ALGOL F

Level 2.1

360S-AL-531 ALGOL F Compiler
and
360S-LM-532 ALGOL F Library

Independent Component Release
for
MVS 3.8

Contents

Figures

1. Introduction

1.1 Overview

The Algol F Level 2.1 Independent Component Release is a complete replacement of the previous release Level 2.0 which was a component of OS/360. This ICR may be used to upgrade an existing Algol F installation at the Level 2.0 to Level 2.1 or alternatively may be used to install the Algol F Compiler and Library where the Compiler and Library have not been previously installed. The ICR includes a number of programming enhancements to the Compiler and the Library. The Library routines have been updated for compatibility with the MVS JES2/3 environment.

2. Programming Enhancements

2.1 Compiler Enhancements

A new format heading now identifies the release level of the Compiler and the time and date of the compilation

Upper and lower case alphabetic characters may be used interchangeably in procedure names, identifier names and Algol Language defined symbols. All alphabetic characters are resolved to upper case except within strings where they retain their upper or lower case specification.

Examples

```
'begin'
'Array'
i
ToTal
```

The range of alphabetic characters is extended to include the national characters $, _, # and @. These national characters may be used wherever an alphabetic character is acceptable in procedure names and identifier names.

Examples

```
i_to_r
#sum
Amt$
@curr
```

The standard Algol array subscript definition of enclosing square brackets is supported

Examples

```
'real' 'array' sum[0:10]
k := sum[i]
```

The operator ** may be used in place of ‘POWER’

Compiled Algol programs are identified by a translator ID of 360SAL531 and a date of compilation.

The semicolon count, wherever printed, is left zero suppressed for improved program readability.

2.2 Run Time Library Enhancements

The run time library routines, specifically all routines responsible for data management and the interface with the operating system are compatible with MVS programming standards. JES2/3 SYSIN datasets are Opened for input only without the Point option set in the DCB MACRF field. JES2/3 SYSOUT datasets are Opened for output only without the Point option set in the DCB MACRF field. Previous techniques to avoid ABENDs when processing SYSIN or SYSOUT datasets are no longer required.

The semicolon count, wherever printed, is left zero suppressed for improved program readability.

3. Installing the ICR

3.1 Planning

Obtain the ICR which is packaged in Hercules Emulated Tape (HET) format with a VOLSER of ALGOL.
The installation JCL and instructions are customized for an MVS 3.8 Turnkey system. If the target system is setup differently the JCL may require modification to suit the system environment.
The password for the Master Catalog of the target MVS system is required for the deletion and re-allocation of the SYS1.ALGLIB dataset.

3.2 Installation

Step 1.
The first dataset on the tape contains the installation JCL to install the remaining datasets on the tape. Download this JCL file using the IEBGENER utility to a dataset where the JCL may be edited and customized for the installation requirements and standards. An example job is shown below.

```
//LOADJCL JOB  ALGOL,'DOWNLOAD JCL',MSGLEVEL=(1,1),  <-- CUSTOMIZE
//             CLASS=A,MSGCLASS=C                    <-- CUSTOMIZE
//GENER   EXEC PGM=IEBGENER
//SYSPRINT DD  DUMMY
//SYSIN    DD  DUMMY
//SYSUT1   DD  DSN=ALGOLF.LVL210.JCL,LABEL=(1,SL,),DISP=OLD,
//             UNIT=3400-6,VOL=SER=ALGOLF            <-- CUSTOMIZE
//SYSUT2   DD  DSN=userid.work.cntl(ALGJCL),disp=shr <-- CUSTOMIZE
```

