TD-OP-070

GRIDCo

OPERATING PROCEDURE FOR KEDJEBI SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR KEDJEBI SUBSTATION (KD70)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Akosmbo Operating Staff, Akosmbo Area Maintenance Staff, Akosmbo Area Dispatch Staff, SCC	**Number:**	TD-OP-070
		Subject Area:	Operating
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		Origin:	Technical Services
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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 KD70 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Akosombo Operating Area and System Control Center (SCC) for operation of equipment at KD70 Substation.

3. Procedure

3.1. To take PU2KD line out of service

SCC shall carry out (or advise the KD70 Operator to carry out) the following:

- Verify opened 70PU2KD-S bypass disconnect switch
- Open 70PU2KD breaker

SCC shall carry out (or advise the PU25 Operator to carry out) the following:

- Verify opened 25PU2KD-S bypass disconnect switch
- Open 25PU2KD breaker
- Check for no potential on PU2KD line

3.2. To take out, isolate and de-energize PU2KD line for work

- KD70 Operator shall request for Station Guarantee from PU25

SCC shall carry out (or advise the KD70 Operator to carry out) the following:

- Check opened 70PU2KD-S bypass disconnect switch and turn off its 125Vdc supply
- Open 70PU2KD breaker

SCC shall advise PU25 Operator to carry out the following:

- Check opened 25PU2KD-S bypass disconnect switch and turn off its 125Vdc supply

SCC shall carry out (or advise the PU25 Operator to carry out) the following:

- Open 25PU2KD breaker
- Check for no potential on PU2KD line

SCC shall advise PU25 Operator to carry out the following:

- Open 25PU2KD-L2 disconnect switch and turn off its 125Vdc supply
- Close 25PU2KD-G ground disconnect switch

SCC shall advise KD70 Operator to carry out the following:

- Open 70PU2KD-L2 disconnect switch and turn off its 125Vdc supply
- Close 70PU2KD-G ground disconnect switch

3.3. To restore PU2KD line to service after work

3.3.1. Prepare PU2KD line for restoration:

KD70 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 PU2KD line

SCC shall advise PU25 Operator to carry out the following:

- Check opened 25PU2KD-S bypass disconnect switch and turn on its 125Vdc supply
- Check opened 25PU2KD breaker
- Open 25PU2KD-G ground disconnect switch
- Turn on 125Vdc supply and close 25PU2KD-L2 disconnect switch

SCC shall advise KD70 Operator to carry out the following:

- Check opened 70PU2KD-S bypass disconnect switch and turn on its 125Vdc supply
- Check opened 70PU2KD breaker
- Open 70PU2KD -G ground disconnect switch
- Turn on 125Vdc supply and close 70PU2KD-L2 disconnect switch

3.3.2. Restoration of PU2KD line to service:

SCC shall:

- Advise the PU25 and KD70 Operators of readiness to restore PU2KD line to service

- Close (or advise the PU25 Operator to close) 25PU2KD breaker
- Close (or advise the KD70 Operator to close) 70PU2KD breaker

3.4. To restore PU2KD line to service after automatic outage

If PU2KD line trips auto due to fault:

KD70 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 PU25 Operator to energize) the line **ONCE** by closing 25PU2KD breaker
- Close (or advise the KD70 Operator to close) 70PU2KD breaker

KD70 Operator shall:

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

3.5. To isolate 70TI Transformer for work

- KD70 Operator shall request Station Guarantee from Customer(s) on 70T1 transformer

SCC shall advise KD70 Operator to carry out the following:

- Inform Customer(s) about readiness to take off 70T1 bank
- Request customer on 70T1 Bank to take off their load
- Transfer Station Service supply from 70TSS1 to the Standby Generator
- Open AC1 Contactor/MCB to take off supply to 70T1 transformer auxiliaries

SCC shall carry out (or advise KD70 Operator to carry out) the following:

- Check opened 70PU2KD-S bypass disconnect switch and turn off its 125Vdc supply
- Open 70T1Y breaker
- Open 70PU2KD breaker
- Check for no potential on 70T1 Bank
- Open 70T1Y-T1 disconnect switch and turn off its125Vdc supply
- Open 70PU2KD-T1 disconnect switch turn off its125Vdc supply
- Open AC control MCB to 70T1 auxiliaries and tag
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- Open 125V DC MCB to 70T1 primary and secondary protection and tag with PC13

