

## CHAPTER 8

### ALARMS AND SHUT-DOWN CONDITIONS

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**1 GENERAL**

The Control Systems for the Gas Turbine Generator Unit monitor all aspects of the Unit and its environment. When preset parameters are exceeded the Control System will activate an Alarm. The nature of the Alarm will have been predetermined according to it's prejudged 'cause and effect'.

The following descriptions relate to the functions and observations made at the Control Panels within the Local Control Room and the Remote Terminal.

**NOTE:** For details of the operator facilities at the Remote Main Computer Console refer to the installer's documentation.

The passive Alarm indications are an early-warning system to inform the Operator that an operating parameter has deviated from normal, but has not, as yet, reached a critical stage which necessitates immediate shut-down of the gas turbine.

**WARNING:** It is particularly important that alarms generated by the Vibration Monitoring Unit are investigated as to their cause at the earliest opportunity.

If an alarm is detected, the horn will sound and the cause will be displayed on the terminal screen. The screen display has the first out sequence providing for display of the first alarm as well as any subsequent alarms. The horn is silenced by selecting the horn silence on the operator interface. Before enabling the acknowledge function, the first out alarm should be noted and field correction(s) made.

A Shut-down Alarm will be instigated when a parameter is exceeded that may indicate a fault where continued operation of the Gas Turbine and/or the Electrical Generator could be detrimental.

**2 ALARMS**

The setting of the MODE SELECT Switch on the Turbine Control Panel in the Local Control Room will determine if 'Local' or 'Remote' operation for the Gas Turbine/Generator Unit. All alarms will be recorded by the control system and can either be viewed on the respective control panel or printed out as an Event List from the Remote Control Terminal.

When an alarm is generated by the exceeding of a preset parameter an indication will appear on the respective display screen that an alarm has been generated.

1. Where the alarm has caused a trip of the Generator Circuit-breaker, Generator or Turbine Shut-down then indications of those effects will be displayed by the status indications. The current alarm will be shown in the bottom window of the screen display with a code of 'AL' for an alarm and 'SD' for an automatic shut-down.
2. Once an alarm has been generated it will activate the audible and visual alarms. The operator may cancel the audible alarm by the operator first selecting the CONTROL FUNCTIONS Screen and positioning the screen cursor alongside the 'Horn Silence' function and depressing the ENTER Key.
3. Moving the screen cursor to the next function 'Acknowledge' and depressing the ENTER Key will confirm that the alarm has been noticed and enables the visual alarm to be deactivated. Should the cause of the alarm have been temporary the alarm indication on the screen will cancel.

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**NOTE:** Each alarm as it is instigated will be automatically displayed in the single line window at the bottom of the current screen page or menu. Therefore only the first alarm will be displayed at the bottom of the screen and where a shut-down has occurred a series of alarms may be generated. An indication to the left of the screen alarm window will indicate that the alarm displayed is number one of the number of alarms in that sequence. To enable the 'first-out' alarm to be identified it may be necessary to view the CURRENT ALARMS screen to identify the sequence of events by the date and time of occurrence.

4. Ascertain and rectify the cause of the alarm(s). The Operator may call to the screen the CURRENT ALARMS screen to view the alarm or alarm sequence.

The Event List on the screen will display in descending order of date and time the last events up to number 75. As the screen can only display 16 lines of the Event List at a time only the last 16 events will be visible at the time of entry into this screen. To view prior entries in the event list depressing the Up Arrow Key will scroll the display to the earlier entries. To return to later entries depressing the Down Arrow Key will scroll down to the later entries.

Where operating from the Remote Terminal and the Data Logger was operational the operating and alarm sequences can be inspected on the print-out to identify the cause of the alarm.

5. Position the screen cursor on the 'Reset' command, when corrective action has been carried out, and activate. If the Alarm indications do not cancel then the fault has not been rectified correctly.

### 3 SHUT-DOWN ALARMS

In the event of a Shut-down Parameter being exceeded or an indicated situation, such as a Fire or Gas Alarm, a Shut-down will be initiated. A Shut-down may also be initiated manually by the operation of an Emergency Stop Switch. The Emergency Stop Switches are located in the Local Control Room and by the Remote Terminal with additional switches mounted on the exterior of the Gas Turbine/Generator Unit Enclosures.

The Generator Circuit-breaker will be tripped to shed the load and the Gas Turbine Shut-down by the closing of the Fuel (and Steam Injection) Control Valves. The Normal Stop sequence is aborted and the Gas Turbine is brought to rest without the benefit of a Cool-down period.

When a Shut-down is initiated an indication on the respective Control Panel for a 'Shut-down Alarm' will become true. Audible and visual signals will be initiated within the Local Control Room when operating in 'Local' mode.

The cause of the Shut-down will require investigation and elimination prior to an attempt to re-start the Gas Turbine Generator Unit.

Once the field condition(s) is corrected, the operator must enable the reset function to reset the annunciator sequence. If a shut-down is detected, the unit will immediately shut-down, the horn sounds and the cause(s) indicated on the display. The shut-down is also sequenced for first out shut-down. Any subsequent shut-downs will be displayed on the screen.

The operator selects the horn silence function to silence the horn. Before acknowledge is activated, the first out shut-down should be noted. Once the field condition(s) is corrected, the operator must enable the reset before restart.

If the unit has alarm(s) in conjunction with shut-down(s), the screen will display the first out alarm and first out shut-down followed by the subsequent alarm(s) and shut-down(s). The horn silence operator interface function silences the horn. Before the acknowledge is activated, the first outs are to be noted.

Once the field conditions are corrected the 'Reset' function is selected and entered before a restart can be achieved.

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The control system also monitors the analogue signals for signal failure condition. If any signal indicates above 100% or below 0% engineering units (i.e. , -10% or +110%) the circuitry detects a signal fail. The signal fails are then processed as either alarms or shut-downs and appropriate alarm or shut-down action alerts the operator.

Typically, if the signal utilized in the application software to initiate a shut-down then a signal fail condition of that signal also initiates a shut-down.