NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

In Service State / TADS Reportable

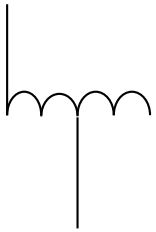
November 2021

RELIABILITY | RESILIENCE | SECURITY




Do I report my transformer based off of low side or high side?

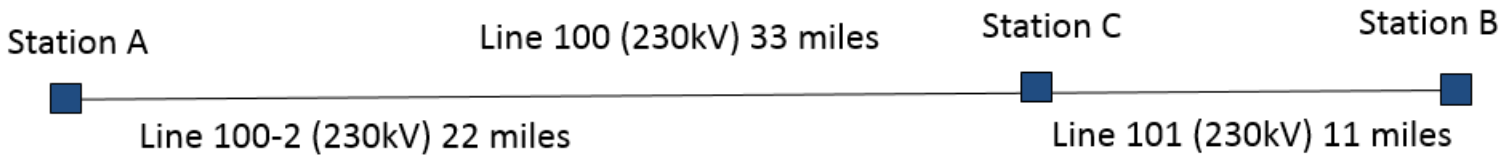
- Transformers are classified as TADS reportable based on their lower or secondary voltage classification. Transformers with secondary or lower winding voltages greater than 100kV, or are included in the BES through the inclusion criteria are reportable.
- Once a transformer has been classified as reportable, it is entered into the inventory based on its high side or primary winding voltage class.



- Examples:
  - A 500kV to 230kV transformer would be entered into TADS as a 400-599kV
  - A 500kV to 138kV transformer would be entered into TADS as a 400-599kV
  - A 500kV to 765kV transformer would be entered into TADS as a 600-799kV
  - A 345kV to 69kV transformer would not be reported into TADS

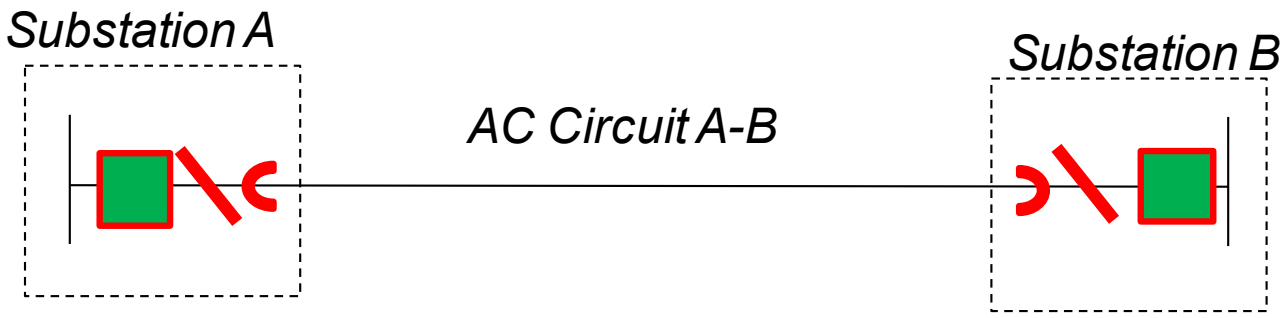
Splitting a Circuit

- If I cut circuit 100 to make a new circuit 100 (relabeled as 100-2 for TADS reporting) & new circuit 101 what is the process?



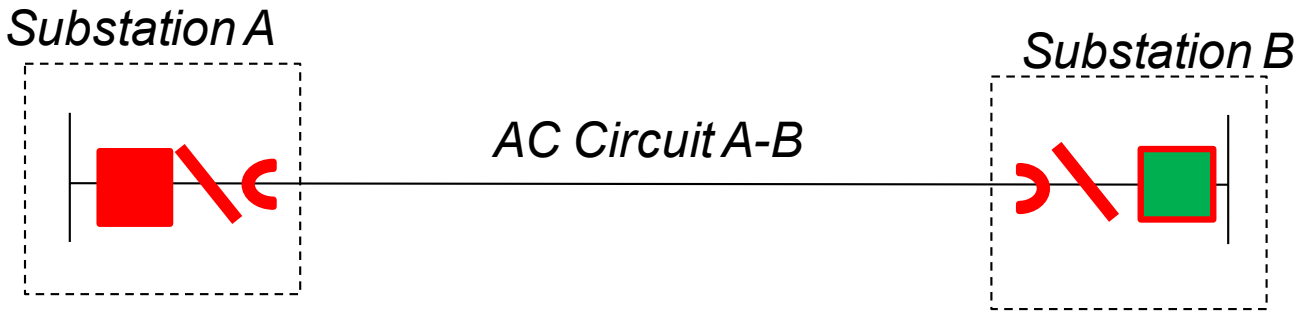
Element Identifier	From Bus	To Bus	Length	In Service Date	Retirement Date	Precursor
100	Station A	Station B	33.0	2/29/2012	11/2/2017	
100-2	Station A	Station C	22.0	12/5/2017		100
101	Station B	Station C	11.0	12/7/2017		100