Figure 1 Download Installation JCL

Step 2.
Edit the downloaded installation JCL to conform to installation standards and submit the job. The installation JCL is listed below.

```
//T1AI    JOB  111,'ALGOL F LVL2.1',   <-- CUSTOMIZE FOR INSTALLATION
//             CLASS=S,MSGCLASS=C,     <-- CUSTOMIZE FOR INSTALLATION
//             REGION=4096K,COND=(0,NE),MSGLEVEL=(1,1)
//*
//*            INSTALL
//*            ALGOL F LEVEL 2.1
//*            360S-AL-531 ALGOL F COMPILER
//*                 AND
//*            360S-LM-532 ALGOL F LIBRARY
//*            INDEPENDENT COMPONENT RELEASE
//*
//*            BEFORE SUBMITTING THIS JOB CUSTOMIZE THE SYMBOLIC
//*            PARAMETERS TO CONFORM TO LOCAL STANDARDS
//*
//*            NOTE -
//*            THIS JOB WILL ISSUE TWO REQUESTS FOR THE
//*            MASTER CATALOG PASSWORD TO DELETE AND RE-ALLOCATE
//*            SYS1.ALGLIB
//*
//*            THIS JCL IS THE FIRST FILE ON THE DISTRIBUTION TAPE
//*
//*            DSN=ALGOLF.LVL210.JCL,LABEL=(1,SL,EXPDT=98000)
//*
//INSTALL PROC OLINK='SYS2.LINKLIB',   <-- TARGET COMPILER LINKLIB
//             OLIB='SYS1.ALGLIB',     <-- TARGET RESIDENT LIBRARY
//             OLUNIT='3350',          <-- TARGET RESIDENT LIBRARY
//             OLVOL='MVSRES',         <-- TARGET RESIDENT LIBRARY
//             OPROC='SYS2.PROCLIB',   <-- TARGET PROCLIB
//             OSAMP='SYS1.SAMPLIB',   <-- TARGET IVP SAMPLIB
//             SOUT='*',               SYSOUT CLASS, DLFT TO MSGCLASS
//             THLQ='ALGOLF',          ADD ADDTNL PREFIX IF REQUIRED
```

```
//             TUNIT='3400-6',         TAPE UNIT FOR DISTRIBUTION TAPE
//             TVOL='ALGOLF'           VOLSER OF DISTRIBUTION TAPE
//*
//*****************************************************************
//*
//*            NAME: INSTALL ALGOL F LEVEL 2.1 ICR
//*
//*            DESC: INSTALL NEW VERSION OF ALGOL F AND ASSOC
//*                  LIBRARIES FROM DISTRIBUTION TAPE
//*
//*****************************************************************
//*
//*            DELETE SYS1.ALGLIB
//*
//DELETE  EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  DUMMY
//*
//*            LOAD ALL DATASETS
//*
//LOAD    EXEC PGM=IEBCOPY,REGION=1024K
//SYSPRINT DD  SYSOUT=&SOUT
//*
//INLINK   DD  DSN=&THLQ..LVL210.MOD,
//             UNIT=&TUNIT,VOL=(PRIVATE,RETAIN,SER=&TVOL),
//             LABEL=(2,SL,EXPDT=98000),DISP=(OLD,PASS)
//OUTLINK  DD  DSN=&OLINK,DISP=SHR             <--- TARGET LIB
//*
//INLIB    DD  DSN=&THLQ..LVL210.LIB,
//             UNIT=&TUNIT,VOL=(PRIVATE,RETAIN,SER=&TVOL),
//             LABEL=(3,SL,EXPDT=98000),DISP=(OLD,PASS)
//OUTLIB   DD  DSN=&OLIB,UNIT=&OLUNIT,         <--- TARGET LIB
//             VOL=SER=&OLVOL,SPACE=(TRK,(15,5,32)),
//             DISP=(,CATLG)
//*
//INPROC   DD  DSN=&THLQ..LVL210.PRC,
//             UNIT=&TUNIT,VOL=(PRIVATE,RETAIN,SER=&TVOL),
//             LABEL=(4,SL,EXPDT=98000),DISP=(OLD,PASS)
//OUTPROC  DD  DSN=&OPROC,DISP=SHR             <--- TARGET LIB
//*
//INSAMP   DD  DSN=&THLQ..LVL210.IVP,
//             UNIT=&TUNIT,VOL=(PRIVATE,RETAIN,SER=&TVOL),
//             LABEL=(5,SL,EXPDT=98000),DISP=(OLD,KEEP)
//OUTSAMP  DD  DSN=&OSAMP,DISP=SHR             <--- TARGET LIB
//*
//        PEND
//        EXEC INSTALL
//DELETE.SYSIN DD *
  DELETE SYS1.ALGLIB PURGE
  SET LASTCC = 0
/*
//LOAD.SYSIN   DD *
    COPY INDD=((INLINK,R)),OUTDD=OUTLINK
    COPY INDD=((INLIB,R)),OUTDD=OUTLIB
    COPY INDD=((INPROC,R)),OUTDD=OUTPROC
    COPY INDD=((INSAMP,R)),OUTDD=OUTSAMP
/*
//
```