3.6. To restore 70T1 Bank to service after work

3.6.1. Prepare 70T1 bank for restoration:

KD70 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 70T1 Bank and temporary grounds removed
- Check opened 70PU2KD-S bypass disconnect switch and turn on its 125Vdc supply
- Turn on 125 dc supply and close 70PU2KD-T1 disconnect switch
- Turn on 125Vdc supply and close 70T1Y-T1 disconnect switch
- Advise SCC of readiness to restore 70T1 Bank to service
- Close AC control MCB to 70T1 auxiliaries and remove tag
- Close 125V DC MCB to 70T1 primary and secondary protection and remove PC13 tag

3.6.2. Restoration of 70T1 bank to service:

- SCC shall close (or advise KD70 Operator to close) the 70PU2KD breaker
- Transfer Station Service supply from the Standby Generator to 70TSS1

- KD70 Operator shall advise customer(s) on 70T1 bank of readiness to restore supply

- SCC shall close (or advise KD70 Operator to close) the 70T1Y breaker

3.7. To restore 70T1 Bank to service after automatic outage

If 70T1 bank trips auto due to fault:

KD70 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 KD70 Operator to energize) the transformer **ONCE** by closing 70PU2KD breaker

KD70 Operator shall advise Customer of readiness to restore supply

SCC shall close (or advise the KD70 Operator to close) 70T1Y breaker

KD70 Operator shall:

- Advise the Supervisor/Area Manager 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 70T1Y Breaker for work

- KD70 Operator shall request Station Guarantee from Customer on 70F1 Feeder

SCC shall advise KD70 Operator to carry out the following:

- Inform Customer about readiness to take off 70T1 bank

- Request Customer on 70T1 Bank to take off their load

- Transfer Station Service supply from 70TSS1 to the Standby Generator

- Open AC1 Contactor/MCB to take off supply to 70T1 transformer auxiliaries

SCC shall carry out (or advise KD70 Operator to carry out) the following:

- Open 70T1Y breaker
- Open 70PU2KD breaker
- Check opened 70PU2KD-S bypass disconnect switch and turn off its 125Vdc supply
- Open 70T1Y-T1 disconnect switch and turn off its125Vdc supply
- Open 70T1Y-Y disconnect switch and turn off its 125Vdc supply
- Check for no potential on 70T1 Bank

3.9. To restore 70T1Y Breaker to service after work

3.9.1. Prepare 70T1Y breaker for restoration:

KD70 Operator shall:

- Advise SCC when work on the 70T1Y breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 70T1 Bank and temporary grounds removed
- Check opened 70PU2KD-S bypass disconnect switch and turn on its 125Vdc supply
- Turn on 125V dc supply and close 70T1Y-Y disconnect switch
- Turn on 125Vdc supply and close 70T1Y-T1 disconnect switch
- Advise SCC of readiness to restore 70T1Y breaker to service

3.9.2. Restoration of 70T1Y breaker to service:

- SCC shall close (or advise KD70 Operator to close) the 70PU2KD breaker
- Transfer Station Service supply from the Standby Generator to 70TSS1
- KD70 Operator shall advise Customer of readiness to restore 70F1 feeder to service
- SCC shall close (or advise KD70 Operator to close) the 70T1Y breaker

3.10. To isolate 70SC1 Capacitor Bank for work

SCC shall carry out or advise KD70 Operator to carry out the following:

- Open 70SC1Y breaker

- Open 70SC1Y-SC1 disconnect switch and turn off its 125Vdc supply

- Close 70SC1Y-G ground disconnect switch

3.11. To restore 70SC1 Capacitor Bank to service after work

3.11.1. Prepare 70SC1Capacitor Bank to service after work

- Advise SCC when work on the 70SC1Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 70SC1 Capacitor Bank

- Check opened 70SC1Y breaker

- Open 70SC1Y-G ground disconnect switch

- Close 70SC1Y-SCI disconnect switch

- Advise SCC of readiness to restore 70SC1Capacitor bank to service

3.11.2. Restoration of 70SC1 Capacitor Bank to service:

- SCC shall close (or advise KD70 Operator to close) 70YSC1breaker if the voltage is below 32.8kV

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 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 normal points of supply to all circuits/equipment such as PU2KD (Kpando-Kedjebi) line and 70T1 transformer.

5. Approval

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Director, Technical Services