In Service State Definition



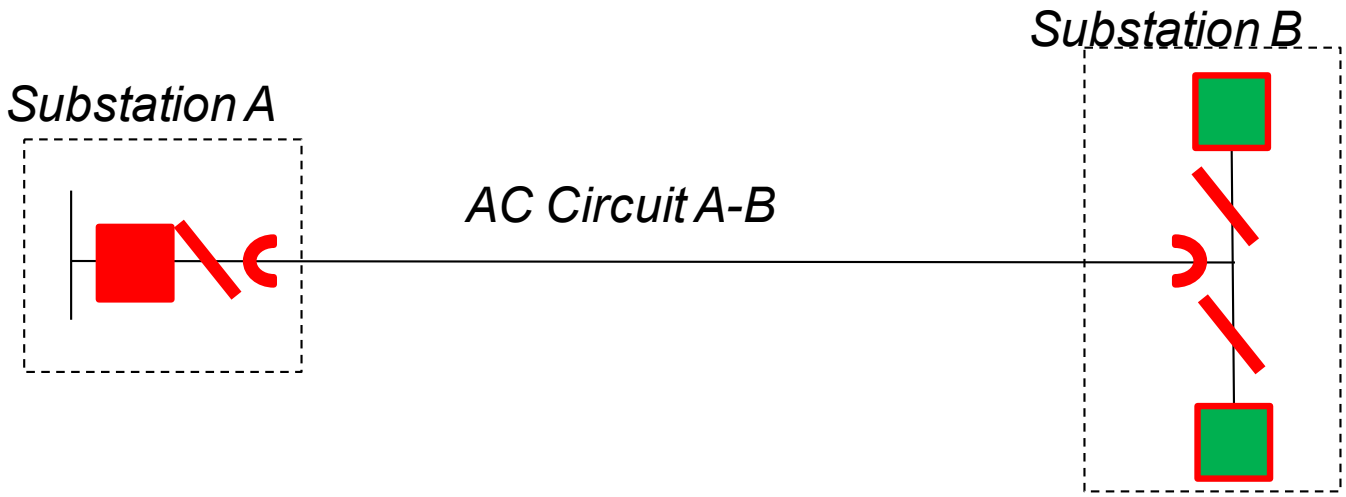
- In Service State
  - An Element that is energized and connected at all its terminals to the system .
    - AC Circuit A-B is not in service in this example because it is not energized and it is not connected to terminal A and terminal B

In Service State Definition



- In Service State
  - An Element that is energized and connected at all its terminals to the system.
    - AC Circuit A-B is not in service in this example because even though it is energized it is not connected at terminal B

