TD-OP-0083

GRIDCo

OPERATING PROCEDURE FOR ACCRA CENTRAL SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR ACCRA CENTRAL SUBSTATION (AC83)**		
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-0083
		Subject Area:	Operating
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Contents

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at AC83 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Accra Operating Area and System Control Center (SCC) for operation of equipment at AC83 Substation.

3. Procedure

3.1. To take H2AC line out of service

SCC shall carry out (or advise the AC83 Operator to carry out) the following:

- Open 83H2AC breaker

SCC shall carry out (or advise the AC83 Operator to carry out) the following:

- Open 5DL2 and 5L2L6 breakers
- Check for no potential on H2AC line

3.2. To take out, isolate and de-energize H2AC line for work

- AC83 Operator shall request for Station Guarantee from H5

SCC shall carry out (or advise the AC83 Operator to carry out) the following:

- Open 83H2AC breaker

SCC shall carry out (or advise the H5 Operator to carry out) the following:

- Open 5L2L6 and 5DL2 breakers

- Check for no potential on H2AC line

SCC shall advise H5 Operator to carry out the following:

- Open 5L2L6-L2 and 5DL2-L2 disconnect switches and turn off its 125Vdc supply

- Close 5H2AC-G ground disconnect switch

SCC shall advise AC83 Operator to carry out the following:

- Open 83H2AC-L2 disconnect switch and turn off its 125Vdc supply

- Close 83H2AC-G ground disconnect switch

3.3. To restore H2AC line to service after work

3.3.1. Prepare H2AC line for restoration

AC83 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 H2AC line

SCC shall advise H5 Operator to carry out the following

- Check opened 5L2L6 and 5DL2 breakers

- Open 5H2AC-G ground disconnect switch

- Turn on 125Vdc supply and close 5L2L6-L2 and 5DL2-L2 disconnect switches

SCC shall advise AC83 Operator to carry out the following:

- Check opened 83H2AC breaker

- Open 83H2AC-G ground disconnect switch

- Turn on 125Vdc supply and close 83H2AC-L2 disconnect switch

3.3.2. Restoration of H2AC line to service:

SCC shall:

Advise the AC83 and H5 Operators of readiness to restore H2AC line to service

- Close (or advise the H5 Operator to close) 5L2L6 and 5DL2 breakers

- Close (or advise the AC83 Operator to close) 83H2AC breaker

3.4. To restore H2AC line to service after automatic outage

If H2AC line trips auto due to fault:

H5 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 H5 Operator to energize) the line **ONCE** by closing 5L2L6 and 5DL2 breakers

- Close (or advise the H5 Operator to close) 83H2AC breaker

H5 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 AC5M line out of service

SCC shall carry out (or advise the AC83 Operator to carry out) the following:

- Open 83AC5M breaker

SCC shall carry out (or advise the M37 Operator to carry out) the following:

- Open 37DL5 and 37L5T2 breakers

- Check for no potential on AC5M line

3.6. To take out, isolate and de-energize AC5M line for work

M37 Operator shall request for Station Guarantee from AC83

SCC shall carry out (or advise the M37 Operator to carry out) the following:

- Open 37DL5 and 37L5T2 breakers

SCC shall carry out (or advise the AC83 Operator to carry out) the following:

- Open 83AC5M breaker

- Check for no potential on AC5M line

SCC shall advise M37 Operator to carry out the following:

- Open 37DL5-L5 and 37L5T2-L5 disconnect switches and turn off its 125Vdc supply
- Close AC5M-G ground disconnect switch

SCC shall advise AC83 Operator to carry out the following:

- Open 83AC5M-L5 disconnect switch and turn off its 125Vdc supply

- Close AC5M-G ground disconnect switch

3.7. To restore AC5M line to service after work

3.7.1. Prepare AC5M line for restoration

AC83 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 AC5M line

SCC shall advise M37 Operator to carry out the following

- Check opened 37DL5 and 37L5T2 breakers
- Open AC5M-G ground disconnect switch
- Turn on 125Vdc supply and close 37DL5-L5 and 37L5T2-L5 disconnect switches

SCC shall advise AC83 Operator to carry out the following:

- Check opened 83AC5M breaker

- Open AC5M-G ground disconnect switch

- Turn on 125Vdc supply and close 83AC5M-L5 disconnect switch

3.7.2. Restoration of AC5M line to service:

SCC shall:

- Advise the AC83 and M37 Operators of readiness to restore AC5M line to service

- Close (or advise the M37 Operator to close) 37DL5 and 37L5T2 breakers

- Close (or advise the AC83 Operator to close) 83AC5M breaker

3.8. To restore AC5M line to service after automatic outage

If AC5M line trips auto due to fault:

M37 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 M37 Operator to energize) the line **ONCE** by closing 37DL5 and 37L5T2 breakers
- Close (or advise the AC83 Operator to close) 83AC5M breaker

M37 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. Isolate 83T1 Transformer for work

AC83 Operator shall request for Station Guarantee from Customer on 83F1 Feeder

SCC shall advise AC83 operator to carry out the following:

- Inform Customer about readiness to take off 83T1 bank
- Request Customer on 83T1 Bank to take off their load
- Transfer Station Service from AC1 to AC2
- Open AC1 Contactor/MCB to take off supply to 83T1 transformer auxiliaries

SCC shall carry out (or advise AC83 operator to carry out) the following:

- Open 83T1Y1Z1 breaker
- Open 83ADT1 breaker
- Check for no potential on 83T1 Bank

SCC shall advise AC83 operator to carry out the following:

- Open 83ADT1-A and 83ADT1-D disconnect switches and turn off 125Vdc supply
- Open 83T1Y1Z1-Y1 and 83T1Y1Z1-Z1 disconnect switches

- Open AC control MCB to 83T1 auxiliaries and tag

- Open 125Vdc MCB to 83T1 primary and secondary protection and tag with PC13

3.10. To restore 83T1 Bank to service after work

3.10.1. Prepare 83T1 bank for restoration:

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

- Check for no potential on 83T1 Bank and temporary grounds removed

- Check opened 83ADT1and 83T1Y1Z1 breakers

- Turn on 125Vdc supply and close 83T1Y1Z1-Y1 and 83T1Y1Z1-Z1 disconnect switches

- Turn on 125Vdc supply and close 83ADT1-A and 83ADT1-D disconnect switches

- Close AC control MCB to 83T1 auxiliaries and remove tag

- Close 125Vdc MCB to 83T1 primary and secondary protection and remove PC13 tag

- Advise SCC of readiness to restore 83T1 Bank to service

3.10.2. Restoration of 83T1 bank to service:

- SCC shall close (or advise AC83 operator to close) 83ADT1 breaker

- AC83 Operator shall advise Customer of readiness to restore 83T1 Bank to service

- SCC shall close (or advise AC83 operator to close) the 83T1Y1Z1 breaker

3.10.3. Restore 83T1 Bank to service after automatic outage

If 83T1 bank trips auto due to fault:

- 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 AC83 Operator to energize) the bank **ONCE** by closing 83ADT1 breaker

AC83 Operator shall advise Customer of readiness to restore 83F1 feeder to service

SCC shall close (or advise AC83 Operator to close) 83T1Y1Z1 breaker

AC83 Operator shall:

- Advise the Supervisor/Area Manager of item above

- If not successful, isolate the Transformer for maintenance men to work on the equipment. See explanation.

3.10.4. Isolate 83T2 Transformer for work

AC83 Operator shall request for Station Guarantee from Customer on 83F2 Feeder

SCC shall advise AC83 operator to carry out the following:

- Inform Customer about readiness to take off 83T2 bank
- Request Customer on 83T2 Bank to take off their load
- Transfer Station Service from AC2 to AC1
- Open AC1 Contactor/MCB to take off supply to 83T2 transformer auxiliaries

SCC shall carry out (or advise AC83 operator to carry out) the following:

- Open 83T2Y1Z1 breaker
- Open 83ADT2 breaker
- Check for no potential on 83T2 Bank

SCC shall advise AC83 operator to carry out the following:

- Open 83ADT2-A and 83ADT2-D disconnect switches and turn off 125Vdc supply
- Open 83T2Y1Z1-Y1 and 83T2Y1Z1-Z1 disconnect switches
- Open AC control MCB to 83T2 auxiliaries and tag
- Open 125Vdc MCB to 83T2 primary and secondary protection and tag with PC13

3.11. To restore 83T2 Bank to service after work

3.11.1. Prepare 83T2 bank for restoration:

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

- Check for no potential on 83T2 Bank and temporary grounds removed

- Check opened 83ADT2 and 83T2Y1Z1 breakers

- Turn on 125Vdc supply and close 83T2Y1Z1-Y1 and 83T2Y1Z1-Z1 disconnect switches

