TD-OP-0062

GRIDCo

OPERATING PROCEDURE FOR MIM SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR MIM SUBSTATION (MM62)**		
Issued To:	Director, System Operations Director, NNS Manager, SCC Manager, Dispatch Operations Area Manager, Techiman Operating Staff, Techiman Area Maintenance Staff, Techiman Area Dispatch Staff, SCC	**Number:**	TD-OP-0062
		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 MM62 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Techiman Operating Area and System Control Center (SCC) for operation of equipment at MM62 Substation.

3. Procedure

3.1. To take MM1JB line out of service

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

- Open 62L1A and 62L1L3 breakers

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

- Open 64L1L2 and 64L1D breakers
- Check for no potential on MM1JB line

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

- MM62 Operator request for Station Guarantee from JB64

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

- Open 62L1A and 62L1L3 breakers

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

- Open 64L1L2 and 64L1D breakers
- Check for no potential on MM1JB line

SCC shall advise JB64 Operator to carry out the following:

- Open 64L1L2-L1 and 64L1D-L1 disconnect switches and turn off its 125Vdc supply
- Close 64MM1JB-G ground disconnect switch

SCC shall advise MM62 Operator to carry out the following:

- Open 62L1A-L1 and 62L1L3-L1 disconnect switches and turn off its 125Vdc supply

- Close 62MM1JB-G ground disconnect switch

3.3. To restore MM1JB line to service after work

3.3.1. Prepare MM1JB line for restoration:

MM62 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 JB64 Operator to carry out the following:

- Check opened 64L1L2 and 64L1D breakers

- Open 64MM1JB-G ground disconnect switch

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

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 62L1L3-L1 disconnect switches

3.3.2. Restoration of MM1JB line to service:

SCC shall:

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

- Close (or advise the JB64 Operator to close) 64L1L2 and 64L1D breakers

- Close (or advise the MM62 Operator to close) 62L1A and 62L1L3 breakers

3.4. To restore MM1JB line to service after automatic outage

If MM1JB line trips auto due to fault:

MM62 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 line **ONCE** by closing 64L1L2 and 64L1D breakers
- Close (or advise the MM62 Operator to close) 62L1A and 62L1L3 breakers

MM62 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 SN3MM line out of service

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

- Open 62L3D and 62L3L1 breakers.

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Verify opened 27L3-D transfer disconnect switch
- Open 27L3A breaker
- Check for no potential on SN3MM line

3.6. To take out, isolate and de-energize SN3MM line for work

- MM62 Operator shall request for Station Guarantee from SN27

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

- Open 62L3D and 62L3L1 breakers

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Check opened 27L3-D transfer disconnect switch and turn off its 125Vdc supply
- Open 27AL3 breaker
- Check for no potential on SN3MM line

SCC shall advise SN27 Operator to carry out the following:

- Open 27AL3-L3 disconnect switch and turn off its 125Vdc supply
- Close 27SN3MM-G ground disconnect switch

SCC shall advise MM62 operator to carry out the following:

- Open 62L3D-L3 and 62L3L1-L3 disconnect switches and turn off its 125Vdc supply
- Close 62SN3MM-G ground disconnect switch

3.7. To restore SN3MM line to service after work

3.7.1. Prepare SN3MM line for restoration:

MM62 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 SN3MM line

SCC shall advise SN27 Operator to carry out the following:

- Check opened 27L3-D transfer disconnect switch and turn on its 125Vdc supply
- Check opened 27AL3 breaker
- Open 27SN3MM-G ground disconnect switch
- Turn on 125Vdc supply and close 27AL3-L3 disconnect switch

SCC shall advise MM62 Operator to carry out the following:

- Check opened 62L3D and 62L3L1 breakers
- Open 62SN3MM-G ground disconnect switch

- Turn on 125Vdc supply and close 62L3D-L3 and 62L3L1-L3 disconnect switches

3.7.2. Restoration of SN3MM line to service:

SCC shall:

- Advise the SN27 and MM62 Operators of readiness to restore SN3MM line to service
- Close (or advise the SN27 Operator to close) 27AL3 breaker
- Close (or advise the MM62 Operator to close) 62L3D and 62L3L1 breakers

3.8. To restore SN3MM line to service after automatic outage

If SN3MM line trips auto due to fault:

MM62 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 SN27 Operator to energize) the line **ONCE** by closing 27AL3 breaker
- Close (or advise the MM62 Operator to close) 62L3D and 62L3L1 breakers