In Service State Definition



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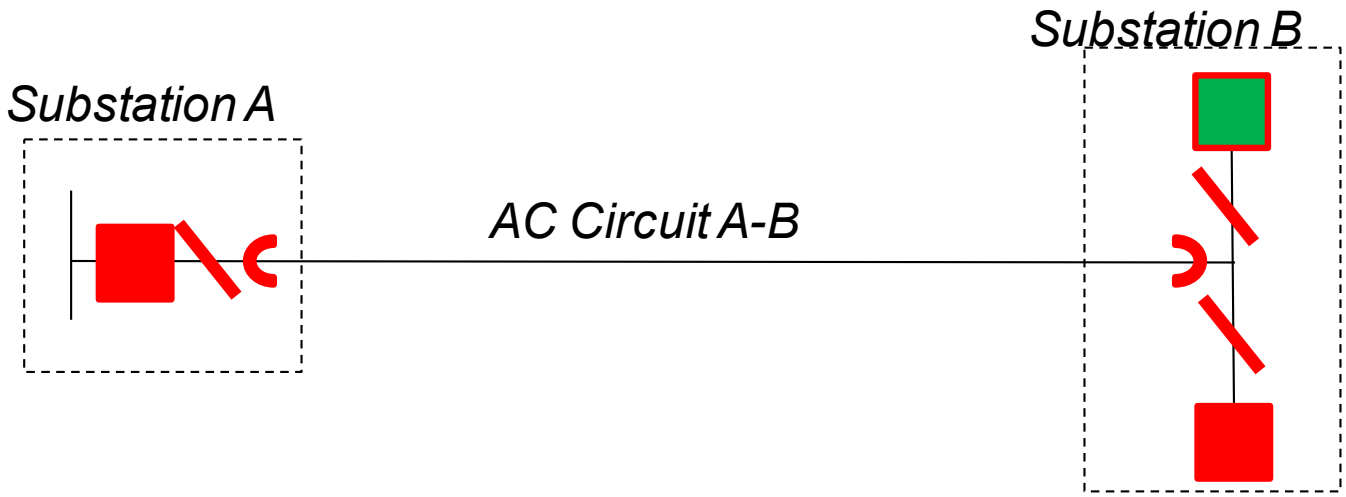
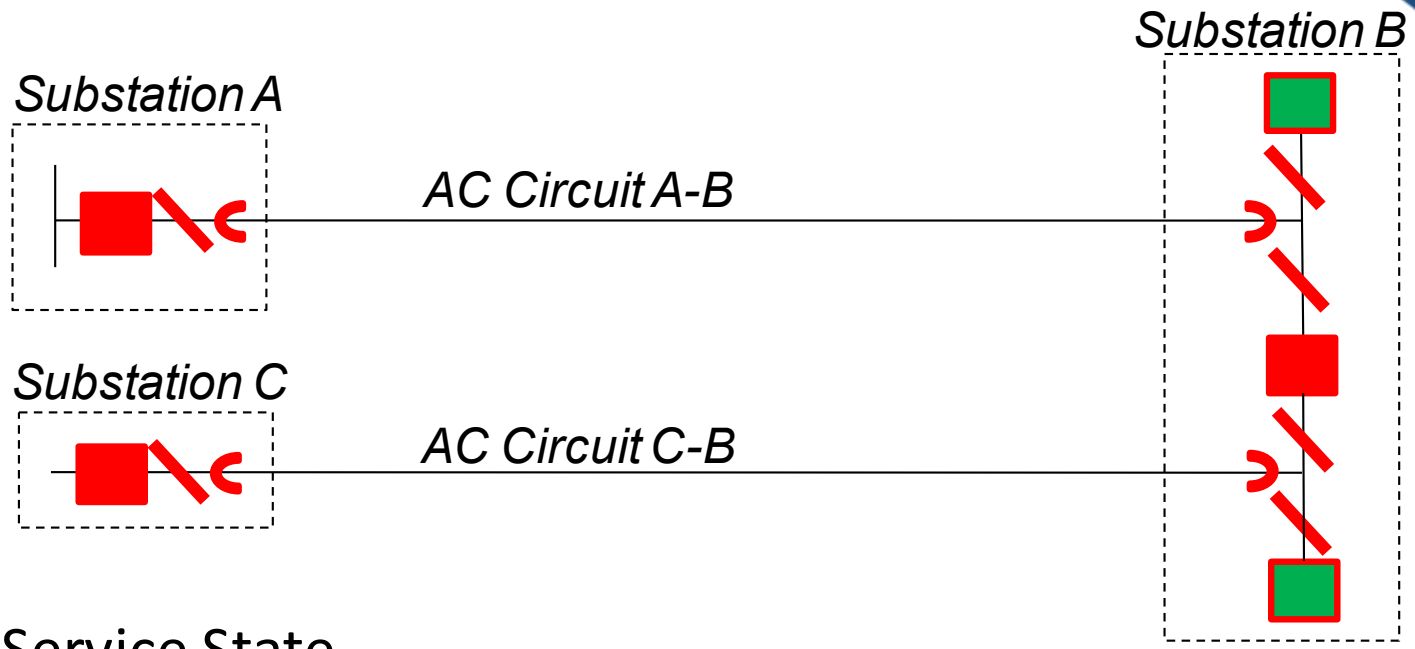
In Service State Definition



- In Service State
  - An Element that is energized and connected at all its terminals to the system.
    - AC Circuit A-B is in service in this example because it is energized and is connected at terminal A and terminal B