- Turn on 125Vdc supply and close 83ADT2-A and 83ADT2-D disconnect switches

- Close AC control MCB to 83T2 auxiliaries and remove tag

- Close 125Vdc MCB to 83T2 primary and secondary protection and remove PC13 tag

- Advise SCC of readiness to restore 83T2 Bank to service

3.11.2. Restoration of 83T2 bank to service:

- SCC shall close (or advise AC83 operator to close) 83ADT2 breaker

- AC83 Operator shall advise Customer of readiness to restore 83T2 Bank to service

- SCC shall close (or advise AC83 operator to close) the 83T2Y1Z1 breaker

3.12. Restore 83T2 Bank to service after automatic outage

If 83T2 bank trips auto due to fault:

- 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 AC83 Operator to energize) the bank **ONCE** by closing 83ADT2 breaker

AC83 Operator shall advise Customer of readiness to restore 83F2 feeder to service

SCC shall close (or advise AC83 Operator to close) 83T2Y1Z1 breaker

AC83 Operator shall:

- Advise the Supervisor/Area Manager of item above

- If not successful, isolate the Transformer for maintenance men to work on the equipment. See explanation.

3.13. To isolate 83T3 Bank for work

AC83 Operator shall request for Station Guarantee from Customer on 83F3 Feeder

SCC shall advise AC83 operator to carry out the following:

- Inform Customer about readiness to take off 83T3 bank

- Request Customer on 83T3 Bank to take off their load

- Transfer Station Service from AC2 to AC1

- Open AC1 Contactor/MCB to take off supply to 83T3 transformer auxiliaries

SCC shall carry out (or advise AC83 operator to carry out) the following:

- Open 83T3Y2Z2 breaker

- Open 83ADT2 breaker

- Check for no potential on 83T3 Bank

SCC shall advise AC83 operator to carry out the following:

- Open 83ADT2-A and 83ADT2-D disconnect switches and turn off 125Vdc supply

- Open 83T3Y2Z2-Y2 and 83T3Y2Z2-Z2 disconnect switches

- Open AC control MCB to 83T3 auxiliaries and tag

- Open 125Vdc MCB to 83T3 primary and secondary protection and tag with PC13

3.14. To restore 83T3 Bank to service after work

3.14.1. Prepare 83T3 bank for restoration:

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

- Check for no potential on 83T3 Bank and temporary grounds removed

- Check opened 83ADT2 and 83T3Y2Z2 breakers

- Turn on 125Vdc supply and close 83T3Y2Z2-Y2 and 83T3Y2Z2-Z2 disconnect switches

- Turn on 125Vdc supply and close 83ADT3-A and 83ADT3-D disconnect switches

- Close AC control MCB to 83T3 auxiliaries and remove tag

- Close 125Vdc MCB to 83T3 primary and secondary protection and remove PC13 tag

- Advise SCC of readiness to restore 83T3 Bank to service

3.14.2. Restoration of 83T3 bank to service:

- SCC shall close (or advise AC83 operator to close) 83ADT3 breaker

- AC83 Operator shall advise Customer of readiness to restore 83T3 Bank to service

- SCC shall close (or advise AC83 operator to close) the 83T3Y2Z2 breaker

3.15. Restore 83T3 Bank to service after automatic outage

If 83T3 bank trips auto due to fault:

- 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 AC83 Operator to energize) the bank **ONCE** by closing 83ADT3 breaker

AC83 Operator shall advise Customer of readiness to restore 83F3 feeder to service

SCC shall close (or advise AC83 Operator to close) 83T3Y2Z2 breaker

AC83 Operator shall:

- Advise the Supervisor/Area Manager of item above

- If not successful, isolate the Transformer for maintenance men to work on the equipment. See explanation.

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 meagered 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 station 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. 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 on, a permanent ground switches a PC 14 to close the ground switch is not required.

The station has two 161Kv buses. The main 'A' bus provides the normal points of supply to all circuits such as H2AC (Achimota-Accra Central), AC5M (Accra Central - Mallam) lines, 83T1, 83T2 and 83T3 transformers. The 'D' bus provides the necessary by-pass route for only one circuit at a time.

5. Approval

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Director, Technical Services