

TO: MSPM Distribution  
FROM: S. L. Rosenbaum  
SUBJ: BD.4.00 - The Search Module Overview  
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The attached section is a minor revision of section BD.4.00. The major change is to the interface between the Search Module and the Segment Management (formerly Segment Housekeeping) Module. The Search Module returns a path name and leaves the job of getting the associated segment up to the Segment Management Module. The new calling sequence to the Search Module reflects this change.

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## Identification

Search Module Overview  
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## Purpose

The Search Module's main task is to direct a search for segments whose exact location, i.e., path name, in the Multics system is not known. A Search Module which can be directed by the user is essential to a system in which the user controls his file system structure. The Search Module must be self-sufficient enough to satisfy the demands of an unconcerned user and yet flexible enough to allow a user to take advantage of and to provide for situations which are peculiar to him, his particular file structure and his procedures.

The Search Module is easy to use, requiring no knowledge by the user of the Search Module's internal composition; on the other hand, the user must be aware of his own file structure if he wishes to direct the Search Module.

## References

Section BD.4.00 presents an overview of the Search Module, its operation and its related data bases. The remainder of BD.4.00 provides a more detailed operational description. Section BX.13.00 contains the instructions for operating the Search Module from the user's point of view and a description of the Search Module commands. It is recommended that the reader be familiar with sections BD.3.00 - "Segment Management Module Overview", BG.00 - "Summary of the Basic File System" and BD.6.02 - "System Skeleton".

## Discussion

When a procedure references a segment by a particular symbolic name for the first time, a fault tag2 fault occurs and control is passed to the Linker. The Linker calls the Segment Management Module for a segment pointer. If the Segment Management Module is unable to establish a segment pointer for the symbolic call name, the Segment

Management Module calls the Search Module for searching advice. The Search Module directs the searching by successively calling Directory Control to look in a sequence of directories for an acceptable segment, and then the Search Module returns the path name of the segment to the Segment Management Module.

The Search Module obtains a specific sequence of directories to use by answering the following questions: What symbolic call name caused the linkage fault to occur? What procedure wants a segment for the call name? In what ring did the fault occur? What kind of advice should be used? Where is the advice stored? What is the advice?

When the Segment Management Module calls the Search Module, it passes along the symbolic call name for which a segment is sought, and the pointer to the faulting segment (the procedure which referenced the call name). In return, the Segment Management Module expects a pointer to a segment for the calling name. To this end, the Segment Management Module invokes the Search Module with the call:

```
call search (name, callerptr, dirname, entry, errtn,
            errcode)
```

where:

name: is the symbolic call name passed by the Linker to the Segment Management Module.

callerptr: is the pointer to the actual segment referencing name, i.e., the faulting segment-not the Linker.

dirname: is the path name of the directory which contains the entry to be used for name.

entry: is the entry name of the segment to be used for name. (Hence, the path name of the segment is "dirname > entry".)

errtn: is the statement to which the Search Module returns in the event of an error.

errcode: contains a code number in the event of an error.

The possible codes and their respective meanings appear in section BX.13.01.

The Search Module uses any of three types of searching advice: enforced, user or default. An administrator at any level may enforce advice in order to regulate the searching techniques of the users under him. For example, an instructor may wish to restrict his class to using utility routines which appear in a certain library when a linkage fault occurs in the user base ring. In general, the system administrator enforces advice upon all users for linkage faults occurring in the administrative ring where the protected supervisor resides. A user may prescribe his own searching technique but it is ignored if advice has been enforced upon him for linkage faults in the ring in which his fault occurred. When neither an administrator nor the user supplies searching advice for linkage faults in a ring, the system provides a standard searching technique.

The Search Module is itself composed of two parts: the Search Module Driver and the Search Module Interpreter, described in BD.4.01 and BD.4.02, respectively. The Search Module Driver is in charge of obtaining the searching rule statements to be interpreted and returning the desired path name to the Segment Management Module. The Search Module Interpreter is solely in charge of interpreting the searching rule statements decreed by the Driver. In the course of fair exchange, the Interpreter expects to be passed a pointer to a searching rule statement. The Driver expects a symbolic path name upon return of the Interpreter.