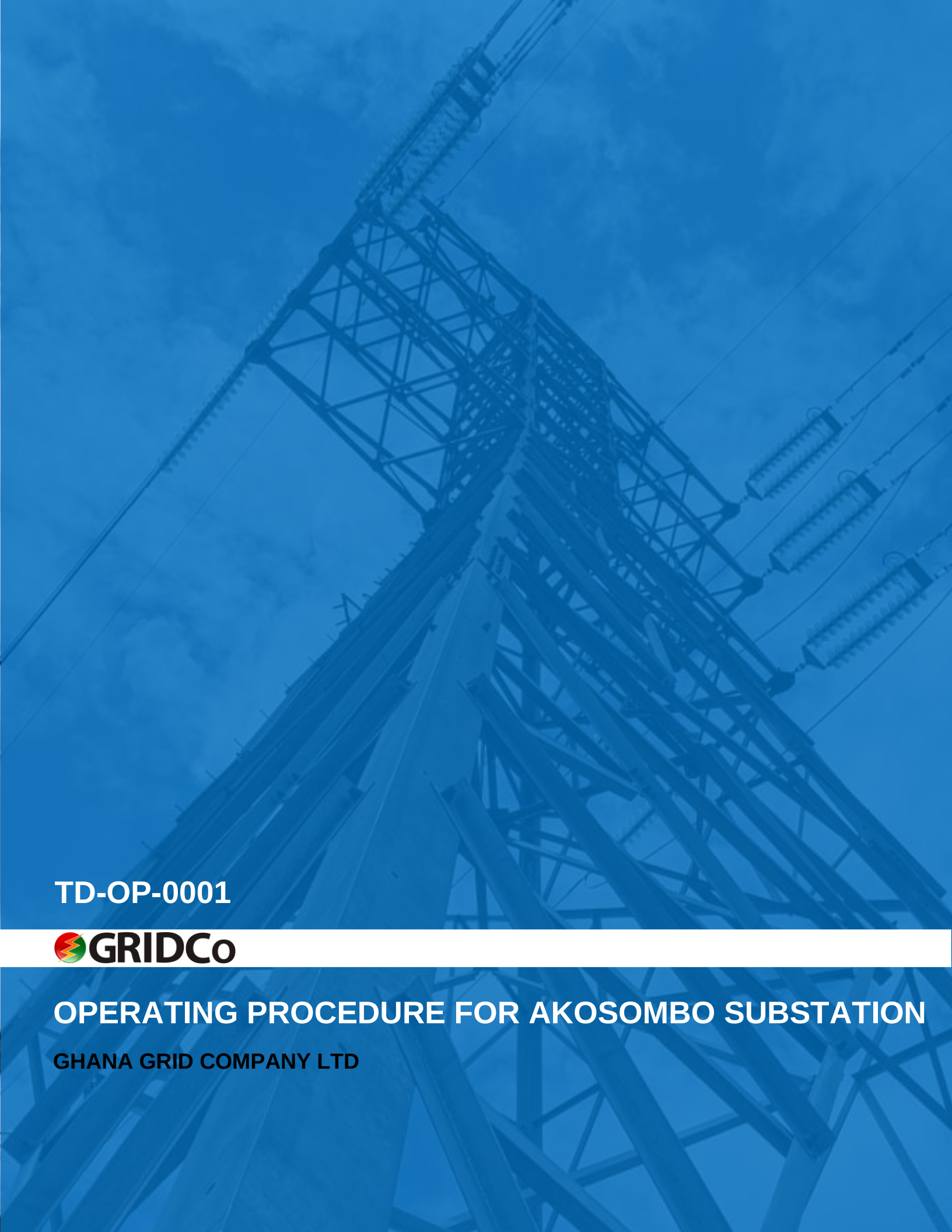

TD-OP-0001

GRIDCo

OPERATING PROCEDURE FOR AKOSOMBO SUBSTATION

GHANA GRID COMPANY LTD

TECHNICAL DIRECTIVES

Title:	**OPERATING PROCEDURE FOR AKOSOMBO SUBSTATION (A1)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Akosombo Operating Staff, Akosombo Area Maintenance Staff, Akosombo Area Dispatch Staff, SCC	**Number:**	TD-OP-0001
		Subject Area:	Operating
		Issue Date:	Trial
		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

Contents

TECHNICAL DIRECTIVES

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at A1 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 A1 Substation.

