TD-OP-0033

GRIDCo

OPERATING PROCEDURE FOR SOGAKOPE SUBSTATION

GHANA GRID COMPANY LTD

TECHNICAL DIRECTIVES

Title:	**OPERATING PROCEDURE FOR SOGAKOPE SUBSTATION (SK33)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Tema Operating Staff, Tema Area Maintenance Staff, Tema Area Dispatch Staff, SCC	**Number:**	TD-OP-0033
		Subject Area:	Operating
		Issue Date:	Trial
		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

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TECHNICAL DIRECTIVES

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at SK33 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Tema Operating Area and System Control Center (SCC) for operation of equipment at SK33 Substation.

3. Procedure

3.1. To take AP2SK line out of service

SCC shall advise SK33 operator to carry out the following:

- Inform Customer about readiness to take off AP2SK line
- Request Customer on 33T1 Bank to take off their load

SCC shall carry out (or advise the SK33 Operator to carry) out the following:

- Open 33AP2SKT1 breaker

SCC shall carry out (or advise AP22 Operator to carry) out the following:

- Open 22T2L2 breaker
- Check for no potential on AP2SK line

3.2. To take out, isolate and de-energize AP2SK line for work

- SK33 Operator shall request for Station Guarantee from AP22

SCC shall advise SK33 operator to carry out the following:

- Inform Customer about readiness to take off AP2SK line
- Request Customer on 33T1 Bank to take off their load

SCC shall carry out (or advise the SK33 Operator to carry out) the following:

- Open 33AP2SKT1 breaker
- Open 33T1Y breaker

SCC shall carry out (or advise AP22 Operator to carry out) the following:

- Open 22T2L2 breaker

- Check for no potential on AP2SK line

SCC shall advise SK33 Operator to carry out the following:

- Open 33AP2SKT1-L2 disconnect switch and turn off its 125Vdc supply
- Close 33AP2SK-G ground disconnect switch

SCC shall advise AP22 Operator to carry out the following:

- Open 22T2L2-L2 disconnect switch and turn off its 125Vdc supply
- Close 22AP2SK-G ground disconnect switch

3.3. To restore AP2SK line to service after work

3.3.1. Prepare AP2SK line for restoration

SK33 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 AP2SK line

SCC shall advise AP22 Operator to carry out the following:

- Check opened 22T2L2 breaker
- Open 22AP2SK-G ground disconnect switch
- Turn on 125Vdc supply and close 22T2L2-L2 disconnect switch

SCC shall advise SK33 Operator to carry out the following:

- Check opened 33AP2SKT1 breaker
- Open 33AP2SK-G ground disconnect switch
- Turn on 125Vdc supply and close 33AP2SKT1-L2 disconnect switch

3.3.2. Restoration of AP2SK line to service:

SCC shall:

- Advise the AP22 and SK33 Operators of readiness to restore AP2SK line to service
- Close (or advise the AP22 Operator to close) 22T2L2 breaker

- Close (or advise the SK33 Operator to close) 33AP2SKT1 breaker

3.4. To restore AP2SK line to service after automatic outage

If AP2SK line trips auto due to fault:

SK33 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 AP22 Operator to energize) the line **ONCE** by closing 22T2L2 breaker
- Close (or advise the SK33 Operator to close) 22AP2SKT1 breaker

AP22 Operator:

- 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 isolate 33T1 Transformer for work

- SK33 Operator shall request Station Guarantee from Customer on 33F1 Feeder

SCC shall advise the SK33 Operator to carry out the following:

- Inform Customer about readiness to take off 33T1 Bank
- Request Customer on 33T1 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 33T1 transformer auxiliaries

SCC shall carry out (or advise SK33 Operator to carry out) the following:

- Open 33T1Y breaker
- Open 33AP2SKT1 breaker

- Check for no potential on 33T1 Bank
- Open 33AP2SKT1-L2 disconnect switch and turn off its 125Vdc supply
- Open 33T1Y-Y disconnect switch and turn off its 125V dc supply
- Open AC control MCB to 33T1 auxiliaries and tag
- Open 125V DC MCB to 33T1 primary and secondary protection and tag with PC13

3.6. To restore 33T1 bank to service after work

3.6.1. Prepare 33T1 Bank for restoration

SK33 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 33T1 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 33T1Y-Y disconnect switch
- Turn on 125Vdc supply and close 33AP2SKT1-L2 disconnect switch
- Close AC control MCB to 33T1 auxiliaries and remove tag
- Close 125V DC MCB to 33T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 33T1 Bank to service

3.6.2. Restoration of 33T1bank to service:

- SCC shall close (or advise SK33 Operator to close) 33AP2SKT1 and 33T1Y breakers
- SK33 Operator shall advise Customer of readiness to restore 33T1 feeder to service
- SCC shall close (or advise SK33 Operator to close) 33T1Y breaker

3.7. To restore 33T1 Bank to service after automatic outage

If 33T1 bank trips auto due to fault:

SK33 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 advise SK33 Operator to advise Customer of readiness to restore 33T1 feeder to service

SCC shall close (or advise the SK33 Operator to close) the bank ONCE by closing 33AP2SKT1 and 33T1Y breakers

SK33 Operator shall:

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

3.8. To isolate 33T1Y Breaker for work

SCC shall advise SK33 Operator to carry out the following:

- Inform Customer about readiness to take off 33T1 bank
- Request Customer on 33T1 Bank to take off their load
- Transfer Station Service from 33T1 to Standby Generator
- Open AC1 Contactor/MCB to take off supply to 33T1 transformer auxiliaries

SCC shall carry out (or advise SK33 Operator to carry out) the following:

- Open 33T1Y breaker
- Open 33AP2SKT1 breaker
- Check for no potential on 33T1 Bank
- Open 33AP2SKT1-L2 disconnect switch and turn off its 125Vdc supply
- Open 33T1Y-Y disconnect switch

3.9. To restore 33T1Y Breaker for service after work

3.9.1. Prepare 33T1Y breaker for restoration

SK33 Operator shall:

- Advise SCC when work on breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 33T1 bank and temporary grounds removed
- Close 33T1Y-Y disconnect switch
- Turn on 125Vdc supply and close 33AP2SKT1-L2 disconnect switch
- Advise SCC of readiness to restore 33T1bank to service

3.9.2. Restoration of 33T1Y breaker to service:

- SCC shall advise SK33 Operator to advise Customer of readiness to restore 33T1 bank to service
- SCC shall close (or advise SK33 Operator to close) 33AP2SKT1 and 33T1Y breakers

4. Explanation

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

- Transformer differential lockout relay-86T
- 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
    b. Line Breaker - Check opened
    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 normal points of supply to all circuits/equipment such as AP2SK line, 33T1 transformer.

5. Approval

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Director, TSD