In Service State Definition



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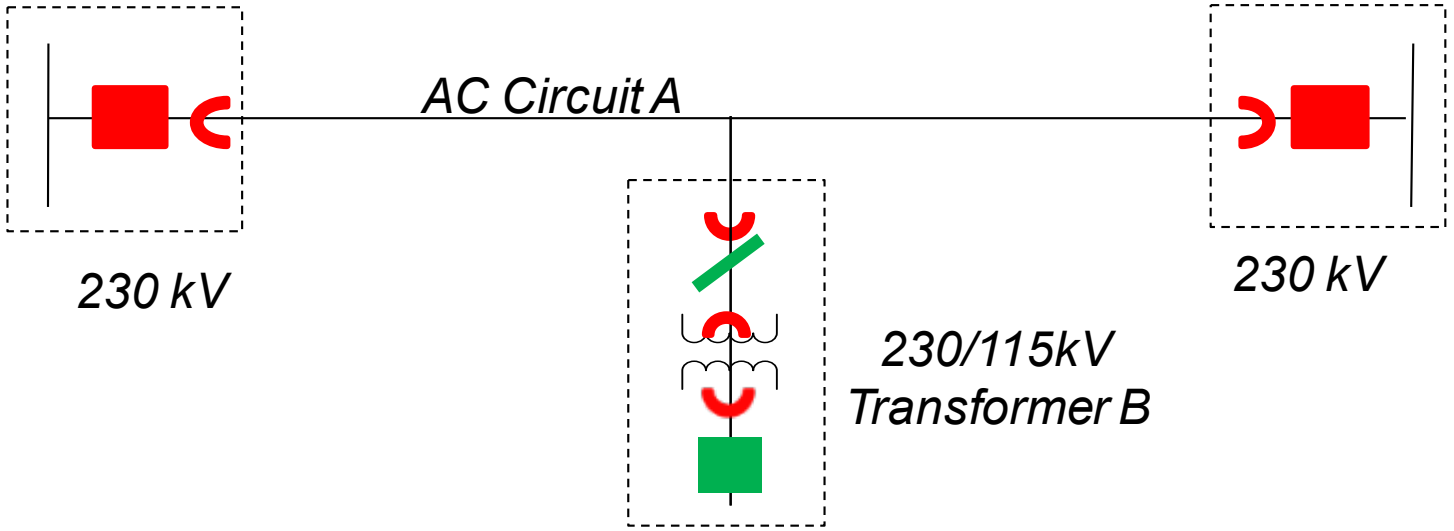
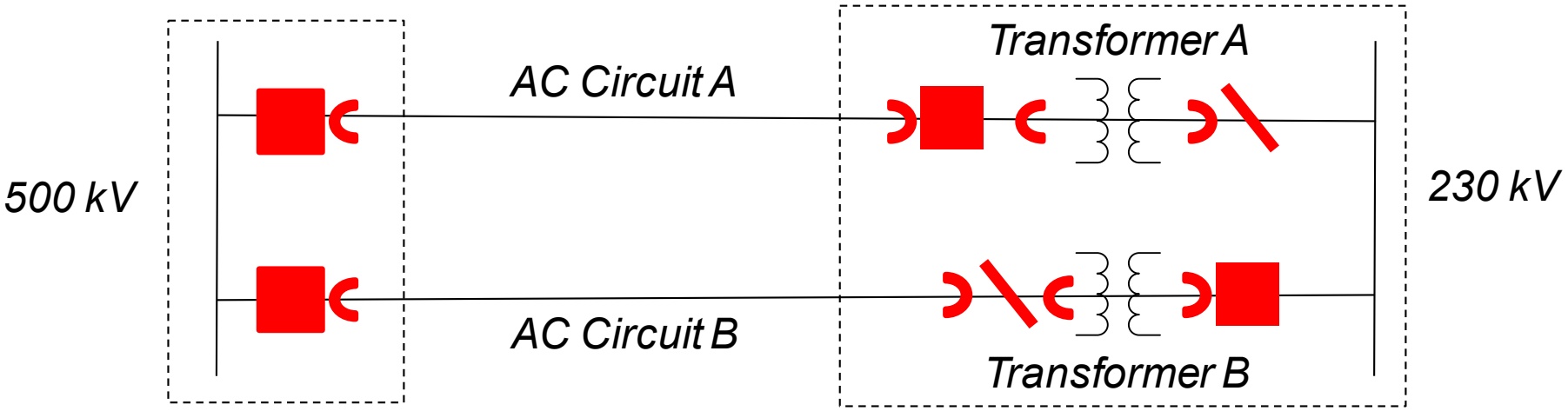
In-Service State Example