MM62 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 62T1 Transformer for work

SCC shall advise MM62 Operator to carry out the following:

- Inform customers about readiness to take off 62T1 bank

- Request customers on 62T1 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 62T1 transformer auxiliaries
- Transfer Station Service from AC1 to the Standby Generator

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

- Open 62T1F1 breaker
- Open 62T1SC1 breaker
- Open 62L1A and 62AD breakers

SCC shall advise MM62 Operator to carry out the following:

- Open 62T1-A disconnect switch and turn off its 125Vdc supply
- Open 62T1F1-T1 disconnect switch
- Open 62T1SC1-T1 disconnect switch
- Open 62TSS1-X fuse
- Open 62FIPT-X fuse
- Check for no potential on 62T1 Bank

3.10. To restore 62T1 Bank to service after work

3.10.1. Prepare 62T1 Bank for restoration:

MM62 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 62T1 Bank and temporary grounds removed
- Close 62F1PT-X fuse
- Close 62TSS1-X fuse
- Close 62T1SC1-T1 disconnect switch
- Close 62T1F1-T1 disconnect switch
- Turn on 125Vdc supply and close 62A-T1 disconnect switch
- Advise SCC of readiness to restore 62T1 Bank to service

3.10.2. Restoration of 62T1 bank to service:

- SCC shall close (or advise MM62 Operator to close) the 62L1A and 62AD breakers
- MM62 Operator shall advise customers of readiness to restore 62F1 feeder to service
- SCC shall close (or advise MM62 Operator to close) the 62T1F1 breaker
- SCC shall close (or advise MM62 Operator to close) 62T1SC1 breaker if the voltage is below 32.8kV

3.11. To restore 62T1 Bank to service after automatic outage

If 62T1 bank trips auto due to fault:

MM62 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 transformer **ONCE** by closing 62L1A and 62AD breakers

MM62 Operator shall advise Customers of readiness to restore 62F1feeder to service

SCC shall close (or advise the MM62 Operator to close) 62T1F1 breaker

MM62 Operator shall:

- Advise the Supervisor/Area Manager and SCC 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 62T1F1 Breaker for work

- MM62 Operator shall request for Station Guarantee from customer on 62Y1 Bus

SCC shall advise MM62 Operator to carry out the following:

- Inform customers about readiness to take off 62T1 bank
- Request customers on 62T1 Bank to take off their load
- Transfer station service supply from AC1 to Standby Generator

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

- Open 62T1F1 breaker

SCC shall advise MM62 Operator to carry out the following:

- Open 62T1F1-T1 disconnect switch
- Open 62T1F1-F1 disconnect switch

3.13. To restore 62T1F1 Breaker to service after work

3.13.1. Prepare 62T1F1 breaker for restoration:

MM62 Operator shall:

- Advise SCC when work on the 62T1F1 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 62T1F1 Breaker and temporary grounds removed
- Close 62T1F1-F1 disconnect switch
- Close 62T1F1-T1 disconnect switch

3.13.2. Restoration of 62T1Y1 Breaker to service:

- MM62 Operator shall advise customers of readiness to restore 62F1 feeder to service
- SCC shall close (or advise MM62 Operator to close) the 62T1F1 breaker
- SCC shall close (or advise MM62 Operator to close) 62T1SC1 breaker if the voltage is below 32.8kV

3.14. To isolate 62SC1 Capacitor Bank for work

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

- Open 62T1SC1 breaker

SCC shall advise MM62 Operator to carry out the following:

- Open 62T1SC1-SC1 disconnect switch
- Close 62SC1-G ground disconnect switch

3.15. To restore 62SC1 Capacitor Bank to service after work

3.15.1. Prepare 62SC1 Capacitor Bank for restoration:

MM62 Operator shall:

- Advise SCC when work on the 62SC1 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 62SC1 Capacitor Bank and temporary grounds removed
- Open 62SC1-G ground disconnect switch
- Close 62T1SC1-SC1 disconnect switch

3.15.2. Restoration of 62SC1 Capacitor Bank to service:

- SCC shall close (or advise MM62 Operator to close) 62T1SC1 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 is a two 161kV buses, the A and D bus arrangements in ring main configuration that provides the normal points of supply to all circuits such as the MM1JB, SN3MM lines, 62T1 transformer and 62SC1 Capacitor Bank.

5. Approval

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Director, TSD

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