Figure 2 Installation JCL

3.3 Changing the Installation Default Compiler Options

The Algol Compiler has been configured with options suitable for the MVS 3.8 environment –

```
ALGOL PUNCH=NODECK,                                    X
      TYPERUN=LOAD,                                    X
      SORCODE=EBCDIC,                                  X
      SORLIST=SOURCE,                                  X
      PRECISN=SHORT
```

The options may be changed by updating the Compiler options setting by use of the AMASPZAP utility program. Member IEXOPTNS in SYS1.SAMPLIB provides a sample job and an explanation of how to change the default options bit settings.

3.4 Running the Installation Verification Programs

The installation job installs four IVP programs (IEXSAMP1, IEXSAMP2, IEXSAMP3 and IEXSAMP4) into SYS1.SAMPLIB and the cataloged procedures to run them into SYS2.PROCLIB. Edit the JCL of the four jobs to conform to installation standards and submit them for execution. The IEXSAMP2 IVP will fail with a return code of 16 as a result of a deliberate divide by zero to prove the successful installation of the run time library error handling module. The IEXSAMP4 job will execute for approximately four minutes on a 25 MIP MVS system. The resulting output from all four jobs may be found in Appendix A, B, C and D.

4. Optional Materials

4.1 Machine Readable Program Source Material

The Assembler and Macro libraries for both the Algol F Level 2.1 Compiler and Library are available in unloaded PDS files distributed in HET format. The HET file may be downloaded from

TBA

4.2 Program Listings

Assembler listings of both the Algol F Level 2.1 Compiler and Library in PDF bookmarked files may be downloaded from

