

CHAPTER 4

START CHECKS AND INITIATION

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1 GENERAL

The Gas Turbine Generator Unit may be started from the Local Control Room or by a 'Remote' control signal from the Remote Terminal or the Remote Main Computer.

The following checks describe the operations and observations to be made in the Local Control Room or at the Remote Terminal.

NOTE: For details of the operators facilities and procedures than can be carried out at the Remote Main Computer refer to the relevent manufacturer's documentation.

When the pre-start checks detailed in Chapter 3, have been carried out the Operator may perform the following:

1. Where not previously set to the desired operating mode set the MODE SELECTOR Switch on the Turbine Control Panel to the desired operating mode.
 - » Remote Run To commence normal operation of the Gas Turbine Generator Unit, when the permission to start signal is generated, either from the Remote Terminal or from the Main Computer.
 - » Local Run To commence normal operation of the Gas Turbine Generator Unit, when the permission to start signal is generated, by the generation of the START signal at the Turbine Control Panel.

2 PERMISSIVE TO START

Once all breakers have been closed and the Turbine Control Panel has been reset, a permissive to start indication will be displayed provided the following conditions have been satisfied:

1. A run mode has been selected on the mode selector switch on the Turbine Control Panel.
2. The unit is not currently in a start or run condition.
3. All shut-downs have been cleared.
4. The restart timer has timed out.
5. The gas generator (NI) speed reference is at minimum.
6. The Fuel Control Computer is not in an alarm condition.
7. The Turbine Lubricating Oil Reservoir is not below the low alarm/permissive to start level.
8. The Turbine Lubricating Oil Reservoir is above the low alarm/permissive to start temperature.
9. The Turbine Lubricating Oil Reservoir is below the high level alarm.
10. The Generator Lubricating Oil level is not below the low alarm/permissive to start level.
11. The Generator Lubricating Oil Reservoir temperature is above the low alarm/permissive to start temperature.

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12. The Generator Lubricating Oil level is not above the high level alarm.
13. The Fire Detection system is in operation.
14. The Turbine Enclosure Gas Level is not at a high alarm condition.
15. The Steam Injection Valves (STIG) are in the shut-down position.
16. The external start interlock is satisfied.
17. All permissives from the Generator Protection Cabinet are satisfied.
18. Fire is not detected in the Turbine Enclosure.
19. The Turbine Enclosure doors are closed.
20. The CO₂ Fire Suppressor System is not inhibited.

Once the above conditions have been met, the turbine/generator set is ready for a start sequence. The status of the above items can be checked by selecting from the MAIN MENU Screen, at the selected terminal, the START PERMISSIVE Screen by depressing the '6' Key on the Keyboard. All items require to be affirmative before a permission to start signal is generated.

3 MANUAL CRANKING

The manual cranking facility is provided for purging by rotating the Turbine Gas Generator by the operation of the Start System. This operation will propel inlet air through the Gas Turbine, Inlet Air and Exhaust Systems; removing any build-up of flammable gas residuals within the system. This facility is also used for manual cranking during off-line water wash procedures.

NOTE: The normal starting sequence commences with a purging cycle. The Turbine Gas Generator is rotated for a period of three minutes to remove potentially flammable gases from the Turbine Inlet and Gas Generator.

1. The Start Permissives must all be affirmative for the system logic to enable the manual crank to be carried out.
2. The MANUAL CRANK item has to be selected with the cursor bar on the CONTROL FUNCTIONS Screen and the ENTER Key on the Keyboard depressed and held down.
3. The MANUAL CRANK item on the screen will change colour to yellow to indicate the instigation of that function.
4. The manual crank sequence is enabled for 3 minutes to a maximum time limit of three (3) minutes. After the ENTER Key is released or the three (3) minutes is up, the starter signal will be cut off.
5. The Generator Lubricating Oil System pump will be started to feed oil to the Generator Bearings.
6. Conditional on there being oil pressure established for the Generator Rotor Bearings, within 3 seconds of Oil Pumps activation, the Start System will operate to rotate the Turbine Gas Generator Rotor. The Gas Generator Rotor will be cranked at approximately 1200 rpm.

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NOTE: A manual crank may take place after a shut-down or stop condition prior to the restart timer timing out if the gas generator speed is below 100 RPM. This manual crank may be used to provide a faster cool down period.

7. Once a 3 minute period has elapsed, for the purging of the Gas Turbine, the Starter System will cease operation.

4 STARTING

The normal operation of the Gas Turbine Generator Unit is activated in response to a start signal. The origin of the start command signal will depend on the setting of the Mode Selector Switch on the Turbine Control Panel in the Local Control Room.

The start command is instigated by the selection of the START command on the CONTROL FUNCTIONS Screen on the respective Terminal. Depressing the ENTER Key on the Keyboard will instigate the Start Sequence.

Once instigated the Start Sequence of the Turbine will then proceed as detailed in Chapter 5. The synchronization and closing of the Generator Circuit-breaker and loading of the Gas Turbine/Generator Unit will only be completed automatically where 'Automatic' mode has been selected on the Generator Control Cabinet in the Local Control Room.