

**OPERATOR TRAINING PROGRAM
JOB PERFORMANCE MEASURE**

STATION:	SALEM		
SYSTEM:	Main Turbine Generator System		
TASK:	Synchronize the Main Generator IAW S2.OP-SO.TRB-0001.		
TASK NUMBER:	N0450040101		
JPM NUMBER:	16-01 NRC Sim-e		
ALTERNATE PATH:	<input type="checkbox"/>	K/A NUMBER:	045 A4.02
APPLICABILITY:	IMPORTANCE FACTOR:		
EO <input type="checkbox"/>	RO <input checked="" type="checkbox"/>	STA <input type="checkbox"/>	SRO <input checked="" type="checkbox"/>
			2.7 RO
			2.6 SRO
EVALUATION SETTING/METHOD:	Simulator / Perform		
REFERENCES:	S2.OP-SO.TRB-0001, Rev 47 (checked 12-15-17)		
TOOLS AND EQUIPMENT:	None		
VALIDATED JPM COMPLETION TIME:	<u>18 min</u>		
TIME PERIOD IDENTIFIED FOR TIME CRITICAL STEPS:	<u>N/A</u>		
Developed By:	R. Chan <i>Rudolph Chan</i> Instructor	Date: 12-15-17	
Validated By:	<i>N/A</i> R 12-15-17 SME or Instructor	Date: <i>N/A</i>	
Approved By:	Training Department <i>[Signature]</i>	Date: 12/15/17	
Approved By:	Operations Department <i>[Signature]</i>	Date: 12/15/17	
ACTUAL JPM COMPLETION TIME:			
ACTUAL TIME CRITICAL COMPLETION TIME:			
PERFORMED BY:			
GRADE:	<input type="checkbox"/> SAT	<input type="checkbox"/> UNSAT	
REASON, IF UNSATISFACTORY:			
EVALUATOR'S SIGNATURE:	DATE:		

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REVISION HISTORY

JPM NUMBER: 16-01 NRC Sim-e

Rev #	Date	Description	Validation Required
00	9-29-17	Added revision history and simulator setup pages. Editorial comments from IP 71111.11 FASA.	Yes
01	12-15-17	Updated to reflect procedure change to S2.OP-SO.TRB-0001, Rev 47 that removed Note on step 4.5.4 that was not applicable following AVR DCP.	No

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SIMULATOR SETUP INSTRUCTIONS

SYSTEM: Main Turbine Generator System
TASK: Synchronize the Main Generator IAW S2.OP-SO.TRB-0001
TASK NUMBER: N0450040101
SIMULATOR IC: IC-244
MALFUNCTIONS / REMOTES:

1. Reset the simulator to IC-244
2. No malfunctions inserted for this JPM.
3. Plant setup:
 - a. Turbine at 1800 rpm, Setter at 1801
 - b. Rx power at 16%
 - c. Steam dumps in MS set about 960 psi
 - d. Generator excitation completed IAW S2.OP-SO.TRB-0001, 4.4. VR set at 2092 amps
4. This setup will ensure that the turbine is rotating too slowly and INCOMING voltage is < 3 KV required to enable Synch Check relay.
5. This completes the setup for this JPM.

OVERRIDES: None

SPECIAL INSTRUCTIONS:

- **ENSURE** sufficient copies of marked up procedure S2.OP-SO.TRB-0001, **Rev. 47. DO NOT USE** the copy in the simulator. The Note at step 4.5.4 in Rev. 46 will confuse the operator during the task.
- At the Lead Evaluator's discretion; providing a marked up copy to the operator next in line could save time by allowing time to read all the Precautions and Limitations and Section 4.5.
- **ENSURE** Main Turbine and Generator parameter screens are open on P250 on 2CC2 console.

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NAME: _____

DATE: _____

SYSTEM: Main Turbine Generator System

TASK: Synchronize the Main Generator IAW S2.OP-SO.TRB-0001.

TASK NUMBER: N0450040101

INITIAL CONDITIONS:

- Unit 2 is at 16% power starting up from a maintenance outage.
- The crew is performing power ascension activities IAW S2.OP-IO.ZZ-0003, Hot Standby to Minimum Load.
- The main turbine is at 1800 rpm with generator excitation applied.

INITIATING CUE:

- You are the Plant Operator.
- The CRS has directed you to **synchronize** the Generator IAW S2.OP-SO.TRB-0001, Turbine-Generator Startup Operations, Section 4.5, Synchronizing the Generator.
 - All Prerequisites are completed SAT.
 - Step 4.5.1 IVs are completed SAT.
 - Synchronize the Generator starting at Step 4.5.2. The 500 KV 1-9 breaker will be closed first followed by the 500 KV 9-10 breaker.