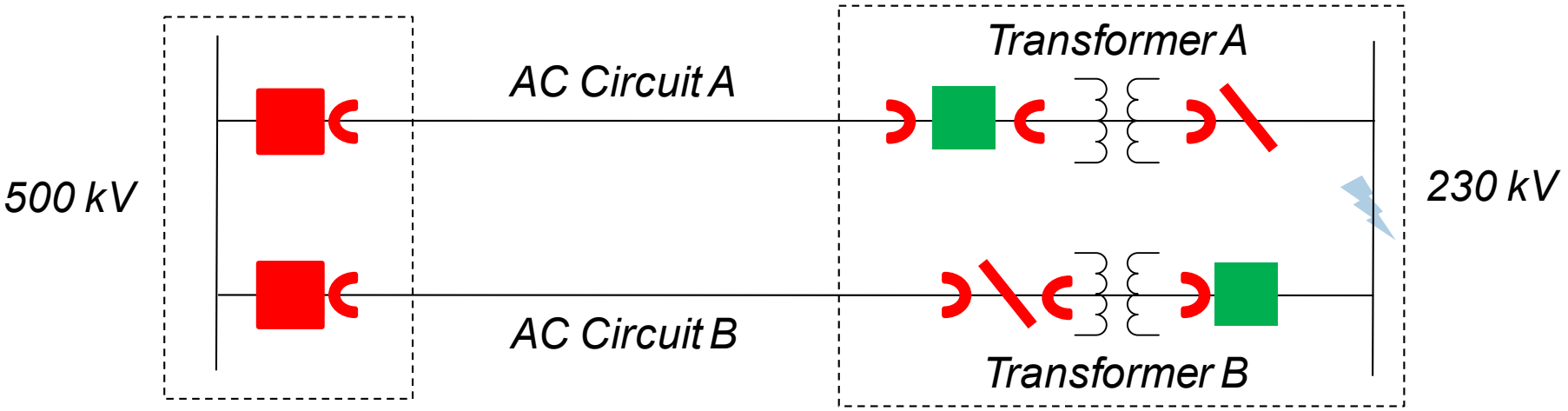
- Transformer B experiences a fault. The fault is interrupted by the breakers on AC circuit A and Transformer B. After the disconnect switch is opened AC Circuit A is automatically restored within a minute.
  - AC Circuit A reports a momentary outage
  - AC Circuit A returns to an in service state per the multi terminal tapped transformer exclusion
  - Transformer B reports an outage - is not in service

