

ETAP FAQ # 12

How do you build and validate switching sequences in ETAP?

Description: Switching Management allows the dispatcher to build a complete switching program using a graphical user interface and execute the switching plan all in one step.

Version: ETAP 7.0

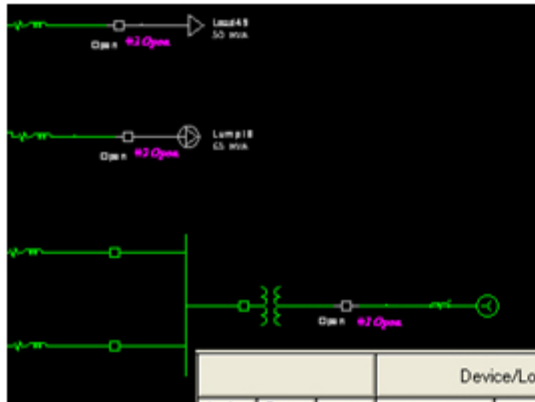
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Switching Sequence Management

The switching sequence contains a list of switching devices and time of execution for circuit breakers, load disconnects, and ground disconnects. Before any switching sequence is executed, the application verifies whether the sequence is compliant with safety switching procedures and requests confirmation during execution of each step before proceeding to the next step in order to avoid inadvertent switching.

Building a Switching Sequence

1. Go to the Mode Toolbar and select Switching Sequence Management.
2. Setup up system alerts.
3. Click the Switching Sequence Builder icon to begin building the switching sequence.
4. Create an action for each step by clicking on the protective device. Open a breaker and close a ground switch by simply clicking each device.



Action #	Group #	Active	Device/Logic		Operation				
			Type	ID	Delay T (H:M:S)	Action	Crew	Remarks	Cost (\$)
1	1	<input checked="" type="checkbox"/>	HV CB	CB805	0:00:00.000	Open			100.00
2	2	<input checked="" type="checkbox"/>	HV CB	CB798	0:00:00.000	Open			50.00
3	3	<input checked="" type="checkbox"/>	HV CB	CB802	0:00:00.000	Open			150.00

5. An interlock scheme can be set for any protective device. Click the Logic Editor button on the Switching Sequence Builder to view or define any preconditioned or post action logic for each protective device.

Pre Condition Logic							
Active	Action		Type	ID/Tag		Status	
<input checked="" type="checkbox"/>	Open		HVCB	1A-1	=	Open	
<input type="checkbox"/>	Close						

Operator Override

Post Action Logic							
Active	Action	Delay	Type	ID/Tag		Status	
>>	Open		HVCB	1A-2	=	Closed	
<input type="checkbox"/>	Close						

The above case shows that the action will not be performed unless HVCB 1A-1 is open. If HVCB 1A-1 is open, then the action from the switching sequence will be performed and HVCB 1A-2 will automatically close as specified in the Post Action Logic.

6. Click the Run Switching Sequence icon to open the Switching Sequence View

7. Click Auto Execute to execute each switching action.

Sequence List

	Action #	Group #	Command	Action Status	Device/Logic		Original	Action	Current	Duration	End
			Time		ID	Type	Status		Status		
>>	1	1	0:00:00.000	Completed	CB102	HV CB	Closed	Open	Open	0:00:00.059	0:00:0.
	2	2	0:00:00.059	Completed	CB120	HV CB	Closed	Open	Open	0:00:00.059	0:00:0.
	3	3	0:00:00.001		CB119	HV CB	Closed	Open	Closed	0:00:00.000	0:00:0.
	4	4	0:00:00.001		CB118	HV CB	Closed	Open	Closed	0:00:00.000	0:00:0.
	5	5	0:00:00.001		GroundSwi...	Grd Swit...	Open	Ground	Open	0:00:00.000	0:00:0.

Progress Status: Action Number: Logic Alert: Operating Alert:

Execution Control

Save Last Config Override Switching Req. Override Operating Req. Skip Alert Evaluation (Load Flow)

8. View any alarms and alerts caused by a switching sequence.

Alert

Action #	Command	Time	Device			Action	Type	Condition	Alert		
			ID	Type	Status				Device ID	Device Type	Required
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	51	Bus	132 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	53	Bus	132 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	74	Bus	13.8 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	75	Bus	13.8 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	76	Bus	13.8 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	752	Bus	13.8 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	Aux. AB	Bus	2.4 kV	
2	0:00:00.059	CB120	HV CB	Open	Open	Critical	Under Voltage	Bus1	Bus	4.16 kV	

Real-Time Simulation and Execution

9. Run a switching sequence using real-time data by clicking the get-online data icon and updated the project with real-time

status for loads, generators, and protective devices. After clicking get online data, repeat steps 1-8 to run a switching sequence simulation using real-time data.

10. Also run a switching sequence using archived data by clicking the get-archived data icon and select the date and time to activate the archived real-time data. After clicking get archived data, repeat steps 1-8 to run a switching sequence simulation using archived real-time data.

Switching sequences can be saved and utilized by the operator at any time. Activate the switching sequence saved in the project and execute the actions specified in real-time.

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