TD-OP-0080

GRIDCo

OPERATING PROCEDURE FOR DAWA SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR DAWA SUBSTATION (DA80)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Dawa Operating Staff, Dawa Maintenance Staff, Dawa Dispatch Staff, SCC	**Number:**	TD-OP-0080
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		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

TECHNICAL DIRECTIVES

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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 DA80 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Dawa Operating Area and System Control Center (SCC) for operation of equipment at DA80 Substation.

3. Procedure

3.1. To take SG6DA line out of service

SCC shall carry out (or advise the DA80 Operator to carry out) the following:

- Open 80L6E and 80L1L6 breakers

SCC shall advise SG51 Operator to carry out the following:

- Open 51PEL6 breaker
- Check for no potential on SG6DA line

3.2. To take out, isolate and de-energize SG6DA line for work

- DA80 Operator shall request for Station Guarantee from SG51

SCC shall carry out (or advise the DA80 Operator to carry out) the following:

- Open 80L6E and 80L1L6 breakers

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PEL6 breaker
- Check for no potential on SG6DA line

SCC shall advise SG51 Operator to carry out the following:

- Open 51PEL6-L6 disconnect switch and turn off its 125Vdc supply
- Close 51SG6DA-G ground disconnect switch

SCC shall advise DA80 Operator to carry out the following:

- Open 80L6E-L6 and 80L1L6-L6 disconnect switches and turn off its 125Vdc

supply

- Close 80SG6DA-G ground disconnect switch

3.3. To restore SG6DA line to service after work

3.3.1. Prepare SG6DA line for restoration

DA80 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 SG6DA line

SCC shall advise SG51 Operator to carry out the following

- Check opened 51PEL6 breaker
- Open 51SG6DA-G ground disconnect switch
- Turn on 125Vdc supply and close 51PEL6-L6 disconnect switch

SCC shall advise DA80 Operator to carry out the following:

- Check opened 80L6E and 80L1L6 breakers
- Open 80SG6DA-G ground disconnect switch
- Turn on 125Vdc supply and close 80L6E-L6 and 80L1L6-L6 disconnect switches

3.3.2. Restoration of SG6DA line to service:

SCC shall:

- Advise the DA80 and SG51 Operators of readiness to restore SG6DA line to service
- Close (or advise the SG51 Operator to close) 51PEL6 breaker
- Close (or advise the DA80 Operator to close) 80L6E and 80L1L6 breakers

3.4. To restore SG6DA line to service after automatic outage

If SG6DA line trips auto due to fault:

E80 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 SG51 Operator to energize) the line **ONCE** by closing 51PEL6 breaker
- Close (or advise the DA80 Operator to close) 80L6E and 80L1L6 breakers

E80 Operator shall:

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

3.5. To take DA1DV line out of service

SCC shall carry out (or advise the DA80 Operator to carry out) the following:

- Open 80PL1 and 80L1L6 breakers

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

- Open ---------- breaker
- Check for no potential on DA1DV line

3.6. To take out, isolate and de-energize DA1DV line for work

- DA80 Operator shall request for Station Guarantee from EL36

SCC shall carry out (or advise the DA80 Operator to carry out) the following:

- Open 80PL1 and 80L1L6 breakers

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

- Open ---------- breaker

- Check for no potential on DA1DV line

SCC shall advise DA80 Operator to carry out the following:

- Open 80PL1-L6 and 80L1L6-L6 disconnect switches and turn off its 125Vdc supply

- Close 80DA1DV-G ground disconnect switch

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

- Open ---------- disconnect switch and turn off its 125Vdc supply

- Close ……DA1DV-G ground disconnect switch

3.7. To restore DA1DV line to service after work

3.7.1. Prepare DA1DV line for restoration

DA80 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 DA1DV line

SCC shall advise DA80 Operator to carry out the following

- Check opened 80PL1 and 80L1L6 breakers

- Open 80DA1DV-G ground disconnect switch

- Turn on 125Vdc supply and close 80PL1-L6 and 80L1L6-L6 disconnect switches

SCC shall advise EL36 Operator to carry out the following:

- Check opened -------- breaker

- Open …….DA1DV-G ground disconnect switch

- Turn on 125Vdc supply and close ---------- disconnect switch

3.7.2. Restoration of DA1DV line to service:

SCC shall:

- Advise the DA80 and ------ Operators of readiness to restore DA1DV line to service

- Close (or advise the DA80 Operator to close) 80PL1 and 80L1L6 breakers
- Close (or advise the ---- Operator to close) ------- breaker

3.8. To restore DA1DV line to service after automatic outage

If DA1DV line trips auto due to fault:

DA80 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 DA80 Operator to energize) the line **ONCE** by closing 80PL1 and 80L1L6 breakers
- Close (or advise the ……. Operator to close) ……. breaker

DA80 Operator shall:

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

3.9. To isolate 80T1 Transformer for work

- DA80 Operator shall request for Station Guarantee from Customer on 80Y1 Bus

SCC shall carry out or advise DA80 Operator to carry out the following:

- Inform Customers about readiness to take off 80T1 Bank
- Request Customers on 80T1 Bank to take off their load
- Transfer Station Service supply from 80TSS1 to 80TSS2
- Open AC1 Contactor/MCB to take off supply to 80T1 transformer auxiliaries

SCC shall carry out (or advise DA80 Operator to carry out) the following:

- Open 80T1Y1 breaker
- Open 80ET1 and 80T1T2 breakers

DA80 Operator shall:

- Check for no potential on 80T1 Bank
- Open 80ET1-T1 and 80T1T2-T1 disconnect switches and turn off 125Vdc supply
- Open 80T1Y1-T1 disconnect switch
- Check open 80T1Y1-S disconnect switch
- Open AC control MCB to 80T1 auxiliaries and tag
- Open 125Vdc MCB to 80T1 primary and secondary protection and tag with PC13

3.10. To restore 80T1 Bank to service

3.10.1. Prepare 80T1 Bank restoration:

DA80 Operation shall:

- Advise SCC when work on the bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 80T1 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 80ET1-T1 and 80T1T2-T1 disconnect switches
- Check open 80T1Y1-S disconnect switch
- Close 80T1Y1-T1 disconnect switch
- Close AC control MCB to 80T1 auxiliaries and remove tag
- Close 125Vdc MCB to 80T1 primary and secondary protection and remove PC13 tag
- Advise SCC and Customers of readiness to energize 80T1 bank

3.10.2. Restoration of 80T1 Bank:

- SCC shall close (or advise DA80 Operator to close) the 80ET1 and 80T1T2 breakers

- Transfer Station Service supply from 80TSS2 to 80TSS1
- DA80 Operator shall advise Customers of readiness to restore 80Y1 feeders to service
- SCC shall close (or advise DA80 Operator to close) 80T1Y1 breaker

3.11. To restore 80T1 Bank to service after automatic outage

If 80T1 Bank trips auto due to fault:

DA80 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 DA80 Operator to energize) the bank **ONCE** by closing 80ET1 and 80T1T2 breakers

DA80 Operator shall advise Customers of readiness to restore 80Y1 feeders to service

SCC shall close (or advise DA80 Operator to close) 80T1Y1 breaker

DA80 Operator shall:

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

3.12. To isolate 80T2 Transformer for work

- DA80 Operator shall request for Station Guarantee from Customer on 80Y2 Bus

SCC shall carry out or advise DA80 Operator to carry out the following:

- Inform Customers about readiness to take off 80T2 Bank
- Request Customers on 80T2 Bank to take off their load

- Transfer Station Service supply from 80TSS2 to 80TSS1

- Open AC1 Contactor/MCB to take off supply to 80T2 transformer auxiliaries

SCC shall carry out (or advise DA80 Operator to carry out) the following:

- Open 80T2Y2 breaker

- Open 80PT2 and 80T1T2 breakers

DA80 Operator shall:

- Check for no potential on 80T2 Bank

- Open 80PT2-T2 and 80T1T2-T2 disconnect switches and turn off 125Vdc supply

- Open 80T2Y2-T2 disconnect switch

- Check open 80T2Y2-S disconnect switch

- Open AC control MCB to 80T2 auxiliaries and tag

- Open 125Vdc MCB to 80T2 primary and secondary protection and tag with PC13

3.13. To restore 80T2 Bank to service

3.13.1. Prepare 80T2 Bank restoration:

DA80 Operation shall:

- Advise SCC when work on the bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 80T2 Bank and temporary grounds removed

- Turn on 125Vdc supply and close 80PT2-T2 and 80T1T2-T2 disconnect switches

- Check open 80T2Y2-S disconnect switch

- Close 80T2Y2-T2 disconnect switch
- Close AC control MCB to 80T2 auxiliaries and remove tag

- Close 125Vdc MCB to 80T2 primary and secondary protection and remove PC13 tag

- Advise SCC and Customers of readiness to energize 80T2 bank

3.13.2. Restoration of 80T2 Bank:

- SCC shall close (or advise DA80 Operator to close) the 80PT2 and 80T1T2 breakers

- Transfer Station Service supply from 80TSS2 to 80TSS1

- DA80 Operator shall advise Customers of readiness to restore 80Y2 feeders to service

- SCC shall close (or advise DA80 Operator to close) 80T2Y2 breaker

3.14. To restore 80T2 Bank to service after automatic outage

If 80T2 Bank trips auto due to fault:

DA80 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 DA80 Operator to energize) the bank **ONCE** by closing 80PT2 and 80T1T2 breakers

DA80 Operator shall advise Customers of readiness to restore 80Y2 feeders to service

SCC shall close (or advise DA80 Operator to close) 80T2Y2 breaker

DA80 Operator shall:

- Advise the Supervisor/Manager of operation above

- Isolate the Transformer for maintenance men to work on the equipment if operation above is not successful. See Explanation.

3.15. To isolate 80T1Y1 Breaker for work

- DA80 Operator shall request for Station Guarantee from Customer on 80Y1 feeders

SCC shall carry out (or advise DA80 Operator to carry out) the following:

- Open 80T1Y1 breaker

SCC shall advise DA80 Operator to carry out the following:

- Open 80T1Y1-T1, 80T1Y1-F1 and 80T1Y1-S disconnect switches and turn off its 125Vdc supply

3.16. To restore 80T1Y1 Breaker to service

3.16.1. Prepare 80T1Y1 Breaker restoration:

DA80 Operation shall:

- Advise SCC when work on the breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check 80T1Y1 Breaker in the opened position and temporary grounds removed

- Turn-on Close 80T1Y1-T1, 80T1Y1-F1 and 80T1Y1-S disconnect switches

3.16.2. Restoration of 80T1Y1 Breaker:

- SCC shall close (or advise DA80 Operator to close) the 80T1Y1 breaker

- DA80 Operator shall advise Customers of readiness to restore 80Y1 feeders to service

- SCC shall close (or advise DA80 Operator to close) 80YF2 breaker

3.17. To isolate 80T2Y2 Breaker for work

- DA80 Operator shall request for Station Guarantee from Customer on 80Y2 feeders

SCC shall carry out (or advise DA80 Operator to carry out) the following:

- Open 80T2Y2 breaker

SCC shall advise DA80 Operator to carry out the following:

- Open 80T2Y2-T2, 80T2Y2-F2 and 80T2Y2-S disconnect switches and turn off its 125Vdc supply

3.18. To restore 80T2Y2 Breaker to service

3.18.1. Prepare 80T2Y2 Breaker restoration:

DA80 Operation shall:

- Advise SCC when work on the breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check 80T2Y2 Breaker in the opened position and temporary grounds removed
- Turn-on Close 80T2Y2-T1, 80T2Y2-F2 and 80T2Y2-S disconnect switches

3.18.2. Restoration of 80T2Y2 Breaker:

- SCC shall close (or advise DA80 Operator to close) the 80T2Y2 breaker
- DA80 Operator shall advise Customers of readiness to restore 80Y2 feeders to service
- SCC shall close (or advise DA80 Operator to close) 80YF2 breaker

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 80kV 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 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 has two 330kV buses. The main 'E' and 'P' buses, a breaker and half configuration provide the normal points of supply to all circuits/equipment such as DA1DV, SG6DA lines, 80T1and 80T2 Transformers.

5. Approval

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Director, Technical Services