

TD-OP-0057



OPERATING PROCEDURE FOR AKYEMPIM SUBSTATION

GHANA GRID COMPANY LTD

TECHNICAL DIRECTIVES

Title: OPERATING PROCEDURE FOR AKYEMPIM SUBSTATION (AR57)		
Issued To: Director, System Operations Director, NNS Manager, SCC Manager, Dispatch Operations Area Manager, Kumasi Operating Staff, Kumasi Area Maintenance Staff, Kumasi Area Dispatch Staff, SCC	Number: TD-OP-0057	
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TECHNICAL DIRECTIVES

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1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at AR57 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Kumasi Operating Area and System Control Center (SCC) for operation of equipment at AR57 Substation.

3. Procedure

3.1. To take AR1AS line out of service

SCC shall carry out (or advise the AR57 Operator to carry out) the following:

- Open 57AL1 breaker

SCC shall advise AS20 Operator to carry out the following:

- Verify opened 20AR1AS-S bypass disconnect switch

SCC shall carry out (or advise the AS20 Operator to carry out) the following:

- Open 20AR1AS breaker
- Check for no potential on AR1AS line

3.2. To take out, isolate and de-energize AR1AS line for work

- AR57 Operator request for Station Guarantee from AS20

SCC shall carry out (or advise the AR57 Operator to carry out) the following:

- Open 57AL1 breaker

SCC shall carry out (or advise AS20 Operator to carry out) the following:

- Check opened 20AR1AS-S bypass disconnect switch and turn off its 125Vdc supply
- Open 20AR1AS breaker
- Check for no potential on AR1AS line

SCC shall advise AS20 Operator to carry out the following:

- Open 20AR1AS-L1 disconnect switch and turn off its 125Vdc supply
- Close 20AR1AS-G ground disconnect switch

SCC shall advise AR57 Operator to carry out the following:

- Open 57AL1-L1 disconnect switch and turn off its 125Vdc supply
- Close 57AR1AS-G ground disconnect switch

3.3. To restore AR1AS line to service after work

3.3.1. Prepare AR1AS line for restoration:

AR57 Operator shall:

- Advise SCC when work on the line has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on AR1AS line

SCC shall advise AS20 Operator to carry out the following:

- Check opened 20AR1AS-S bypass disconnect switch and turn on its 125Vdc supply
- Check opened 20AR1AS breaker
- Open 20AR1AS-G ground disconnect switch
- Turn on 125Vdc supply and close 20AR1AS-L1 disconnect switch

SCC shall advise AR57 Operator to carry out the following:

- Check opened 57AL1 breaker
- Open 57AR1AS-G ground disconnect switch
- Turn on 125Vdc supply and close 57AL1-L1 disconnect switch

3.3.2. Restoration of AR1AS line to service:

SCC shall:

- Advise the AS20 and AR57 Operators of readiness to restore AR1AS line to service
- Close (or advise the AS20 Operator to close) 20AR1AS breaker
- Close (or advise the AR57 Operator to close) 57AL1 breaker

3.4. To restore AR1AS line to service after automatic outage

If AR1AS line trips auto due to fault:

AR57 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall:

- Energize (or advise the AS20 Operator to energize) the line **ONCE** by closing 20AR1AS breaker
- Close (or advise the AR57 Operator to close) 57AL1 breaker

AR57 Operator shall:

- Advise the Supervisor/Area Manager of operation above
- Advise maintenance men to patrol the line if the operation above is not successful

3.5. To take D3AR line out of service

SCC shall carry out (or advise the AR57 Operator to carry out) the following:

- Open 57L3A breaker

SCC shall carry out (or advise the D11 Operator to carry out) the following:

- Verify opened 11D3AR-S bypass disconnect switch and turn off its 125Vdc supply
- Open 11D3AR breaker
- Check for no potential on D3AR line

3.6. To take out, isolate and de-energize D3AR line for work

- AR57 Operator shall request for Station Guarantee from D11

SCC shall carry out (or advise the AR57 Operator to carry out) the following:

- Open 57L3A breaker

SCC shall advise D11 Operator to carry out the following:

- Check opened 11D3AR-S bypass disconnect switch and turn off its 125Vdc supply

SCC shall carry out (or advise the D11 Operator to carry out) the following:

- Open 11D3AR breaker
- Check for no potential on D3AR line

SCC shall advise D11 Operator to carry out the following:

- Open 11D3AR-L3 and turn off its 125Vdc supply
- Close 11D3AR-G ground disconnect switch

