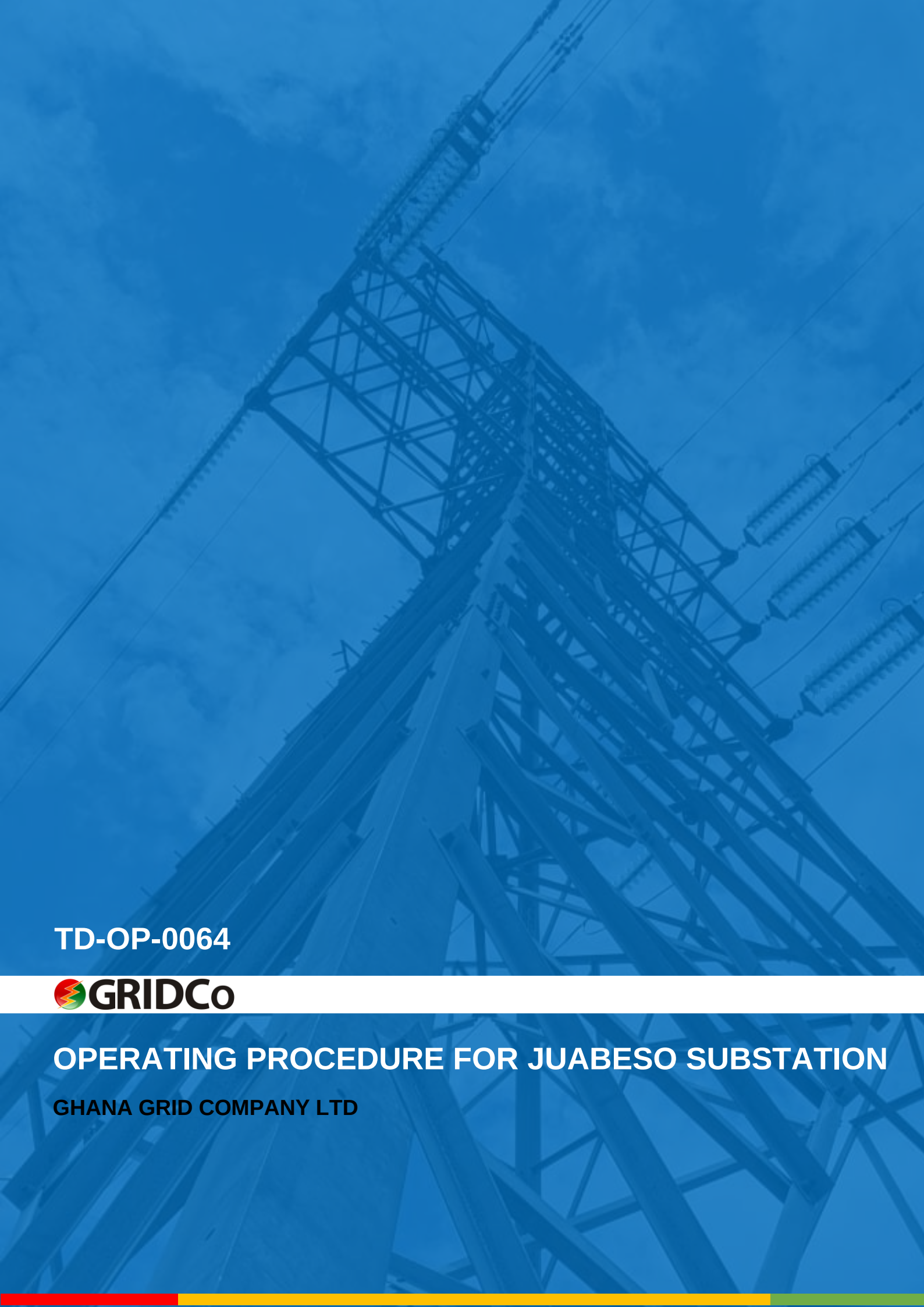

TD-OP-0064

GRIDCo

OPERATING PROCEDURE FOR JUABESO SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR JUABESO SUBSTATION (JB64)**		
Issued To:	Director, System Operations Director, NNS Manager, SCC Manager, Dispatch Operations Area Manager, Kumasi Operating Staff, Kumasi Area Maintenance Staff, Kumasi Area Dispatch Staff, SCC	**Number:**	TD-OP-0064
		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 JB64 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Kumasi Operating Area and System Control Center (SCC) for operation of equipment at JB64 Substation.

