

Built-in-Test

The system software is designed to continuously monitor the electrical and optical performance of all stations simultaneously.

This functionality, called BIT (for Built-in-Test), automatically monitors each station every ten minutes for basic operational characteristics. These tests continually verify that signal output for each station is within design limits; this includes both empty stations and stations with ongoing vials.

Two different signal levels are used to verify operation of the station over the established signal range. Tests are performed on dark readings (the output from the station when its excitation LEDs are off) and on fluorescence unit readings (the output from the station when a vial is present and the excitation LEDs are on).

Fluorescence Units correspond to the units on the vertical axis of the Plot function.

Dark readings are evaluated to be below a maximum established range. When they exceed that range, the software declares the station in error. High dark readings may indicate a light leak in the cabinet or an electrical failure within the rack.

Fluorescence unit readings are evaluated to be within a specified maximum and minimum range which has been established for the instrument during calibration at the factory. The fluorescence range should be stable throughout the life of the instrument without recalibration by the user. However, should an out of range reading occur, the software declares that station in error. This may occur due to an electrical or optical component failure.

Additionally, the fluorescence readings are evaluated for consistency while vials are in stations. If consecutive fluorescence unit readings vary by more than a predetermined amount, the

station is declared in error. This feature determines the stability and the acceptability of a station for use during protocol.

These protection features verify that calibration has been maintained for all stations within the system, and insure that the user is alerted of electronic or optical changes or failures which may be significant enough to affect results.

The function of BIT can be demonstrated by entering a vial into the instrument, and then removing that vial from the station without scanning it out. The resulting error is the response of the BIT function.

BIT also tests that all racks are properly communicating with the computer. This also occurs every ten minutes. Likewise, the user is alerted if any communications failure has occurred.