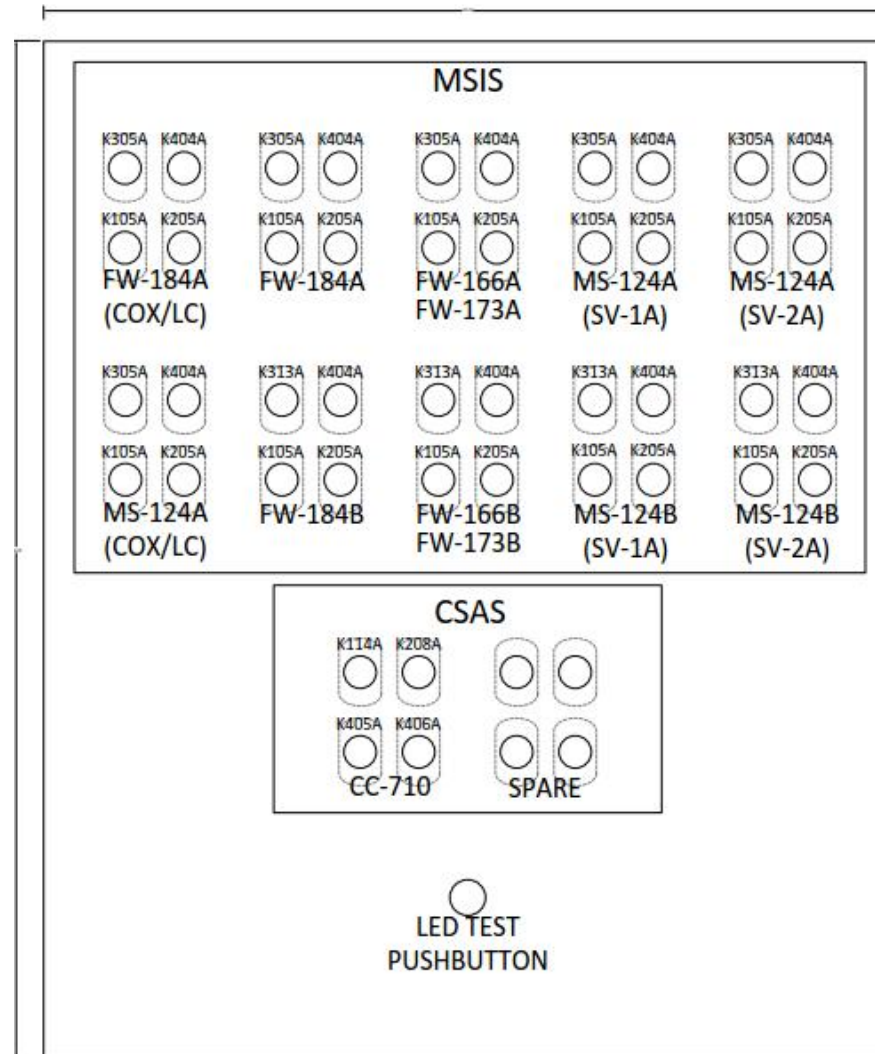
## Proposed Design (CSAS)



# ESFAS Aux Relay Cabinet Layout Concept



# LED Test Fixture



# Technical Specifications Change

- Remove ESFAS Relays K305, K313, K114 from Technical Specifications Table 4.3-2 note 3
- This will change the frequency of testing of ESFAS Relays K305, K313, K114 (and the added MSIS & CSAS Relays) to the frequency established by the Surveillance Frequency Control Program
- The relay surveillance frequency will be changed to be tested during power operation.

# Technical Specifications Change

Current Technical Specification Table 4.3-2 Note 3

## TABLE NOTATION

- (1) Each train or logic channel shall be tested **in accordance with the Surveillance Frequency Control Program.**
- (2) Testing of Automatic Actuation Logic shall include the energization/deenergization of each initiation relay and verification of the OPERABILITY of each initiation relay.
- (3) A subgroup relay test shall be performed which shall include the energization/deenergization of each subgroup relay and verification of the OPERABILITY of each subgroup relay. Relays K109, K114, K202, K301, K305, K308 and K313 are exempt from testing during power operation but shall be tested **in accordance with the Surveillance Frequency Control Program** and during each COLD SHUTDOWN condition unless tested within the previous 62 days
- (4) Using installed test switches.
- (5) To be performed during each COLD SHUTDOWN if not performed in the previous 6 months.
- (6) Each train shall be tested, with the exemption of relays, K110, K410 and K412, **in accordance with the Surveillance Frequency Control Program.** Relays K110, K410 and K412 shall be tested **in accordance with the Surveillance Frequency Control Program.**

WATERFORD – UNIT 3

3/4 3-27

AMENDMENT NO 67, 69, 78, **249**

# Technical Specifications Change

Revised Technical Specification Table 4.3-2 Note 3

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# Closing

- Waterford 3 is being proactive with eliminating the identified Single Point Vulnerability in the ESFAS circuitry.
- The proposed ESFAS circuitry modification will:
  - Eliminate identified Single Point Vulnerability
  - Allow for non-intrusive, safe method for testing on-line
  - Will identify a failure of an ESFAS Actuation Relay
  - Will comply with Reg. Guide 1.22
- Expected submittal date is December 5<sup>th</sup>, 2017.

# Conclusion

- Thank you for your time and attention.
- Questions?