Identification

Short Call/Save/Return
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Purpose

The standard call/save/return is of such length that it
is impractical for language translators to compile calls
to short supporting procedures. In order to provide language
translators with greater flexibility in their choice of
tactics, extremely short call/save/return sequences have
been defined. The following section defines the sequences.
These sequences must be used with great caution. The
final section is a short discussion of the cautions to
be observed when using the short sequences.

The Short Sequences

The short call is

```
    [eapap  arglist]       optional loading of arg ptr

    tsbbp   callee         transfer to callee, return is in
                           bb<-bp base pair
```

Note that no registers or bases are saved and the contents
of base pair bb<-bp (and ab<-ap if used) are lost.

The short save is empty, i.e., the address callee in the
tsb instruction is the actual entry point in the procedure
segment and not in the linkage section as in the standard
call. The stack frame is not bumped and the value of
lb<-lp is unchanged.

The short return is,

```
    tra bp|0
```

This returns to the instruction following the tsb instruction
in the call. Note that base pair bb<-bp (and ab<-ap if
arguments were passed) is not restored.

Cautions Regarding the Use of Short Sequence

The motivation for the short sequences is the desire to
make it practical for compilers to call short support
procedures. The following comments are made with that
objective in mind.

The four ways in which the short call/save/return differs
from the long are:

1.   The stack is not bumped, i.e., the called procedure is
      not provided with a new stack frame.

2.   The called procedure does not have access to its own
      linkage section, i.e., lp remains pointing to the caller's
      linkage section.

3.   The return location is not left in the stack.

4.   Registers and bases are not saved and restored.

These differences have several pertinent implications.

1.   The two sequences are incompatible (the return information
      is in different places). Thus, a short (long) call may
      not be used to call a procedure which uses a long (short)
      return, respectively.

2.   The called procedure cannot call another procedure or have
      any internal static storage. Both of these require that
      the procedure be able to refer to its own linkage section.

3.   The called procedure may not refer to automatic storage
      (stack) in the usual way since the sp base is pointing
      to the callers stack frame.

4.   The caller is responsible for saving and restoring any
      registers or bases whose contents he wishes preserved.

5.   A standard argument list need not be used. However, whenever
      an argument list is used (even a nonstandard one) its location
      should be transmitted via the ab<-bp base pair.

6.   The registers may be used to transmit both input and output
      arguments.

7.   The stack may be used by the called procedure, but only
      in a parasitic fashion. The contents of sp|18 point to
      the beginning of the unused portion of the stack. Before
      using any of this space the callee must update the contents
      of sp|18 so that it points beyond the area to be used. This
      is necessary since the system assumes that the stack is
      unused beginning with the word pointed to by the contents
      of sp|18 and may use the space when processing a fault or
      interrupt. Before return to the caller sp|18 must be
      restored to its original value. The called procedure
      must not change the contents of the sb<-sp base pair,
      i.e., the stack discipline specified in BD.7.02 must be
      observed.

System procedures, especially the debugging aids, are
written under the assumption that all procedures use the
long call/save/return. In particular, the system assumes
stack discipline is observed. If anything happens while
control is in a procedure reached by a short call the
system will not be able to provide much assistance in
diagnosing the trouble. For this reason, use of the short
call is suggested only for short support routines called
by compiled procedures.