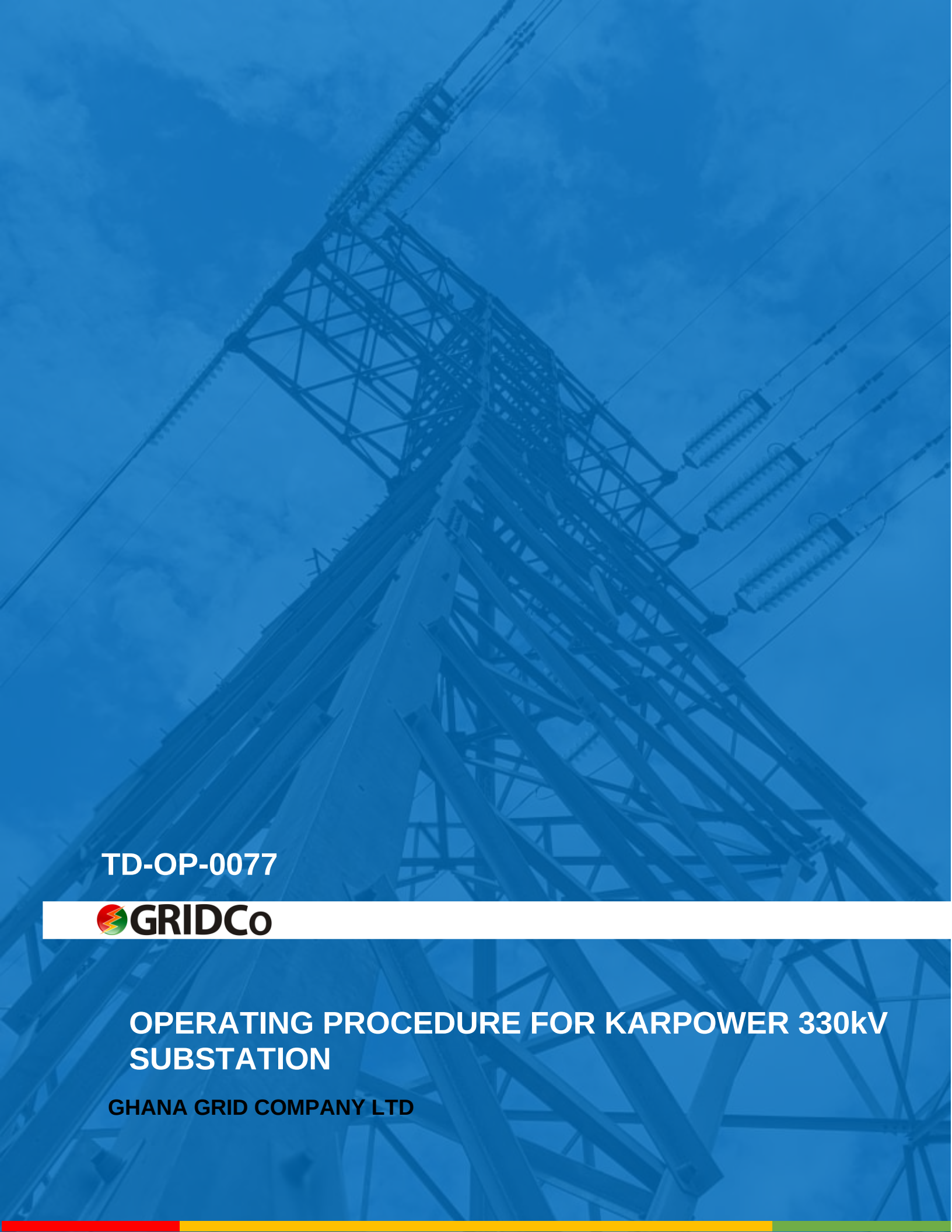

TD-OP-0077

GRIDCo

OPERATING PROCEDURE FOR KARPOWER 330kV SUBSTATION

GHANA GRID COMPANY LTD

Title: OPERATING PROCEDURE FOR KARPOWER 330kV SUBSTATION (KA77)		
Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Manager, Karpower Operating Staff, Karpower Maintenance Staff, Karpower Dispatch Staff, SCC	**Number:**	TD-OP-0077
	Subject Area:	Operating
	Issue Date:	Trial
	Origin:	Technical Services
Key Words: Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

CONTENTS

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at KA77 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Karpower and System Control Center (SCC) for operation of equipment at KA77 Substation.