3. Procedure

3.1. To take A1AA line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL1 and 1T1L1 breakers

SCC shall advise AA71 Operator to carry out the following:

- Open 71L1A1 and 71L1L3 breakers
- Check for no potential on A1AA line

3.2. To take out, isolate and de-energize A1AA line for work

- A1 Operator shall request for Station Guarantee from AA71

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1TILI and 1DL1 breakers

SCC shall advise AA71 Operator to carry out the following:

- Open 71L1A1 and 71L1L3 breakers
- Check for no potential on A1AA line

SCC shall advise AA71 Operator to carry out the following:

- Open 71L1A1-L1 and 71L1L3-L1 disconnect switches and turn off its 125Vdc supply
- Close 71A1AA-G ground disconnect switch

SCC shall advise A1 Operator to carry out the following:

- Open 1TILI-L1 and 1DL1-L1 disconnect switches and turn off its125Vdc supply

- Close 1A1AA-G ground disconnect switch

3.3. To restore A1AA line to service after work

3.3.1. Prepare A1AA line for restoration

A1 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 A1AA line

SCC shall advise AA71 Operator to carry out the following

- Check opened 71L1A1 and 71L1L3 breakers

- Open 71A1AA-G ground disconnect switch

- Turn on 125Vdc supply and close 71L1A1-L1 and 71L1L3-L1 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1TILI and 1DL1 breakers

- Open 1A1AA-G ground disconnect switch

- Turn on 125Vdc supply and close 1TILI-L1 and 1DL1-L1 disconnect switches

3.3.2. Restoration of A1AA line to service:

SCC shall:

- Advise the A1 and AA71 Operators of readiness to restore A1AA line to service

- Close (or advise the AA71 Operator to close) 71L1A1 and 71L1L3 breakers

- Close (or advise the A1 Operator to close) 1T1L1 and 1DL1 breakers

3.4. To restore A1AA line to service after automatic outage

If A1AA line trips auto due to fault:

A1 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 AA71 Operator to energize) the line **ONCE** by closing 71L1A1 and 71L1L3 breakers
- Close (or advise the A1 Operator to close) 1T1L1 and 1DL1 breakers

A1 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 A2AE line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL2 and 1T2L2 breakers

SCC shall carry out (or advise the AE59 Operator to carry out) the following:

- Open 59L2A and 59L2L5 breakers
- Check for no potential on A2AE line

3.6. To take out, isolate and de-energize A2AE line for work

- A1 Operator shall request for Station Guarantee from AE59

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1T2L2 and 1DL2 breakers

SCC shall carry out (or advise the AE59 Operator to carry out) the following:

- Open 59L2A and 59L2L5 breakers
- Check for no potential on A2AE line

SCC shall advise AE59 Operator to carry out the following:

- Open 59L2A-L2 and 59L2L5-L2 disconnect switches and turn off its 125Vdc supply

- Close 59A2AE-G ground disconnect switch

SCC shall advise A1 Operator to carry out the following:

- Open 1T2L2-L2 and 1DL2-L2 disconnect switches and turn off 125Vdc supply
- Close 1A2AE-G ground disconnect switch

3.7. To restore A2AE line to service after work

3.7.1. Prepare A2AE line for restoration

A1 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 A2AE line

SCC shall advise AE59 Operator to carry out the following:

- Check opened 59L2A and 59L2L5 breakers
- Open 59A2AE-G ground disconnect switch
- Turn on 125Vdc supply and close 59L2A-L2 and 59L2L5-L2 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1T2L2 and 1DL2 breakers
- Open 1A2AE-G ground disconnect switch
- Turn on 125Vdc supply and close 1T2L2-L2 and 1DL2-L2 disconnect switches

3.7.2. Restoration of A2AE line to service:

SCC shall:

- Advise the A1 and AE59 Operators of readiness to restore A2AE line to service
- Close (or advise the A1 Operator to close) 1T2L2 and 1DL2 breakers
- Close (or advise the AE59 Operator to close) 59L2A and 59L2L5 breakers