Successful Completion Criteria:

1. All critical steps completed.
2. All sequential steps completed in order.
3. All time-critical steps completed within allotted time.
4. JPM completed within validated time. Completion time may exceed the validated time if satisfactory progress is being made (and NRC concurrence is obtained).

Task Standard for Successful Completion:

1. Synchronizes the Generator to the electrical grid IAW S2.OP-SO.TRB-0001.

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SYSTEM: Main Turbine Generator System

TASK: Synchronize the Generator IAW S2.OP-SO.TRB-0001

* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
		<p>PROVIDE the operator a copy of S2.OP-SO.TRB-0001, Rev. 47.</p> <p>Evaluator's Note: DO NOT USE the copy in the simulator (Rev. 46). This revision contains a Note at step 4.5.4 that is not applicable and could confuse the operator performing the task.</p>			
	CUE	<p>Fill in the JPM Start Time when the student acknowledges the Initiating Cue.</p> <p>START TIME: _____</p>			
		The following steps are from S2.OP-SO.TRB-0001, Turbine-Generator Startup Operations			
	4.5.2	ENSURE 500 KV BUS SECT 9-10 (30X) Breaker SELECTED to 9-10 LOCAL.	Operator verifies 9-10 Breaker is Selected to 9-10 LOCAL.		
	4.5.3	At 2RP6, SELECT NO. 2 UNIT SCOPE TRANSFER Switch to either REGULAR SCOPE or SPARE SCOPE position.	Operator verifies that REGULAR SCOPE is illuminated on 2PR6.		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
	4.5.4	MONITOR selected synchroscope while performing the following: 1. PRESS SCOPE TEST pushbutton on 500KV BREAKER SECTIONS 1-9 (32X) Bezel. 2. ENSURE synchroscope hand indicates 12 o'clock. 3. ENSURE INCOM KV and RUN KV Voltmeters both respond by moving upscale. 4. RELEASE SCOPE TEST pushbutton.	Operator depresses SCOPE TEST. Operator verifies synchroscope hand indicates 12 o'clock. Operator verifies that the INCOM KV and RUN KV voltmeters move upscale. Operator releases SCOPE TEST PB.		
	4.5.5	ENSURE that MAIN GEN SYNC PERM BYPASS keylock switch is in the NORMAL position.	Operator verifies MAIN GEN SYNCH PERM BYPASS keylock switch is in the NORMAL position.		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
*	4.5.6	<p>IF 500KV BUS SECT. 1-9 (32X) Breaker is available, THEN:</p> <p>1. SELECT Mimic Bus 500KV BUS SECT. 1-9 BREAKER 32X.</p> <p>a. ENSURE Mimic Bus pushbutton back light is yellow.</p> <p>b. ENSURE 1-9 MIMIC BUS INTERLOCK CLOSE SELECTION bezel back light is lit.</p> <p>2. SELECT 1-9 SYNCH POT ON.</p>	<p>Operator determines that the 500 KV 1-9 breaker will be closed first from the Initiating Cue sheet.</p> <p>Operator depresses 1-9 Mimic Bus PB and verifies the Mimic Bus PB illuminates yellow AND the console bezel for the MIMIC BUS 1-9 INTERLOCK CLOSE SELECTION is illuminated.</p> <p>Operator depresses the 1-9 SYNCH POT ON and verifies bezel illuminates.</p>		
	4.5.7	<p>IF 500KV BUS SECT. 1-9 (32X) Breaker is NOT available, THEN:</p> <p>1. SELECT Mimic Bus 500KV BUS SECT. 9-10 BREAKER 30X.</p> <p>a. ENSURE Mimic Bus pushbutton back light is yellow.</p> <p>b. ENSURE 9-10 (30X) bezel MIMIC BUS INTLK CLS SEL is lit.</p> <p>2. SELECT 9-10 SYNCH POT ON.</p>	<p>Operator determines Step is N/A since both 1-9 and 9-10 breakers are available and continues on.</p>		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
*	4.5.8	ADJUST INCOM KV (Generator Output Voltage) to 3 - 5KV greater than RUN KV (Line Voltage).	Operator determines that INCOM KV is NOT 3-5 KV greater than RUN KV. (As Found; INCOM KV = 499, RUN KV = 498) Operator adjust the Voltage Regulator to raise INCOM KV by: At the EXCITATION, VOLTAGE REGULATOR, VREG CNTRL SETPT ADJ bezel; operator depresses the RAISE SETPT bezel until INCOM KV is 3-5 KV greater than RUN KV (at least 501 KV to meet Synch Permissive)		
	NOTE	NOTE 1. The following parameters should be closely monitored when closing the generator output breaker: <input type="checkbox"/> Steam Dump Valve Demand <input type="checkbox"/> Reactor Power <input type="checkbox"/> RCS Pressure <input type="checkbox"/> S/G Steam Flow	Operator reads the Note and continues on.		