3. Procedure

3.1. To take KA9AM line out of service

SCC shall carry out (or advise the KA77 Operator to carry out) the following:

- Open 77T6L9 breaker

SCC shall carry out (or advise the AM84 Operator to carry out) the following:

- Open 84L9P and 84T1L9 breakers
- Check for no potential on KA9AM line

3.2. To take out, isolate and de-energize KA9AM line for work

- KA77 Operator shall request for Station Guarantee from AM84

SCC shall carry out (or advise the KA77 Operator to carry out) the following:

- Open 77T6L9 breaker

SCC shall carry out (or advise the AM84 Operator to carry out) the following:

- Open 84L9P and 84T1L9 breakers
- Check for no potential on KA9AM line

SCC shall advise the KA77 Operator to carry out the following:

- Open 77T6L9-L9 disconnect switch and turn off 125Vdc supply
- Close 77KA9AM-G ground disconnect switch

SCC shall advise the AM84 Operator to carry out the following:

- Open 84L9P-L9 and 84T1L9-L9 disconnect switches and turn off 125Vdc supply

- Close 84L9-G1 ground disconnect switch

3.3. To restore KA9AM line to service after work

1.3.1. Prepare KA9AM line for restoration

KA77 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 KA9AM line

SCC shall advise AM84 Operator to carry out the following:

- Open 84L9-G1 ground disconnect switch

- Turn on 125Vdc supply and close 84L9P-L9 and 84T1L9-L9 disconnect switches

SCC shall advise KA77 Operator to carry out the following:

- Check opened 77T6L9 breaker

- Open 77KA9AM-G ground disconnect switch

- Turn on 125Vdc supply and close 77T6L9-L9 disconnect switch

1.3.2. Restoration of KA9AM line to service:

SCC shall:

- Advise the KA77 and AM84 Operators of readiness to restore KA9AM line to service

- Close (or advise AM84 operator to close) 84L9P and 84T1L9 breakers

- Close (or advise KA77 operator to close) 77T6L9 breaker

3.4. To restore KA9AM line to service after automatic outage

If KA9AM line 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 KA77 Operator to energize) the line **ONCE** by closing 77T6L9 breaker
- Close (or advise AM84 operator to close) 84L9P and 84T1L9 breakers

KA77 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 take KA11T line out of service

SCC shall carry out (or advise the KA77 Operator to carry out) the following:

- Open 77T5L11 breaker

SCC shall carry out (or advise the TT32 Operator to carry out) the following:

- Open 32PL11 and 32L11L9 breakers
- Check for no potential on KA11T line

3.6. To take out, isolate and de-energize KA11T line for work

- KA77 Operator shall request for Station Guarantee from TT32

SCC shall carry out (or advise the KA77 Operator to carry out) the following:

- Open 77T5L11 breaker

SCC shall carry out (or advise the TT32 Operator to carry out) the following:

- Open 32PL11 and 32L11L9 breakers
- Check for no potential on KA11T line

SCC shall advise the KA77 Operator to carry out the following:

- Open 77T5L11-L11 disconnect switch and turn off 125Vdc supply

- Close 77KA11T-G ground disconnect switch

SCC shall advise the TT32 Operator to carry out the following:

- Open 32PL11-L11 and 32L11L9-L11 disconnect switches and turn off 125Vdc supply

- Close 32KA11T-G ground disconnect switch

3.7. To restore KA11T line to service after work

1.7.1. Prepare KA11T line for restoration

KA77 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 KA11T line

SCC shall advise TT32 Operator to carry out the following:

- Open 32KA11T-G ground disconnect switch

- Turn on 125Vdc supply and close 32PL11-L11 and 32L11L9-L11 disconnect switches

SCC shall advise KA77 Operator to carry out the following:

- Check opened 77T5L11 breaker

- Open 77KA11T-G ground disconnect switch

- Turn on 125Vdc supply and close 77T5L11-L11 disconnect switch

1.7.2. Restoration of KA11T line to service:

SCC shall:

- Advise the KA77 and TT32 Operators of readiness to restore KA11T line to service

- Close (or advise TT32 operator to close) 32PL11 and 32L11L9 breakers

- Close (or advise KA77 operator to close) 77T5L11 breaker

3.8. To restore KA11T line to service after automatic outage

If KA11T line 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 KA77 Operator to energize) the line **ONCE** by closing 77T5L11 breaker
- Close (or advise TT32 operator to close) 32PL11 and 32L11L9 breakers

KA77 Operator shall:

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

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 Generating station has two 161Kv buses. The main 'A' and 'D' buses, configuration provides the normal points of supply to all circuits/equipment such as KA9AM and KA11T lines.

5. Approval

…….

Director, Technical Services