3.8. To restore A2AE line to service after automatic outage

If A2AE line trips auto due to fault:

A1 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 AE59 Operator to energize) the line **ONCE** by closing 59L2A and 59L2L5 breakers
- Close (or advise the A1 Operator to close) 1T2L2 and 1DL2 breakers

A1 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 take A3V line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL3 and 1T3L3 breakers

SCC shall carry out (or advise the V2 Operator to carry out) the following:

- Open 2L3A and 2L3L13 breakers
- Check for no potential on A3V line

3.10. To take out, isolate and de-energize A3V line for work

- A1 Operator shall request for Station Guarantee from V2

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1T3L3 and 1DL3 breakers

SCC shall carry out (or advise the V2 Operator to carry out) the following:

- Open 2L3A and 2L3L13 breakers
- Check for no potential on A3V line

SCC shall advise A1 Operator to carry out the following:

- Open 1T3L3-L3 and 1DL3-L3 disconnect switches and turn off its125Vdc

supply

- Close 1A3V-G ground disconnect switch

SCC shall advise V2 Operator to carry out the following:

- Open 2L3A-L3 and 2L3L13 –L3 disconnect switches and turn off its 125Vdc supply

- Close 2A3V-G ground disconnect switch

3.11. To restore A3V line to service after work

3.11.1. Prepare A3V line for restoration

A1 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 A3V line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2L3A and 2L3L13 breakers

- Open 2A3V-G ground disconnect switch

- Turn on 125Vdc supply and close 2L3A–L3 and 2L3L13–L3 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1T3L3 and 1DL3 breakers

- Open 1A3V-G ground disconnect switch

- Turn on 125Vdc supply and close 1T3L3-L3 and 1DL3-L3 disconnect switches

3.11.2. Restoration of A3V line to service:

SCC shall:

- Advise the A1 and V2 Operators of readiness to restore A3V line to service

- Close (or advise the V2 Operator to close) 2L3A and 2L3L13 breakers

- Close (or advise the A1 Operator to close) 1T3L3 and 1DL3 breakers

3.12. To restore A3V line to service after automatic outage

If A3V line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1T3L3 and 1DL3 breakers
- Close (or advise the V2 Operator to close) 2L3A and 2L3L13 breakers

A1 Operator:

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

3.13. To take A4G line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL4 and 1T4L4 breakers

SCC shall carry out (or advise the G17 Operator to carry out) the following:

- Open 17A4G breaker
- Check for no potential on A4G line

3.14. To take out, isolate and de-energize A4G line for work

- A1 Operator shall request for Station Guarantee from G17

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL4 and 1T4L4 breakers

SCC shall carry out (or advise the G17 Operator to carry out) the following:

- Open 17A4G breaker

- Check for no potential on A4G line

SCC shall advise A1 Operator to carry out the following:

- Open 1DL4-L4 and 1T4L4-L4 disconnect switches and turn off its125Vdc supply

- Close 1A4G-G ground disconnect switch

SCC shall advise G17 Operator to carry out the following:

- Open 17A4G-L4 disconnect switch and turn off its125Vdc supply

- Close 17A4G-G ground disconnect switch

3.15. To restore A4G line to service after work

3.15.1. Prepare A4G line for restoration

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

- Check for no potential on A4G line

SCC shall advise G17 Operator to carry out the following:

- Check opened 17A4G breaker

- Open 17A4G-G ground disconnect switch

- Turn on 125Vdc supply and close 17A4G-L4 disconnect switch

SCC shall advise A1 Operator to carry out the following:

- Check opened 1T4L4 and 1DL4 breakers

- Open 1A4G-G ground disconnect switch

- Turn on 125Vdc supply and close 1DL4-L4 and 1T4L4-L4 disconnect switches

3.15.2. Restoration of A4G line to service:

SCC shall:

- Advise the A1 and G17 Operators of readiness to restore A4G line to service

- Close (or advise the V2 Operator to close) 17A4G breaker

- Close (or advise the A1 Operator to close) 1T4L4 and 1DL4 breakers

3.16. To restore A4G line to service after automatic outage

If A4G line trips auto due to fault:

A1 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 G17 Operator to energize) the line **ONCE** by closing 17A4G breaker
- Close (or advise the A1 Operator to close) 1T4L4 and 1DL4 breakers

A1 Operator shall:

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

3.17. To take A5V line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL5 and 1T5L5 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2L5A and 2L5L15 breakers
- Check for no potential on A5V line

3.18. To take out, isolate and de-energize A5V line for work

- A1 Operator shall request for Station Guarantee from V2

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1T5L5 and 1DL5 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2L5A and 2L5L15 breakers

- Check for no potential on A5V line

SCC shall advise A1 Operator to carry out the following:

- Open 1T5L5-L5 and 1DL5-L5 disconnect switches and turn off its 125Vdc supply

- Close 1A5V-G ground disconnect switch

SCC shall advise V2 Operator to carry out the following:

- Open 2L5A-L5 and 2L5L15-L5 disconnect switches and turn off its 125Vdc supply

- Close 2A5V-G ground disconnect switch

3.19. To restore A5V line to service after work

3.19.1. Prepare A5V line for restoration

A1 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 A5V line

SCC shall advise V2 Operator to carry out the following

- Check opened 2L5A and 2L5L15 breakers

- Open 2A5V-G ground disconnect switch

- Turn on 125Vdc supply and close 2L5A-L5 and 2L5L15-L5 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1T5L5 and 1DL5 breakers

- Open 1A5V-G ground disconnect switch

- Turn on 125Vdc supply and close 1T5L5-L5 and 1DL5-L5 disconnect switches

3.19.2. Restoration of A5V line to service:

SCC shall:

- Advise the A1 and V2 Operators of readiness to restore A5V line to service

- Close (or advise the V2 Operator to close) 2L5A and 2L5L15 breakers
- Close (or advise the A1 Operator to close) 1T5L5 and 1DL5 breakers

3.20. To restore A5V line to service after automatic outage

If A5V line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1T5L5 and 1DL5 breakers
- Close (or advise the V2 Operator to close) 2L5A and 2L5L15 breakers

A1 Operator shall:

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

3.21. To take A6V line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL6 and 1T6L6 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2L6A and 2L6L16 breakers
- Check for no potential on A6V line

3.22. To take out, isolate and de-energize V2 line for work

- A1 Operator shall request for Station Guarantee from V2

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1T6L6 and 1DL6 breakers

SCC shall carry out (or advise V2 Operator to carry out) the following:

- Open 2L6A and 2L6L16 breakers
- Check for no potential on A6V line

SCC shall advise A1 Operator to carry out the following:

- Open 1T6L6-L6 and 1DL6-L6 disconnect switches and turn off its 125Vdc supply
- Close 1A6V-G ground disconnect switch

SCC shall advise V2 Operator to carry out the following:

- Open 2L6A-L6 and 2L6L16-L6 disconnect switches and turn off its 125Vdc supply
- Close 2A6V-G ground disconnect switch

3.23. To restore A6V line to service after work

3.23.1. Prepare A6V line for restoration

A1 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 A6V line

SCC shall advise V2 Operator to carry out the following

- Check opened 2L6A and 2L6L16 breakers
- Open 2A6V-G ground disconnect switch
- Turn on 125Vdc supply and close 2L6A-L6 and 2L6L16-L6 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1T6L6 and 1DL6 breakers
- Open 1A6V-G ground disconnect switch
- Turn on 125Vdc supply and close 1T6L6-L6 and 1DL6-L6 disconnect switches

3.23.2. Restoration of A6V line to service:

SCC shall:

- Advise the A1 and V2 Operators of readiness to restore A6V line to service
- Close (or advise the V2 Operator to close) 2L6A and 2L6L16 breakers
- Close (or advise the A1 Operator to close) 1T6L6 and 1DL6 breakers

3.24. To restore A6V line to service after automatic outage

If A6V line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1T6L6 and 1DL6 breakers
- Close (or advise the V2 Operator to close) 2L6A and 2L6L16 breakers

A1 Operator shall:

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

3.25. To take A7F line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1AL7 and 1L7L11 breakers

SCC shall advise F15 Operator to carry out the following:

- Open 15L7A and 15L1L7 breakers
- Check for no potential on A7F line

3.26. To take out, isolate and de-energize A7F line for work

- A1 Operator shall request for Station Guarantee from F15

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1L7L11 and 1AL7 breakers

SCC shall advise F15 Operator to carry out the following:

- Open 15L7A and 15L1L7 breakers
- Check for no potential on A7F line

SCC shall advise A1 Operator to carry out the following:

- Open 1L7L11-L7 and 1AL7-L7 disconnect switches and turn off its 125Vdc supply
- Close 1A7F-G ground disconnect switch

SCC shall advise F15 Operator to carry out the following:

- Open 15L7A- L7 and 15L7L11- L7 disconnect switches and turn off its 125Vdc supply
- Close 15A7F-G ground disconnect switch

3.27. To restore A7F line to service after work

3.27.1. Prepare A7F line for restoration

A1 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 A7F line

SCC shall advise F15 Operator to carry out the following

- Check opened 15L7A and 15L1L7 breakers
- Open 15A7F-G ground disconnect switch
- Turn on 125Vdc supply and close 15L7A-L7 and 15L1L7-L7 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1L7L11 and 1AL7 breakers
- Open 1A7F-G ground disconnect switch

- Turn on 125Vdc supply and close 1L7L11-L7 and 1AL7-L7 disconnect switches

3.27.2. Restoration of A7F line to service:

SCC shall:

- Advise the A1 and F15 Operators of readiness to restore A7F line to service
- Close (or advise the F15 Operator to close) 15L7A and 15L1L7 breakers
- Close (or advise the A1 Operator to close) 1L7L11 and 1AL7 breakers

3.28. To restore A7F line to service after automatic outage

If A7F line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1L7L11 and 1AL7 breakers
- Close (or advise the F15 Operator to close) 15L7A and 15L1L7 breakers

A1 Operator shall:

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

3.29. To take A8AP line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1AL8 and 1L8L10 breakers

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 22L8AD breaker

- Check for no potential on A8AP line

3.30. To take out, isolate and de-energize A8AP line for work

- A1 Operator shall request for Station Guarantee from AP22

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1AL8 and 1L8L10 breakers

SCC shall carry out (or advise the AP22 Operator to carry out) the following:

- Open 22L8AD breaker
- Check for no potential on A8AP line

SCC shall advise A1 Operator to carry out the following:

- Open 1AL8-L8 and 1L8L10-L8 disconnect switches and turn off its 125Vdc supply
- Close 1A8AP-G ground disconnect switch

SCC shall advise AP22 Operator to carry out the following:

- Open 22L8AD-L8 disconnect switch and turn off its 125Vdc supply
- Close 22L8AD-G ground disconnect switch

3.31. To restore A8AP line to service after work

3.31.1. Prepare A8AP line for restoration

A1 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 A8AP line

SCC shall advise AP22 Operator to carry out the following:

- Check opened 22L8AD breaker
- Open 22A8AP-G ground disconnect switch
- Turn on 125Vdc supply and close 22L8AD-L8 disconnect switch

SCC shall advise A1 Operator to carry out the following:

- Check opened 1L8L10 and 1AL8 breakers

- Open 1A8AP-G ground disconnect switch

- Turn on 125Vdc supply and close 1AL8-L8 and 1L8L10-L8 disconnect switches

3.31.2. Restoration of A8AP line to service:

SCC shall:

- Advise the A1 and AP22 Operators of readiness to restore A8AP line to service

- Close (or advise the A1 Operator to close) 1L8L10 and 1AL8 breakers

- Close (or advise the AP22 Operator to close) 22L8AD breaker

3.32. To restore A8AP line to service after automatic outage

If A8AP line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1L8L10 and 1AL8 breakers

- Close (or advise the AP22 Operator to close) 22L8AD breaker

A1 Operator shall:

- Advise the Supervisor/Area Manager of operation above

- Advise maintenance men to patrol the line if the operation above is not successful

3.33. To take A9AP line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL9 and 1L9L13 breakers

SCC shall carry out (or advise the AP22 Operator to carry out) the following:

- Open 22L9AD breaker
- Check for no potential on A9AP line

3.34. To take out, isolate and de-energize A9AP line for work

- A1 Operator shall request for Station Guarantee from AP22

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL9 and 1L9L13 breakers

SCC shall carry out (or advise the AP22 Operator to carry out) the following:

- Open 22L9AD breaker
- Check for no potential on A9AP line

SCC shall advise A1 Operator to carry out the following:

- Open 1DL9-L9 and 1L9L13-L9 disconnect switches and turn off its125Vdc supply
- Close 1A9AP-G ground disconnect switch

SCC shall advise AP22 Operator to carry out the following:

- Open 22L9AD-L9 disconnect switch and turn off its 125Vdc supply
- Close 22A9AP-G ground disconnect switch

3.35. To restore A9AP line to service after work

3.35.1. Prepare A9AP line for restoration

A1 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 A9AP line

SCC shall advise AP22 Operator to carry out the following:

- Check opened 22L9AD breaker
- Open 22A9AP-G ground disconnect switch

- Turn on 125Vdc supply and close 22L9AD-L9 disconnect switch

SCC shall advise A1 Operator to carry out the following:

- Check opened 1L9L13 and 1DL9 breakers
- Open 1A9AP-G ground disconnect switch
- Turn on 125Vdc supply and close 1DL9-L9 and 1L9L13-L9 disconnect switches

3.35.2. Restoration of A9AP line to service:

SCC shall:

- Advise the A1 and AP22 Operators of readiness to restore A9AP line to service
- Close (or advise the A1 Operator to close) 1L9L13 and 1DL9 breakers
- Close (or advise the AP22 Operator to close) 22L9AD breaker

3.36. To restore A9AP line to service after automatic outage

If A9AP line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1L9L13 and 1DL9 breakers
- Close (or advise the AP22 Operator to close) 22L9AD breaker

A1 Operator shall:

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

3.37. To take Z10A line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL10 and 1L8L10 breakers

SCC shall carry out (or advise the Z19 Operator to carry out the) following:

- Open 19ADL10 breaker
- Check for no potential on Z10A line

3.38. To take out, isolate and de-energize Z10A line for work

- A1 Operator shall request for Station Guarantee from Z19

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL10 and 1L8L10 breakers

SCC shall carry out (or advise the Z19 Operator to carry out) the following:

- Open 19ADL10 breaker
- Check for no potential on Z10A line

SCC shall advise A1 Operator to carry out the following:

- Open 1DL10–L10 and 1L8L10-L10 disconnect switches and turn off its 125Vdc supply
- Close 1Z10A-G ground disconnect switch

SCC shall advise Z19 Operator to carry out the following:

- Open 19ADL10-L10 disconnect switch and turn off its 125Vdc supply
- Close 19Z10A-G ground disconnect switch

3.39. To restore Z10A line to service after work

3.39.1. Prepare Z10A line for restoration

A1 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 Z10A line

SCC shall advise Z19 Operator to carry out the following:

- Check opened 19ADL10 breaker
- Open 19ADL10-G ground disconnect switch
- Turn on 125Vdc supply and close 19ADL10-L10 disconnect switch

SCC shall advise A1 Operator to carry out the following:

- Check opened 1L8L10 and 1DL10 breakers
- Open 1Z10A-G ground disconnect switch
- Turn on 125Vdc supply and close 1DL10-L10 and 1L8L10-L10 disconnect switches

3.39.2. Restoration of Z10A line to service:

SCC shall:

- Advise the A1 and Z19 Operators of readiness to restore Z10A line to service
- Close (or advise the A1 Operator to close) 1L8L10 and 1DL10 breakers
- Close (or advise the Z19 Operator to close) 19ADL10 breaker

3.40. To restore Z10A line to service after automatic outage

If Z10A line trips auto due to fault:

A1 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 Z19 Operator to energize) the line **ONCE** by closing 19ADL10 breaker
- Close (or advise the A1 Operator to close) 1L8L10 and 1DL10 breakers

A1 Operator shall:

- Advise the Supervisor/Area Manager of operation above

- Advise maintenance men to patrol the line if the operation above is not successful

3.41. To take A11F line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1DL11 and 1L7L11 breakers

SCC shall advise F15 Operator to carry out the following:

- Open 15L11A and 15L2L11 breakers

- Check for no potential on A11F line

3.42. To take out, isolate and de-energize A11F line for work

- A1 Operator shall request for Station Guarantee from F15

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1L7L11 and 1DL11 breakers

SCC shall advise F15 Operator to carry out the following:

- Open 15L11A and 15L2L11 breakers

- Check for no potential on A11F line

SCC shall advise A1 Operator to carry out the following:

- Open 1L7L11-L11 and 1DL11-L11 disconnect switches and turn off its 125Vdc supply

- Close 1A11F-G ground disconnect switch

SCC shall advise F15 Operator to carry out the following:

- Open 15L11A-L11 and 15L2L11-L11 disconnect switches and turn off its 125Vdc supply

- Close 15A11F-G ground disconnect switch

3.43. To restore A11F line to service after work

3.43.1. Prepare A11F line for restoration

A1 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 A11F line

SCC shall advise F15 Operator to carry out the following:

- Check opened 15L11A and 15L2L11 breakers

- Open 15A11F-G ground disconnect switch

- Turn on 125Vdc supply and close 15L11A-L11 and 15L2L11-L11 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1L7L11 and 1DL11 breakers

- Open 1A11F-G ground disconnect switch

- Turn on 125Vdc supply and close 1L7L11-L11 and 1DL11-L11 disconnect switches

3.43.2. Restoration of A11F line to service:

SCC shall:

- Advise the A1 and F15 Operators of readiness to restore A11F line to service

- Close (or advise the A1 Operator to close) 1L7L11 and 1DL11 breakers

- Close (or advise the F15 Operator to close) 15L11A and 15L2L11 breakers

3.44. To restore A11F line to service after automatic outage

If A11F line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing

1L7L11 and 1DL11 breakers

- Close (or advise the F15 Operator to close) 15L11A and 15L2L11 breakers

A1 Operator shall:

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

3.45. To take A12N line out of service

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1AL12 and 1T7L12 breakers

SCC shall advise N14 Operator to carry out the following:

- Open 14L12L2 and 14L12A breakers
- Check for no potential on A12N line

3.46. To take out, isolate and de-energize A12N line for work

- A1 Operator shall request for Station Guarantee from N14

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1T7L12 and 1AL12 breakers

SCC shall advise N14 Operator to carry out the following:

- Open 14L12L2 and 14L12A breakers
- Check for no potential on A12N line

SCC shall advise A1 Operator to carry out the following:

- Open 1T7L12-L12 and 1AL12-L12 disconnect switches and turn off its 125Vdc supply
- Close 1A12N-G ground disconnect switch

SCC shall advise N14 Operator to carry out the following:

- Open 14L12L2-L12 and 14L12A-L12 disconnect switches and turn off its 125Vdc supply
- Close 14A12N-G ground disconnect switch

3.47. To restore A12N line to service after work

3.47.1. Prepare A12N line for restoration

A1 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 A12N line

SCC shall advise N14 Operator to carry out the following

- Check opened 14L12L2 and 14L12A breakers
- Open 14A12N-G ground disconnect switch
- Turn on 125Vdc supply and close 14L12L2-L12 and 14L12A-L12 disconnect switches

SCC shall advise A1 Operator to carry out the following:

- Check opened 1T7L12 and 1AL12 breakers
- Open 1A12N-G ground disconnect switch
- Turn on 125Vdc supply and close 1T7L12-L12 and 1AL12-L12 disconnect switches

3.47.2. Restoration of A12N line to service:

SCC shall:

- Advise the A1 and N14 Operators of readiness to restore A12N line to service
- Close (or advise the A1 Operator to close) 1T7L12 and 1AL12 breakers
- Close (or advise the N14 Operator to close) 14L12L2 and 14L12A breakers

3.48. To restore A12N line to service after automatic outage

If A12N line trips auto due to fault:

A1 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 A1 Operator to energize) the line **ONCE** by closing 1T7L12 and 1AL12 breakers

- Close (or advise the N14 Operator to close) 14L12L2 and 14L12A breakers

A1 Operator shall:

- Advise the Supervisor/Area Manager of operation above

- Advise maintenance men to patrol the line if the operation above is not successful

3.49. To isolate 1T7 Transformer for work

- A1 Operator shall request Station Guarantee from Customers on 1F1 and 1F2 Feeders

SCC shall carry out or advise A1 operator to carry out the following:

- Inform customers about readiness to take off 1T7 Bank

- Request customers on 1T7 Bank to take off their load

- Transfer Station Service supply from AC7 to Standby Generator

- Open AC7 Contactor/MCB to take off supply to 1T7 transformer auxiliaries

SCC shall carry out (or advise A1 Operator to carry out) the following:

- Open 1B1F1 and 1B1F2 feeder breakers

- Open 1DT7 and 1T7L12 breakers

A1 Operator shall:

- Check for no potential on 1T7 Bank

- Open 1DT7-T7 and 1T7L12-T7 disconnect switches

- Open 1B1F1-B1 and 1B1F2-B1 disconnect switches

- Open AC control MCB to 1T7 auxiliaries and tag

- Open 125V DC MCB to 1T7 primary and secondary protection and tag with PC13

3.50. To restore 1T7 Bank to service

3.50.1. Prepare 1T7 Bank restoration:

A1 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 1T7 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 1DT7-T7 and 1T7L12-T7 disconnect switches
- Turn on 125Vdc supply and close 1B1F1-B1 and 1B1F2-B1 disconnect switches
- Close AC control MCB to 1T7 auxiliaries and remove tag
- Close 125V DC MCB to 1T7 primary and secondary protection and remove PC13 tag
- Advise SCC and Customers of readiness to energize 1T7 bank

3.50.2. Restoration of 1T7 Bank:

- SCC shall close (or advise A1 Operator to close) the 1DT7 and 1T7L12 breakers
- A1 Operator shall advise Customers of readiness to restore 1F1 and 1F2 feeders to service
- SCC shall close (or advise A1 Operator to close) 1B1F1 and 1B1F2 breakers

3.51. To restore 1T7 Bank to service after automatic outage

If 1T7 Bank trips auto due to fault:

A1 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 A1 Operator to energize) the bank **ONCE** by closing 1DT7 and 1T7L12 breakers

- Advise Customer of readiness to restore 1F1 and 1F2 feeders to service
- Close 1B1F1 and 1B1F2 breakers

A1 Operator shall:

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

3.52. To isolate 1F1 Feeder for work

- A1 Operator shall request for Station Guarantee from Customer on 1F1 Feeder

SCC shall carry out or advise the A1 Operator to carry out the following:

- Open 1B1F1 breaker

A1 Operator shall:

- Open 1B1F1-L disconnect switch

3.53. To restore 1F1 Feeder for service after work

3.53.1. Prepare 1F1 Feeder for service after work

- A1 Operator shall advise SCC and Customer when work on the feeder has been completed and permit surrendered (including all Station Guarantees)
- Check opened 1B1F1 breaker
- Close 1B1F1-L disconnect switch
- Advise SCC of readiness to restore lF1 feeder to service
- SCC shall close (or advise A1 Operator to close)1B1F1 breaker

3.54. To isolate 1F2 Feeder for work

- A1 Operator shall request Station Guarantee from Customer on 1F2 Feeder

SCC shall carry out (or advise the A1 Operator to carry out) the following:

- Open 1B1F2 breaker

A1 Operator shall:

- Open 1B1F2-L disconnect switch

3.55. To restore 1F2 feeder for service after work

3.55.1. Prepare 1F2 Feeder for service after work

- A1 Operator shall advise SCC and Customer when work on the feeder has been completed and permit surrendered (including all Station Guarantees)
- Check opened 1B1F2 breaker
- Close 1B1F2-L disconnect switch
- Advise SCC of readiness to restore 1F2 feeder to service
- SCC shall close (or advise A1 Operator to close) 1B1F2 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 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 provide the normal points of supply to all circuits/equipment such as A1AA, A2V, A3V, A4G, A5V, A6V, A7F , A8AP, A9AP, Z10A, A11F, A12N lines, 1T7 transformer.

5. Approval

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Director, Technical Services

TECHNICAL DIRECTIVES