In-Service State Example



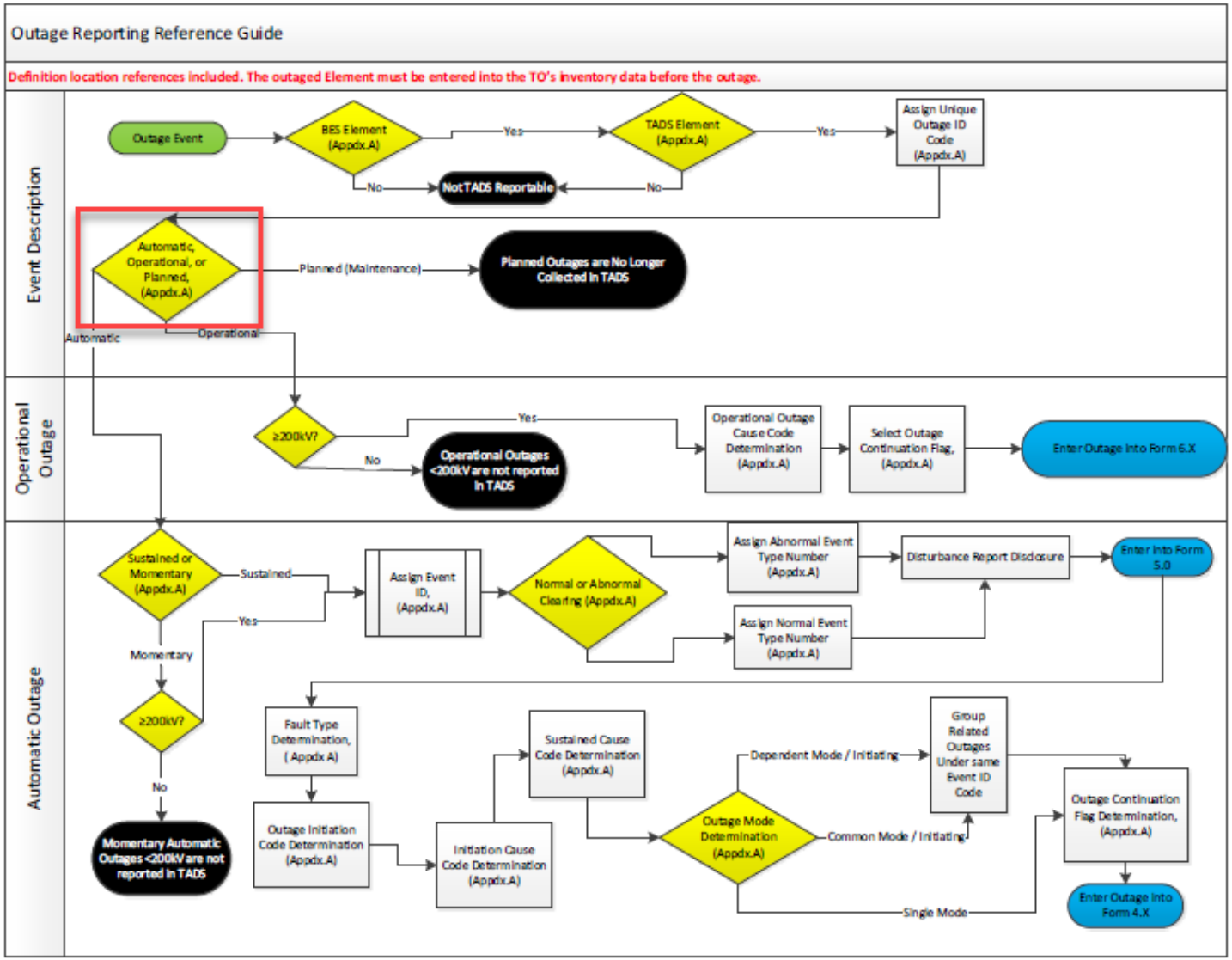
- AC Circuit A is bound by the two breakers
  - Transformer A is bound by a breaker and a disconnect switch
  - AC Circuit B is bound by a breaker and a disconnect switch
  - Transformer B is bound by a breaker and a disconnect switch

In-Service State Example



- A 230 kV bus fault opens the designated breakers.
  - AC Circuit A reports an outage – one terminal is disconnected
  - Transformer A reports an outage – both terminals are disconnected
  - AC Circuit B DOES NOT report an outage – both terminals are connected
  - Transformer B reports an outage – one terminal is disconnected

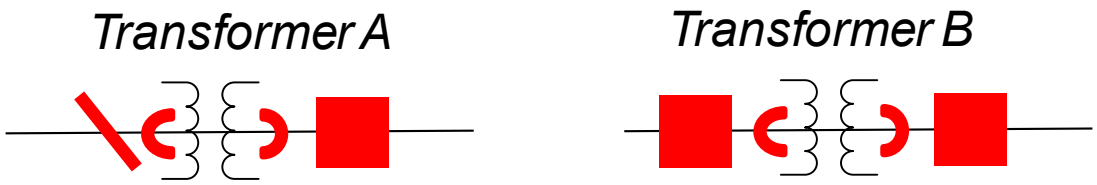
Determination: Is it an automatic outage?