3. Procedure

3.1. To take MM1JB line out of service

SCC shall carry out (or advise the JB64 Operator to carry out) the following:

- Open 64L1D and 64L1L2 breakers

SCC shall carry out (or advise the MM62 Operator to carry out) the following:

- Open 62L1A and 62L3L1 breakers
- Check for no potential on MM1JB line

3.2. To take out, isolate and de-energize MM1JB line for work

- JB64 Operator request for Station Guarantee from MM62

SCC shall carry out (or advise the JB64 Operator to carry out) the following:

- Open 64L1D and 64L1L2 breakers

SCC shall carry out (or advise MM62 Operator to carry out) the following:

- Open 62L1A and 62L3L1 breakers
- Check for no potential on MM1JB line

SCC shall advise MM62 Operator to carry out the following:

- Open 62L1A-L1 and 62L3L1-L1 disconnect switches and turn off 125Vdc supply
- Close 62MM1JB-G ground disconnect switch

SCC shall advise JB64 Operator to carry out the following:

- Open 64L1D-L1 and 64L1L2-L1 disconnect switches and turn off its 125Vdc supply

- Close 64MM1JB-G ground disconnect switch

3.3. To restore MM1JB line to service after work

3.3.1. Prepare MM1JB line for restoration:

JB64 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 MM1JB line

SCC shall advise MM62 Operator to carry out the following:

- Check opened 62L1A and 62L1L3 breakers

- Open 62MM1JB-G ground disconnect switch

- Turn on 125Vdc supply and close 62L1A-L1 and 62L3L1-L1 disconnect switches

SCC shall advise JB64 Operator to carry out the following:

- Check opened 64L1D and 64L1L2 breakers

- Open 64MM1JB-G ground disconnect switch

- Turn on 125Vdc supply and close 64L1D-L1 and 64L1L2-L1 disconnect switches

3.3.2. Restoration of MM1JB line to service:

SCC shall:

- Advise the MM62 and JB64 Operators of readiness to restore MM1JB line to service

- Close (or advise the MM62 Operator to close) 62L1A and 62L3L1 breakers

- Close (or advise the JB64 Operator to close) 64L1A and 64L1L2 breakers

3.4. To restore MM1JB line to service after automatic outage

If MM1JB line trips auto due to fault:

JB64 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 MM62 Operator to energize) the line **ONCE** by closing 62L1A and 62L3L1 breakers
- Close (or advise the JB64 Operator to close) 64L1A and 64L1L2 breakers

JB64 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 AS2JB line out of service

SCC shall carry out (or advise the JB64 Operator to carry out) the following:

- Open 64L2D and 64L1L2 breakers

SCC shall carry out (or advise the AS20 Operator to carry out) the following:

- Verify opened 20AS2JB-S bypass disconnect switch
- Open 20AS2JB breaker
- Check for no potential on AS2JB line

3.6. To take out, isolate and de-energize AS2JB line for work

- JB64 Operator shall request for Station Guarantee from AS20

SCC shall carry out (or advise the JB64 Operator to carry out) the following:

- Open 64L2D and 64L1L2 breakers

SCC shall carry out (or advise the AS20 Operator to carry out) the following:

- Checked opened 20AS2JB-S bypass disconnect switch and turn off its 125Vdc supply

- Open 20AS2JB breaker

- Check for no potential on AS2JB line

SCC shall advise JB64 Operator to carry out the following:

- Open 64L2D-L2 and 64L1L2-L2 disconnect switches and turn off 125Vdc supply

- Close 64AS2JB-G ground disconnect switch

SCC shall advise AS20 Operator to carry out the following:

- Open 20AS2JB-L2 disconnect switch and turn off its 125Vdc supply

- Close 20AS2JB-G ground disconnect switch

3.7. To restore AS2JB line to service after work

3.7.1. Prepare AS2JB line for restoration:

JB64 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 AS2JB line

SCC shall advise AS20 Operator to carry out the following:

- Check opened 20AS2JB breaker

- Checked opened 20AS2JB-S bypass disconnect switch and turn on its 125Vdc supply

- Open 20AS2JB-G ground disconnect switch

- Turn on 125Vdc supply and close 20AS2JB-L2 disconnect switch

SCC shall advise JB64 Operator to carry out the following:

- Check opened 64L2D and 64L1L2 breakers

- Open 64AS2JB-G ground disconnect switch

- Turn on 125Vdc supply and close 64L2D-L2 and 64L1L2-L2 disconnect switches

3.7.2. Restoration of AS2JB line to service:

SCC shall:

- Advise the AS20 and JB64 Operators of readiness to restore AS2JB line to service
- Close (or advise the AS20 Operator to close) 20AS2JB breaker
- Close (or advise the JB64 Operator to close) 64L2D and 64L1L2 breakers

3.8. To restore AS2JB line to service after automatic outage

If AS2JB line trips auto due to fault:

JB64 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 AS20 Operator to energize) the line **ONCE** by closing 20AS2JB breaker
- Close (or advise the JB64 Operator to close) 64L2D and 64L1L2 breakers

JB64 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. To isolate 64T1 Transformer for work

SCC shall advise JB64 Operator to carry out the following:

- Inform Customer about readiness to take off 64T1 bank
- Request Customer on 64T1 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 64T1 transformer

auxiliaries

- Transfer Station Service from 64TSS1 to 64TSS2, if Station Service is on 64T1 Bank

SCC shall carry out (or advise JB64 Operator to carry out) the following:

- Open 64SC1F1 and 64T1F1 breakers
- Open 64AT1 and 64T1T2 breakers
- Check for no potential on 64T1 Bank

SCC shall advise JB64 Operator to carry out the following:

- Open 64T1F1-F1 disconnect switch
- Open 64AT1-T1 and 64T1T2-T1 disconnect switches and turn off 125Vdc supply
- Open AC control MCB to 64T1 auxiliaries and tag
- Open 125Vdc MCB to 64T1 primary and secondary protection and tag with PC13

3.10. To restore 64T1 Bank to service after work

3.10.1. Prepare 64T1 bank for restoration:

JB64 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 64T1 Bank and temporary grounds removed
- Close 64T1F1-F1 disconnect switch
- Turn on 125Vdc and close 64AT1-T1 and 64T1T2-T1 disconnect switches
- Close AC control MCB to 64T1 auxiliaries and remove tag
- Close 125Vdc MCB to 64T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 64T1 Bank to service

3.10.2. Restoration of 64T1 bank to service:

- SCC shall close (or advise JB64 Operator to close) the 64AT1 and 64T1T2 breakers

- JB64 Operator shall advise Customer of readiness to restore 64F1 feeder to service

- SCC shall close (or advise JB64 Operator to close) the 64T1F1 breaker

- Transfer Station Service from 64TSS2 to 64TSS1, if Station Service is on 64T1 Bank

3.11. To restore 64T1 Bank to service after automatic outage

If 64T1 bank trips auto due to fault:

JB64 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 JB64 Operator to energize) the bank **ONCE** by closing 64AT1 and 64T1T2 breakers

JB64 Operator shall advise Customer of readiness to restore 64F1 feeder to service

SCC shall close (or advise JB64 Operator to close) 64T1F1 breaker

JB64 Operator shall:

- Advise the Supervisor/Area Manager of item above

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

3.12. To isolate 64T2 Transformer for work

SCC shall advise JB64 Operator to carry out the following:

- Inform Customer about readiness to take off 64T2 bank

- Request Customer on 64T2 Bank to take off their load

- Open AC1 Contactor/MCB to take off supply to 64T2 transformer auxiliaries

- Transfer Station Service from 64TSS2 to 64TSS1, if Station Service is on

64T2 bank

SCC shall carry out (or advise JB64 Operator to carry out) the following:

- Open 64SC2F2 and 64T2F2 breakers
- Open 64DT2 and 64T1T2 breakers
- Check for no potential on 64T2 Bank

SCC shall advise JB64 Operator to carry out the following:

- Open 64T2F2-F2 and 64SC2F2-F2 disconnect switches
- Open 64DT2-T2 and 64T1T2-T2 disconnect switches and turn off 125Vdc supply
- Open AC control MCB to 64T2 auxiliaries and tag
- Open 125Vdc MCB to 64T2 primary and secondary protection and tag with PC13

3.13. To restore 64T2 Bank to service after work

3.13.1. Prepare 64T2 bank for restoration:

JB64 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 64T2 Bank and temporary grounds removed
- Close 64T2F2-F2 and 64SC2F2-F2 disconnect switches
- Turn on 125Vdc supply and close 64DT2-T2 and 64T1T2-T2 disconnect switches
- Close AC control MCB to 64T2 auxiliaries and remove tag
- Close 125Vdc MCB to 64T2 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 64T2 Bank to service

3.13.2. Restoration of 64T2 bank to service:

- SCC shall close (or advise JB64 Operator to close) the 64DT2 and 64T1T2 breakers
- JB64 Operator shall advise Customer of readiness to restore 64F2

feeder to service

- SCC shall close (or advise JB64 Operator to close) the 64T2F2 breaker
- Transfer Station Service from 64TSS1 to 64TSS2, if Station Service is on 64T2 Bank

3.14. To restore 64T2 Bank to service after automatic outage

If 64T2 bank trips auto due to fault:

JB64 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 JB64 Operator to energize) the bank **ONCE** by closing 64DT2 and 64T1T2 breakers

JB64 Operator shall advise Customer of readiness to restore 64F2 feeder to service

SCC shall close (or advise JB64 Operator to close) 64T2F2 breaker

JB64 Operator shall:

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

3.15. To Isolate 64T1F1 Breaker for work

- JB64 Operator shall request Station Guarantee from Customer on 64F1 feeder

SCC shall advise JB64 Operator to carry out the following:

- Inform Customer about readiness to take off 64T1 bank
- Request Customer on 64T1 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 64T1 transformer auxiliaries

