Identification

Standard Call Brackets
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References

This section assumes a thorough knowledge of BD.9.00,
and a reading knowledge of BD.9.01-03.

Purpose

A common problem in sub-system implementation lies in
the fact that it is not easy for the sub-system (which
nominally resides in ring 32) to interpose itself between
its user procedures (which nominally reside in ring 33)
and Multics system procedures. That is, a ring 33 procedure
could, unless somehow prevented from so doing, call into
ring 1 or even ring 0 without the sub-system it is executing
under being aware of the call, and possibly interfere
disastrously with the workings of the sub-system. For
the sub-system to prevent this sort of thing requires
herculean labors. The system, however, can achieve the
desired end in a rather elegant fashion, simply by adhering
to the following convention.

Convention

The highest generally allowable ring number in the call
bracket of a system routine is 48.

Discussion

If no system routine can be called from a ring "outside"
of ring 48, procedures executing under a (ring 32 through
ring 47) subsystem simply cannot sneak around their sub-system.
They must, instead, call upon the sub-system to perform
the calls for them. By means of a transfer vector-like
arrangement of some sort, the sub-system is able to exercise
whatever degree of control it needs to over inward calls,
at the minimum cost of an extra call and return. It can,
of course, do argument validation itself, when necessary.
Subsystems which do not need the ability to interpose
themselves between the system and their subordinate procedures
can place the subordinate procedures in rings 33 - 48;
subsystems which do need the ability can place theirs
in ring 49 or above.

Exceptions

Library routines and compiler run-time routines are not
subject to the convention, as subjecting them to the convention
would introduce needless overhead. However, library routines
and compiler run-time routines should have a maximum call
bracket limit of 56. This allows rings 57-63 to be used
for "restricted users" in the old CTSS sense of the term,
and is also, for example, of use to instructors who do
not want their classes to employ the library or run-time
routines freely (if at all).

The convention is not intended to suggest that there are
no conceivable exceptions to the general rule other than
the one just stated. There may well be system routines
which are innocuously-callable from any ring, but the
convention should be applied in general and only violated
after careful thought. The basic point is that it is
far easier for a sub-system to pass on calls than it is
for the sub-system to intercept calls, so calls on which
the system programmer is sure that interception will not
be needed can be allowed by means of an upper limit on
the call bracket greater than 48, but less than 57.