Automatic Outage

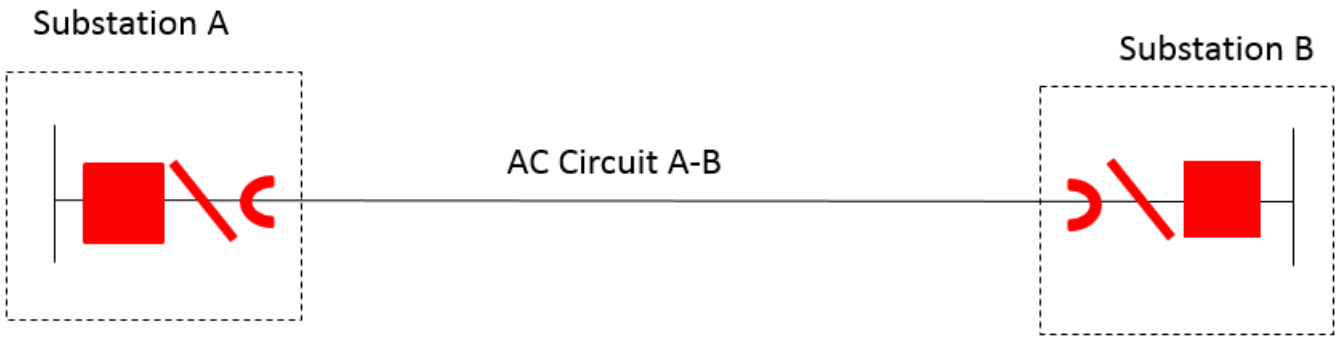
- Automatic Outage:
  - An outage that results from the automatic operation of a switching device, causing an Element to change from an In-Service State to a not In-Service State.
    - Single-pole (phase) tripping followed by successful AC single-pole (phase) reclosing is not an Automatic Outage.
- In-Service State:
  - An Element that is energized and connected at all its terminals to the system.

AC Transformer Definition



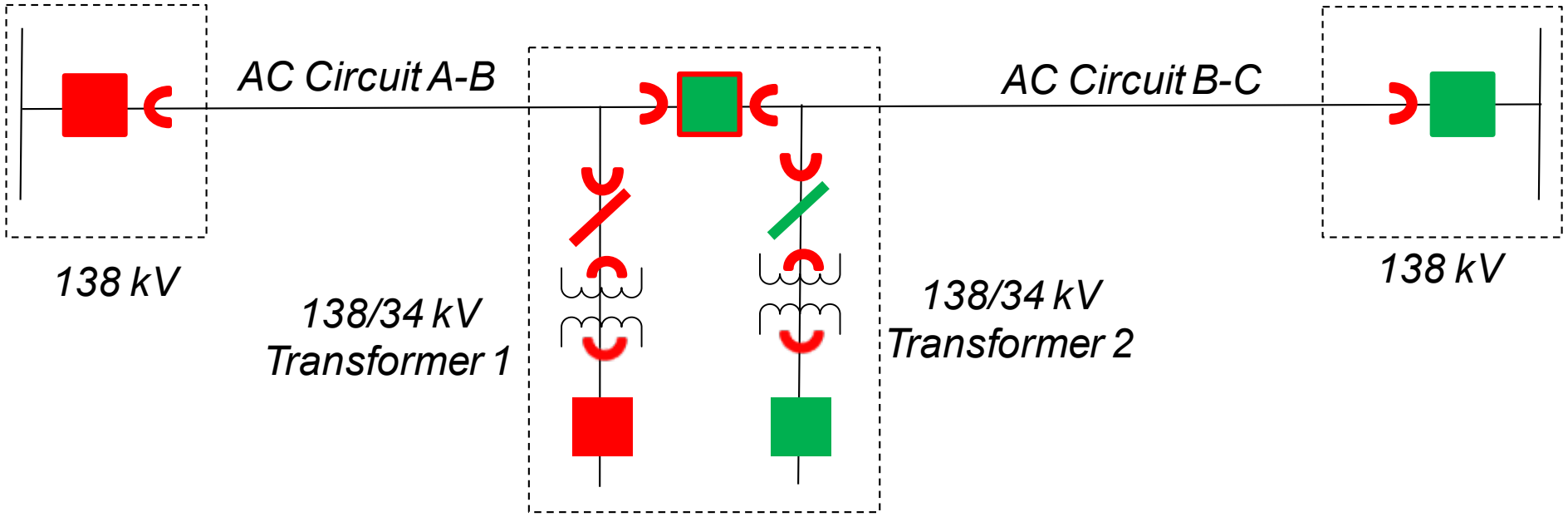
- AC Transformer
  - A bank comprised of three single-phase transformers or a single three-phase transformer. A Transformer is bound by its associated switching or interrupting devices.
  - Transformer A is bound by the breaker and disconnect switch.
  - Transformer A is Not in Service if either the breaker or disconnect switch is open.
  - Transformer B is bound by breakers on the high and low side.
  - Transformer B is Not in Service if either breaker is open