- Transfer Station Service from 64TSS1 to 64TSS2, if Station Service is on 64T1 bank

SCC shall carry out (or advise JB64 Operator to carry out) the following:

- Open 64SC1F1 and 64T1F1 breakers
- Open 64AT1 and 64T1T2 breakers
- Check for no potential on 64T1 Bank

SCC shall advise JB64 Operator to carry out the following:

- Open 64T1F1-F1 and 64SC1F1-F1 disconnect switches
- Open 64AT1-T1 and 64T1T2-T1 disconnect switches and turn off 125Vdc supply

3.16. To restore 64T1F1 Breaker to service after work

3.16.1. Prepare 64T1F1 breaker for restoration:

JB64 Operator shall:

- Advise SCC when work on the 64T1F1 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 64T1F1 Breaker and temporary grounds removed
- Close 64T1F1-F1 and 64SC1F1-F1 disconnect switches
- Turn on 125Vdc supply and close 64AT1-T1 and 64T1T2-T1 disconnect switches
- Check for no potential on 64F1 feeder

3.16.2. Restoration of 64T1F1 breaker to service:

- SCC shall close (or advise JB64 Operator to close) the 64AT1 and 64T1T2 breakers
- JB64 Operator shall advise Customer of readiness to restore 64F1 feeder to service
- SCC shall close (or advise JB64 Operator to close) the 64T1F1 breaker

3.17. To Isolate 64T2F2 Breaker for work

- JB64 Operator shall request Station Guarantee from Customer on 64F2

feeder

SCC shall carry out (or advise JB64 Operator to carry out) the following:

- Open 64SC2F2 and 64T2F2 breakers
- Open 64DT2 and 64T1T2 breakers

SCC shall advise JB64 Operator to carry out the following:

- Open 64T2F2-F2 and 64SC2F2-F2 disconnect switches
- Open 64DT2-T2 and 64T1T2-T2 disconnect switches and turn off 125Vdc supply
- Check for no potential on 64T2 Bank

3.18. To restore 64T2F2 Breaker to service after work

3.18.1. Prepare 64T2F2 breaker for restoration:

JB64 Operator shall:

- Advise SCC when work on the 64T2F2 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 64T2F2 Breaker and temporary grounds removed
- Close 64T2F2-F2 and 64SC2F2-F2 disconnect switches
- Turn on 125Vdc supply and close 64DT2-T2 and 64T1T2-T2 disconnect switches

3.18.2. Restoration of 64T2F2 breaker to service:

- SCC shall close (or advise JB64 Operator to close) the 64DT2 and 64T1T2 breakers
- JB64 Operator shall advise Customer of readiness to restore 64F2 feeder to service
- SCC shall close (or advise JB64 Operator to close) the 64T2F2 breaker

3.19. To isolate 64SC1 Capacitor Bank for work

SCC shall carry out (or advise JB64 Operator to carry out) the following:

- Open 64SC1F1 breaker

SCC shall advise JB64 Operator to carry out the following:

- Open 64SC1F1-SC1 disconnect switch

- Close 64SC1-G ground disconnect switch

3.20. To restore 64SC1 Capacitor Bank to service after work

3.20.1. Prepare 64SC1 Capacitor Bank for restoration:

JB64 Operator shall:

- Advise SCC when work on the 64SC1 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 64SC1 Capacitor Bank and temporary grounds removed

- Open 64SC1-G ground disconnect switch

- Close 64SC1F1-SC1 disconnect switch

3.20.2. Restoration of 64SC1 Capacitor Bank to service:

- SCC shall close (or advise JB64 Operator to close) 64SC1F1 breaker if the voltage is below 32.8kV

3.21. To isolate 64SC2 Capacitor Bank for work

SCC shall carry out (or advise JB64 Operator to carry out) the following:

- Open 64SC2F2 breaker

SCC shall advise JB64 Operator to carry out the following:

- Open 64SC2F2-SC2 disconnect switch

- Close 64SC2-G ground disconnect switch

3.22. To restore 64SC2 Capacitor Bank to service after work

3.22.1. Prepare 64SC2 Capacitor Bank for restoration:

JB64 Operator shall:

- Advise SCC when work on the 64SC2 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 64SC2 Capacitor Bank and temporary grounds removed

- Open 64SC2-G ground disconnect switch

- Close 64SC2F2-SC2 disconnect switch

3.22.2. Restoration of 64SC2 Capacitor Bank to service:

- SCC shall close (or advise JB64 Operator to close) 64SC2F2 breaker 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 has two 161kV buses. The main 'A' and 'D' buses, a breaker and half configuration provides the normal points of supply to all circuits/equipment such as MM1JB, AS2JB lines, 64T1, 64T2 transformers, 64SC1 and 64SC2 Capacitor Banks.

5. Approval

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Director, TSD