	CAUTION	CAUTION The T-Error recorder on 2RP3 will be inaccurate during initial loading of the Turbine-Generator. Raising Turbine Inlet Pressure will cause Tref to rise from the No-Load value of 547°F to the corresponding value for 40 – 60 MW, resulting in faster response of the T-Error pen. Only narrow range Tave should be monitored until a stable load is applied.	Operator reads the Caution and continues on.		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
	4.5.9	REQUEST Electric System Operator permission to load Main Generator.	Cue: The Electric System Operator grants permission to load main generator.		
	4.5.10	NOTIFY the Hope Creek CRS/SM that Unit 2 Generator is to be synchronized to the grid. 1. RECORD contact in Control Room Narrative Log.	Cue: Hope Creek CRS/SM is notified that Unit 2 will be synchronized to the grid. Cue: The extra NCO will record contact info in Narrative Log.		
	4.5.11	ADJUST RAMP RATES for the following to 10%/MIN: <input type="checkbox"/> VLV POS CNTRL <input type="checkbox"/> VLV POS LIM <input type="checkbox"/> TURB INLET PRESS CNTRL	Operator adjusts the RAMP RATES using the DEHC HMI panel and verifies that 10%/min is indicated on the HMI panel screen.		
	4.5.12	IF in OPERATOR MODE - AUTO, THEN:	At the DEHC HMI panel, the operator determines that OPERATOR MODE is in AUTO. Operator performs steps in section 4.5.12 as applicable.		
	NOTE	NOTE 1. MAIN GEN SYNC PERMISSIVE green indicating light will NOT light with any of the following: <input type="checkbox"/> MAIN GEN SYNC PERM BYPASS key lock switch in BYPASS position. <input type="checkbox"/> SYNCH POT OFF pushbutton selected. <input type="checkbox"/> INCOMING VOLTAGE less than RUNNING VOLTAGE <input type="checkbox"/> SYNCH SCOPE ROTATION is NOT every 25 - 30 seconds in the fast direction.	Operator reads Note and continues on.		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
*	4.5.12.1	<p>ADJUST turbine speed as follows until the synchroscope is rotating SLOWLY in the FAST direction at a rate of approximately 1 revolution in every 25 to 30 seconds:</p> <p>a. ADJUST the SETTER - SETTER slightly above the REFERENCE AND ACTUAL SPEED displays.</p> <p>b. SELECT SETTER - GO.</p>	<p>Operator determines that adjustment to turbine speed is required.</p> <p>Operator adjusts turbine speed using the DEHC HMI panel until synchroscope is rotating SLOWLY in the FAST direction. Note: the operator may use a stop watch or watch the clock.</p> <p>Operator adjusts SETTER above REFERENCE AND ACTUAL SPEED displays. (As found SETTER = 1801) Operator should select 1-2 rpm increments when adjusting turbine speed.</p> <p>Operator selects SETTER GO (illuminates Green) and verifies ACTUAL AND REFERENCE turbine speed adjusts to SETTER SPEED.</p> <p>SETTER speed of 1802-1803 is acceptable to meet the Synch Permissive.</p>		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
	4.5.12.2	<p>IF MAIN GEN SYNC PERMISSIVE green indicating light is NOT lit each time the synchroscope indicator is near the 12 o'clock position, OR is lit at any other synchroscope position, THEN:</p> <p>a. REQUEST permission from the CRS/SM to bypass the synchroscope interlock.</p> <p>b. PLACE MAIN GEN SYNC PERM BYPASS key lock switch in BYPASS.</p> <p>c. INITIATE a Notification to repair the circuit.</p>	<p>Operator determines that the SYCNH PERMISSIVE is operating properly and marks step N/A and continues on.</p> <p><u>IF</u> the MAIN GEN SYNC PERMISSIVE is NOT lit as expected, THEN provide the following cue:</p> <p>Cue: CRS directs you to re-perform Section 4.5.</p> <p><u>Note:</u> Not satisfying the Voltage and turbine speed requirements in Steps 4.5.8 and 4.5.12.1 would be the most likely cause for response not obtained.</p>		
		<p align="center">CAUTION</p> <p>Operator action is required upon Generator Output Breaker closure, if load is NOT automatically picked up within 15 seconds. [1% REFERENCE change approximately 10 MW (NOT to exceed 4%)]</p>	<p>Operator reads Caution and continues on.</p>		