SCC shall advise AR57 operator to carry out the following:

- Open 57L3A-L3 and turn off its 125Vdc supply
- Close 57D3AR-G ground disconnect switch

3.7. To restore D3AR line to service after work

3.7.1. Prepare D3AR line for restoration:

AR57 Operator shall:

- Advise SCC when work on the line has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on D3AR line

SCC shall advise D11 Operator to carry out the following:

- Check opened 11D3AR-S bypass disconnect switch and turn off its 125Vdc supply
- Check opened 11D3AR breaker
- Open 11D3AR-G ground disconnect switch
- Turn on 125Vdc supply and close 11D3AR-L3 disconnect switch

SCC shall advise AR57 Operator to carry out the following:

- Check opened 57L3A breaker
- Open 57D3AR-G ground disconnect switch

- Turn on 125Vdc supply and close 57L3A-L3 disconnect switch

3.7.2. Restoration of D3AR line to service:

SCC shall:

- Advise the D11 and AR57 Operators of readiness to restore D3AR line to service
- Close (or advise the D11 Operator to close) 11D3AR breaker
- Close (or advise the AR57 Operator to close) 57L3A breaker

3.8. To restore D3AR line to service after automatic outage

If D3AR line trips auto due to fault:

AR57 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall:

- Energize (or advise the D11 Operator to energize) the line **ONCE** by closing 11D3AR breaker
- Close (or advise the AR57 Operator to close) 57L3A breaker

AR57 Operator shall:

- Advise the Supervisor/Area Manager of operation above
- Advise maintenance men to patrol the line if the operation above is not successful

3.9. To isolate 57T1 Transformer for work

AR57 Operator may request Station Guarantee from Customer on 57F1 Feeder

SCC shall advise AR57 Operator to carry out the following:

- Inform Customer about readiness to take off 57T1 bank

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- Request Customer on 57T1 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 57T1 transformer auxiliaries
- Transfer Station Service from 57TSS1 to the Standby Generator

SCC shall carry out (or advise AR57 Operator to carry out) the following:

- Open 57BF1 and 57SC1.2B breakers
- Open 57T1B breaker
- Open 57AT1 breaker
- Check for no potential on 57T1 Bank
- Open 57AT1-A disconnect switch and turn off its 125Vdc supply
- Open 57T1B-B disconnect switch
- Open AC control MCB to 57T1 auxiliaries and tag
- Open 125V DC MCB to 57T1 primary and secondary protection and tag with PC13

3.10. To restore 57T1 Bank to service after work

3.10.1. Prepare 57T1 Bank for restoration:

AR57 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 57T1 Bank and temporary grounds removed
- Close 57T1B-B disconnect switch
- Turn on 125Vdc supply and close 57AT1-A disconnect switch
- Close AC control MCB to 57T1 auxiliaries and remove tag
- Close 125V DC MCB to 57T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 57T1 Bank to service

3.10.2. Restoration of 57T1 Bank to service:

- SCC shall close (or advise AR57 Operator to close) the 57AT1 breaker

- AR57 Operator shall advise customers of readiness to restore 57F1 feeder to service
- SCC shall close (or advise AR57 Operator to close) the 57T1B and 57BF1 breakers

3.11. To restore 57T1 Bank to service after automatic outage

If 57T1 bank trips auto due to fault:

AR57 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall energize (or advise the AR57 Operator to energize) the bank ONCE by closing 57AT1 breaker

AR57 Operator shall advise Customer of readiness to restore 57F1 feeder to service

SCC shall close (or advise AR57 Operator to close) 57T1B and 57BF1 breakers

AR57 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above
- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.12. To Isolate 57T1B Breaker for work

- AR57 Operator may request Station Guarantee from Customer on 57F1 Feeder

SCC shall advise AR57 Operator to carry out the following:

- Inform Customer about readiness to take off 57T1 bank
- Request Customer on 57T1 Bank to take off their load
- Transfer station service supply from 57TSS1 to Standby Generator

SCC shall carry out (or advise AR57 Operator to carry out) the following:

- Open 57BF1 and 57SC1.2B breakers
- Open 57T1B breaker
- Open 57AT1 breaker

SCC shall advise AR57 Operator to carry out the following:

- Open 57BF1-B disconnect switch
- Open 57T1B-B disconnect switch
- Open 57AT1-A disconnect switch and turn off its 125Vdc supply
- Check for no potential on 57T1 Bank

3.13. To restore 57T1B Breaker to service after work

3.13.1. Prepare 57T1B Breaker for restoration:

AR57 Operator shall:

- Advise SCC when work on the 57T1B breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 57T1B Breaker and temporary grounds removed
- Close 57BF1-B disconnect switch
- Close 57T1B-B disconnect switch
- Turn on 125Vdc supply and close 57AT1-A disconnect switch

3.13.2. Restoration of 57T1B breaker to service:

- SCC shall close (or advise AR57 Operator to close) the 57AT1 breaker
- AR57 Operator shall advise customers of readiness to restore 57F1 feeder to service
- SCC shall close (or advise AR57 Operator to close) the 57T1B breaker
- SCC shall close (or advise AR57 Operator to close) the 57BF1 breaker

3.14. To isolate 57BF1 Breaker for work

- AR57 Operator shall request Station Guarantees from Customer on 57F1 Feeder

SCC shall advise AR57 Operator to carry out the following:

- Inform Customer about readiness to take off 57F1 feeder
- Request Customer on 57F1 feeder to take off their load

SCC shall carry out (or advise AR57 Operator to carry out) the following:

- Open 57BF1 breaker
- Open 57T1B breaker

SCC shall advise AR57 Operator to carry out the following:

- Open 57BF1-F1 disconnect switch
- Open 57BF1-B disconnect switch

3.15. To restore 57BF1 Breaker to service after work

3.15.1. Prepare 57BF1 Breaker for restoration:

AR57 Operator shall:

- Advise SCC when work on the 57BF1 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 57BF1 Breaker and temporary grounds removed
- Close 57BF1-B disconnect switch
- Close 57BF1-F1 disconnect switch

3.15.2. Restoration of 57BF1 Breaker to service:

- AR57 Operator shall advise customers of readiness to restore 57F1 feeder to service
- SCC shall close (or advise AR57 Operator to close) the 57T1B breaker
- SCC shall close (or advise AR57 Operator to close) the 57BF1 breaker

4. Explanation

Transformer and Bus automatic outages may be caused by the following relay operations:

- Transformer differential lockout relay-86T

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- Transformer Bucholtz relay or high temperature lockout relay-86G
- Transformer overcurrent back up relays
- a. If 86T operates, the breakers which have opened auto, cannot be reclosed until the lockout relay has been reset or the lockout feature has been by-passed.
- Carry out thorough inspection of the Transformer and the 34kV and 11kV Structures looking for oil leakage, shattered insulators on the structures and dead birds or reptiles
- b. 86T can be reset manually immediately after an automatic outage if the station is attended.
- c. 86G cannot be reset unless transformer gas and / or temperature conditions are normal or the MCB to the transformer protective relays is off.

NOTE:

- I. If it has been necessary to restore the MCB to the transformer relay in order to reset 86G and restore a healthy bank to service, they shall not be restored until the gas and /or temperature conditions on the faulted bank is rectified.
- II. Operation of 86T or 86G lockout relays may be due to major transformer faults hence No attempt should be made to re-energize the bank until Electrical Maintenance staff have inspected and meggered the Transformer.

ISOLATION AND DE-ENERGIZING

1. Open the necessary breaker(s) to take the line off potential.
2. Check all three phases off potential using the Multifunction meter or Analog Voltmeter or for Pole discrepancies on the panel.
3. Open the necessary disconnect switches or MODS to isolate the line from all sources of supply.
4. Close the Grounding Switch.
5. Report completion of the isolation and de-energizing at all assisting stations, to the where the Protection Guarantee is to be issued and to System Control Centre.
6. Issue Work or Work and Test Permit to the workman.

ORDER TO OPERATE

1. An O.TO. (Order-To-Operate) to isolate a line is as follows:
 - a. Line Voltage - Check all three phases off potential

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- b. Line Breaker - Check Open
 - c. Line Disconnect Switches - Open, lock and Tag (MCB to MOD Turn-off)
2. Due to communication difficulties arising when grounds are placed on a line it is necessary to issue a Protection Guarantee on the line before grounds are placed. A work and Test Permit allows for closing and opening permanent grounds switches while the Permit is in effect.
 3. If work is to be done a permanent ground switches a PC 14 to close the ground switch is not required.

The station is only one 161Kv bus arrangement. The main "A" bus provides the the normal points of supply to all circuits/equipment such as AR1AS (Ayanfuri – Asawinso), AS2JB (Asawinso – Juaboso), AS3BT (Asawinso – Obotan) lines, 20T1 and 20T2 Transformers.

5. Approval

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Director, TSD