AC Circuit Definition



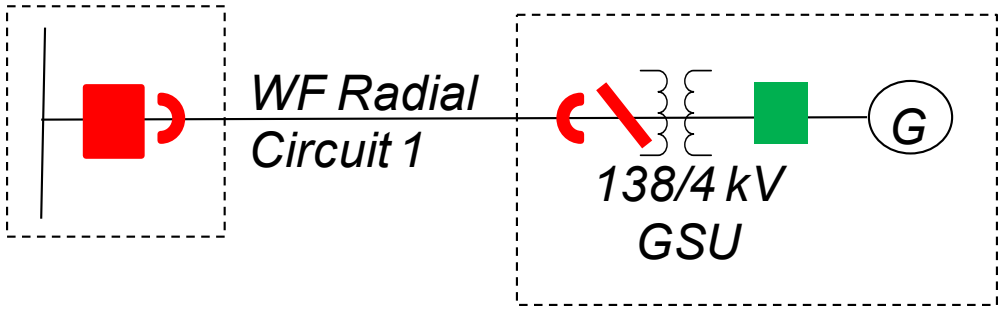
- AC Circuit
  - A set of AC overhead or underground three-phase conductors that are bound by AC Substations.
  - Note: Radial circuits which are BES elements are to be included in AC Circuits.
  - The boundary of an AC Circuit extends to the transmission side of an AC Substation.
  - A circuit breaker, Transformer, and their associated disconnect switches are not considered part of the AC Circuit, but they are defined, instead, as part of the AC Substation.

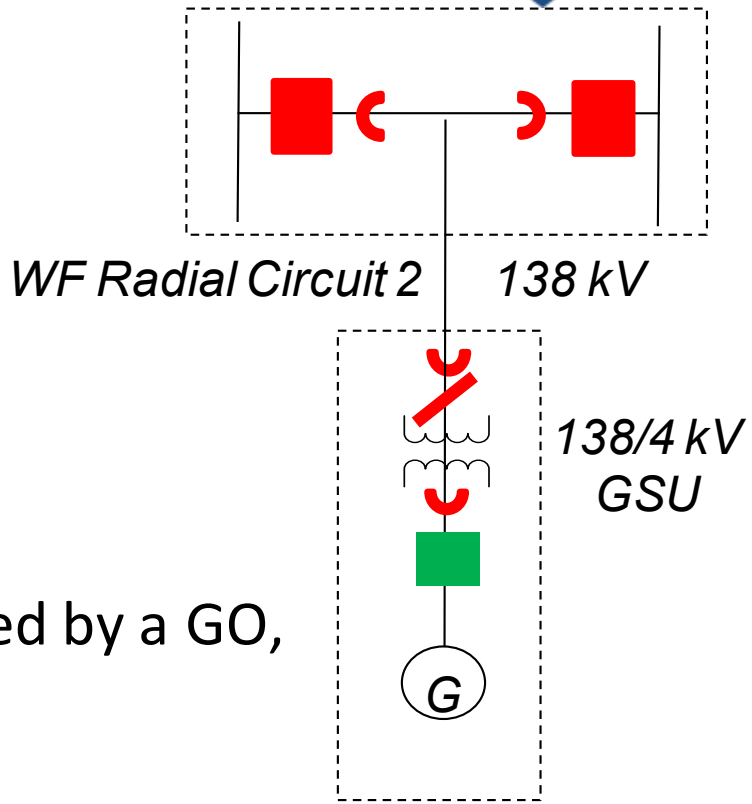
Shared Breaker Interrupts Multiple Lines



- AC Circuit A-B and AC Circuit B-C Report an outage
  - AC Circuit B-C is not energized or connected at terminal B or terminal C
  - AC Circuit A-B is energized, but is not connected at terminal B

Radial connection to Wind Farm





- If a Wind Farm Radial circuit is owned by a GO, the circuit is not reportable to TADS
  - GO cannot be forced to register as TO
- WF Radial Circuit 1 and WF Radial Circuit 2 are in service in these examples

Momentary or Sustained

- Momentary Outage:
  - An Automatic Outage with an Outage Duration less than one minute.
    - If the circuit recloses and trips again within less than a minute of the initial outage, it is only considered one outage. The circuit would need to remain in service for longer than one minute between the breaker operations to be considered as two outages.
- Sustained Outage:
  - An Automatic Outage with an Outage Duration of a minute or greater.

Questions and Answers

TADS@NERC.NET