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* #	STEP NO.	STEP (Shaded area denotes Critical Step) (* Critical Step)	STANDARD (Bolded area identifies Task Standard)	EVAL S/U	COMMENTS (Required for UNSAT evaluation)
*	4.5.12.3	WHEN synchroscope is 1 to 2 minutes before 12 o'clock, THEN CLOSE the selected 500KV GROUP BUS - BREAKER SECTION: <input type="checkbox"/> 1-9 (32X) OR <input type="checkbox"/> 9-10 (30X)	<p>Operator depresses the CLOSE PB for 500 KV GROUP BUS – BREAKER Section 1-9 (32X) when the synchroscope is 1 to 2 minutes before 12 o'clock and verifies 1-9 CLOSE PB is illuminated.</p> <p>Operator verifies load is rising on generator by monitoring <u>either</u> the MW indicator on 2RP3, MW Recorder on 2RP5, OR using the HMI panel GENERATOR LOAD lower left hand corner of screen. <u>Note:</u> the MW indicator on 2RP3 reads about 10 MW lower, so the operator may choose to raise load based on this indicator which is acceptable.</p>		

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	4.5.12.4	<p>IF GENERATOR LOAD - MW does NOT raise to approximately 40 MW - 60 MW within 15 seconds, THEN: [C0431]</p> <p>a. RAISE SETTER - SETTER display less than or equal to 4% above the REFERENCE display (approximately 1% for each 10 MW) AND SELECT SETTER - GO.</p> <p>OR</p> <p>b. SELECT OPERATOR MODE - MANUAL</p> <p>(1) SELECT RAISE until GENERATOR LOAD - MW are approximately 40 MW to 60 MW.</p> <p>(2) SELECT OPERATOR MODE - AUTO.</p>	<p>Operator verifies that generator load rises to 40 MW – 60 MW within 15 seconds and marks this step as N/A and continues on.</p> <p><u>Note:</u> the MW indicator on 2RP3 reads about 10 MW lower, so the operator may choose to raise load based on this indicator which is acceptable.</p> <p>If raising load, THEN the Operator adjusts the SETTER to 1-3% above the reference THEN selects GO. (<u>Note:</u> during validations the SETTER is about 12%)</p>		
	4.5.12.5	<p>SELECT SYNCH POT OFF for the selected 500KV GROUP BUS -BREAKER SECTION:</p> <p><input type="checkbox"/> 1-9 (32X)</p> <p>OR</p> <p><input type="checkbox"/> 9-10 (30X)</p>	<p>Operator depresses the SYNCH POT OFF PB and verifies bezel illuminates.</p>		
	CUE:	<p>JPM is Complete</p> <p>RECORD the STOP TIME.</p> <p>STOP TIME: _____</p>	<p>Terminate the JPM when the operator completes Step 4.5.12.5 or at Lead Evaluators direction.</p>		

OPERATIONS DEPARTMENT
JOB PERFORMANCE MEASURE

TQ-AA-106-0303

JPM: 16-01 NRC Sim-e

JOB PERFORMANCE MEASURE VALIDATION CHECKLIST

NOTE: All steps of this checklist should be performed upon initial validation. Prior to JPM usage, revalidate JPM using steps 8 and 11 below.

- _____ 1. Task description and number, JPM description and number are identified.
- _____ 2. Knowledge and Abilities (K/A) references are included.
- _____ 3. Performance location specified. (in-plant, control room, or simulator)
- _____ 4. Initial setup conditions are identified.
- _____ 5. Initiating and terminating Cues are properly identified.
- _____ 6. Task standards identified and verified by SME review.
- _____ 7. Critical steps meet the criteria for critical steps and are identified with an asterisk (*).
- _____ 8. Verify the procedure referenced by this JPM matches the most current revision of that procedure: Procedure Rev. _____ Date _____
- _____ 9. Pilot test the JPM:
 - a. verify Cues both verbal and visual are free of conflict, and
 - b. ensure performance time is accurate.
- _____ 10. If the JPM cannot be performed as written with proper responses, then revise the JPM.
- _____ 11. When JPM is revalidated, SME or Instructor sign and date JPM cover page.

SME/Instructor: _____

Date: _____

SME/Instructor: _____

Date: _____

SME/Instructor: _____

Date: _____

**OPERATIONS DEPARTMENT
JOB PERFORMANCE MEASURE**

INITIAL CONDITIONS:

- Unit 2 is at 18% power starting up from a refueling outage.
- The crew is performing power ascension activities IAW S2.OP-IO.ZZ-0003, Hot Standby to Minimum Load.
- The main turbine is at 1800 rpm with generator excitation applied.

INITIATING CUE:

- You are the Plant Operator.
- The CRS has directed you to **synchronize** the Generator IAW S2.OP-SO.TRB-0001, Turbine-Generator Startup Operations, section 4.5, Synchronizing the Generator.
 - All Prerequisites are completed SAT.
 - Step 4.5.1 IVs are completed SAT.
 - Synchronize the Generator starting at Step 4.5.2. The 500 KV 1-9 breaker will be closed first followed by the 500 KV 9-10 breaker.