

## 1 SUMMARY

This package of subroutines **counts and times subprogram calls** during execution of a Fortran program that has been suitably preprocessed. Each call is represented by a parent-child relationship in a tree.

**ATTRIBUTES** — **Version:** 1.0.0. **Remark:** This is a slightly rewritten version of OE07, and supersedes it. **Types:** OE17A. **Original date:** September 1980. **Origin:** S.Marlow, Harwell.

## 2 HOW TO USE THE PACKAGE

### 2.1 Argument list

(i) At each entry point to a subprogram:

```
CALL OE17A(LCALL,NAME)
```

(ii) On each return from a subprogram:

```
CALL OE17B(LCALL)
```

(iii) Whenever the details of call sequences ending at a particular subprogram are required to be printed:

```
CALL OE17C(LCCALL,NAME)
```

LCALL is an INTEGER which will be set by the subroutine to 1 or 2 according to whether the call is to OE17A or OE17B. No action is taken on an OE17A call with LCALL set to 1.

LCCALL is an INTEGER which must be set by the user to any value other than 3 before the first of a sequence of consecutive calls to OE17C. On exit, it is set by the subroutine to 3.

NAME is a CHARACTER\*6 variable which must be set by the user to the name of the subprogram. This argument is not altered by the subroutine.

### 2.2 Common

The subroutines contain the following common blocks to record array sizes and information about the current status of the tree and to specify workspace.

```
COMMON/OE17D/TIME,SMALL,LW,NNODE,NODEC,LEVEL,LP  
COMMON/OE17E/NAMSUB(1000)  
COMMON/OE17F/NCOUNT(1000)  
COMMON/OE17G/ATIME(1000)  
COMMON/OE17H/LCHILD(1000)  
COMMON/OE17I/LKIN(1000)
```

TIME is a REAL variable which is set by the subroutine to the time (seconds) at entry to the first of a sequence of OE17C calls. It must not be set or altered by the user.

SMALL is a REAL variable which must be set by the user to a small positive number. If subtracted from a positive clock reading it should not alter it. SMALL is not altered by the subroutine.

LW is an INTEGER which must be set by the user to indicate the lengths of arrays in OE17E/F/G/H/I. If no declaration of OE17E - I is made by the user then LW should be 1000. If  $LW \leq 0$  then there is an immediate return

from OE17A/B/C. LW is not altered by the subroutine.

NNODE is an INTEGER which must initially be set by the user to zero and thereafter left unchanged. It will be set by the subroutine to the number of nodes in the tree and can change only on an OE17A entry when it may increase by one. If NNODE > LW then part of the tree is omitted. A warning message is printed if OE17C is called for a node with one or more missing children.

NODEC is an INTEGER which must not be set or altered by the user. It is set by the subroutine to point to the current node of the tree.

LEVEL is an INTEGER variable which will be set by the subroutine only if NNODE > LW to indicate the number of extra tree levels that would be currently active if all the tree could be stored. It must initially be set to zero by the user and thereafter not altered.

LP is an INTEGER variable which must be set by the user to the stream number for OE17C printing. If  $LP \leq 0$  no printing is done. LP is not altered by the subroutine.

NAMSUB is a CHARACTER\*6 array which must not be set or altered by the user. It will be set by the subroutine so that NAMSUB(I) holds the name associated with tree node I.

NCOUNT is an INTEGER array which must not be set or altered by the user. It will be set by the subroutine so that IABS(NCOUNT(I)) holds the number of times the call corresponding to tree node I has been made. It is normally positive, but is negated if lack of space prevents a child being stored.

ATIME is a REAL array which must not be set or altered by the user. It is set by the subroutine so that if node I is not in the active chain of calls then ATIME(I) holds the accumulated time in seconds spent at node I, and if it is then ATIME(I) is negative and the accumulated time spent at node I is ATIME(I)+(current time).

LCHILD is an INTEGER array which must not be set or altered by the user. It will be set by the subroutine so that LCHILD(I) is the node number of the first child of node I, or to itself if it has no children.

LKIN is an INTEGER array which must not be set or altered by the user. It will be set by the subroutine so that LKIN(I) is the node number of the next brother/sister of node I if it has one, or else -LKIN(I) is the node number of its parent.

### 3 GENERAL INFORMATION

**Workspace:** Five arrays in common (see §2.2).

**Use of common:** See §2.2.

**Other routines called directly:** Calls ZA02AS.

**Input/output:** Printing by OE17C of the times, counts and call sequence trees.

**Restrictions:** If the number of tree nodes exceeds the size of the arrays in common, then information is lost.

### 4 METHOD

OE17A sets up the tree by linking the new subprogram name to the previous one as a child, unless this link already appears in the current tree. Arrays ATIME and NCOUNT are updated for the current node.

OE17B updates the time, held in ATIME, for the current node. It revises NODEC to point to the parent node.

OE17C prints the time spent in the subprogram for each call sequence in which it appears, and the corresponding call sequence itself. TIME is set for the first of each set of consecutive calls to OE17C. The overall time for the current subprogram is calculated and printed, together with the call chain containing the current node.