TBA

Appendix A. IVP IEXSAMP1 Listing

```
                                    J E S 2   J O B   L O G


13.34.17 JOB 9290  IEF677I WARNING MESSAGE(S) FOR JOB T1IV1    ISSUED
13.34.17 JOB 9290  $HASP373 T1IV1    STARTED - INIT  6 - CLASS S - SYS SYSA
13.34.17 JOB 9290  IEF403I T1IV1 - STARTED - TIME=13.34.17
13.34.17 JOB 9290  IEFACTRT - Stepname  Procstep  Program   Retcode
13.34.17 JOB 9290  T1IV1      IVP1      ALGOL     ALGOL     RC= 0000
13.34.17 JOB 9290  T1IV1      IVP1      LKED      IEWL      RC= 0000
13.34.18 JOB 9290  T1IV1      IVP1      GO        GO        RC= 0000
13.34.18 JOB 9290  T1IV1      AMBLIST             AMBLIST   RC= 0000
13.34.18 JOB 9290  IEF404I T1IV1 - ENDED - TIME=13.34.18
13.34.18 JOB 9290  $HASP395 T1IV1    ENDED

   1     //T1IV1   JOB  111,'ALGOL F LVL2.1',   <-- CUSTOMIZE FOR SITE STANDARDS JOB 9290
         //            CLASS=S,MSGCLASS=C,     <-- CUSTOMIZE FOR SITE STANDARDS 00002001
         //            REGION=1024K,COND=(0,NE),MSGLEVEL=(1,1)                  00003001
         ***                                                                    00004001
         ***       IBM Algol F Level 2.1 IVP                                    00005001
         ***                                                                    00006001
         ***       360S-AL-531 Algol F Compiler                                 00007001
         ***            and                                                     00008001
         ***       360S-LM-532 Algol F Library                                  00009001
         ***                                                                    00010001
   2     //IVP1   EXEC  ALGOFCLG,PARM.GO='TRACE'                                00011001
         ***                                                                    00001001
         ************************************************************************ 00002001
         ***                                                                    00003001
         ***       IBM ALGOL F LEVEL 2.1                                        00004001
         ***                                                                    00005001
         ***       360S-AL-531 ALGOL F COMPILER                                 00006001
         ***            AND                                                     00007001
         ***       360S-LM-532 ALGOL F LIBRARY                                  00008001
         ***                                                                    00009001
         ***       COMPILE, LINK-EDIT AND EXECUTE A PROGRAM                     00010001
         ***                                                                    00011001
         ************************************************************************ 00012001
         ***                                                                    00013001
   3     XXALGOL   EXEC PGM=ALGOL,REGION=1024K                                00014001
   4     XXSYSPRINT DD  SYSOUT=*                                              00015001
   5     XXSYSPUNCH DD  DUMMY                                                 00016001
   6     XXSYSLIN   DD  DSN=&&OBJECT,UNIT=VIO,SPACE=(3200,(20,10)),           00017001
         XX             DISP=(,PASS)                                          00018001
   7     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(50,10))                         00019001
   8     XXSYSUT2   DD  UNIT=VIO,SPACE=(2048,(50,10))                         00020001
   9     XXSYSUT3   DD  UNIT=VIO,SPACE=(2048,(40,10))                         00021001
  10     //ALGOL.SYSIN  DD  *                                                 00012001
  11     XXLKED    EXEC PGM=IEWL,PARM='XREF,LIST,LET',COND=(5,LT,ALGOL),      00022001
         XX             REGION=1024K                                          00023001
  12     XXSYSPRINT DD  SYSOUT=*                                              00024001
  13     XXSYSLIB   DD  DSN=SYS1.ALGLIB,DISP=SHR                              00025001
  14     XXSYSLMOD  DD  DSN=&&GOSET(GO),UNIT=VIO,DISP=(,PASS),                00026001
         XX             SPACE=(2048,(100,20,1))                               00027001
  15     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(100,20))                        00028001
  16     XXSYSLIN   DD  DSN=&&OBJECT,DISP=(OLD,DELETE)                        00029001
  17     XX         DD  DDNAME=SYSIN                                          00030001
  18     XXGO      EXEC PGM=GO,COND=((5,LT,ALGOL),(5,LT,LKED)),              00031001
         XX             REGION=1024K                                          00032001
  19     XXSTEPLIB  DD  DSN=&&GOSET,DISP=(OLD,PASS)                           00033001
  20     XXALGLDD01 DD  SYSOUT=*                                              00034001
  21     XXSYSPRINT DD  SYSOUT=*                                              00035001
  22     XXSYSUT1   DD  UNIT=VIO,SPACE=(1024,(20,10))                         00036001
  23     //AMBLIST  EXEC PGM=AMBLIST                                          00067001
         ***                                                                    00068001
         ***        DEMONSTRATE LANGUAGE TRANSLATOR ID FOR ALGOL F              00069001
         ***        PROGRAMS AND TIME OF COMPILATION                            00070001
         ***                                                                    00071001
  24     //SYSPRINT  DD  SYSOUT=*                                             00072001
  25     //SYSLIB    DD  DSN=&&GOSET,DISP=(OLD,PASS)                          00073001
  26     //SYSIN     DD  *                                                    00074001
 STMT NO. MESSAGE
-
   18     IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR T1IV1 ALGOL IVP1
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I DMY  ALLOCATED TO SYSPUNCH
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I VIO  ALLOCATED TO SYSUT1
```

```
IEF237I VIO  ALLOCATED TO SYSUT2
IEF237I VIO  ALLOCATED TO SYSUT3
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I T1IV1 ALGOL IVP1 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09290.SO0103                    SYSOUT
IEF285I   SYS12230.T133417.RA000.T1IV1.OBJECT     PASSED       *--------2
IEF285I   SYS12230.T133417.RA000.T1IV1.R0000001   DELETED      *--------0
IEF285I   SYS12230.T133417.RA000.T1IV1.R0000002   DELETED      *--------0
IEF285I   SYS12230.T133417.RA000.T1IV1.R0000003   DELETED      *-------13
IEF285I   JES2.JOB09290.SI0101                    SYSIN
IEF373I STEP /ALGOL   / START 12230.1334
IEF374I STEP /ALGOL   / STOP  12230.1334 CPU    0MIN 00.05SEC SRB    0MIN 00.00SEC VIRT   192K SYS   304K
*********************************************************************************************************************************
*     1. Jobstep of job: T1IV1       Stepname: ALGOL       Program name: ALGOL      Executed on 17.08.12 from 13.34.17 to 13.34.17 *
*         elapsed time  24:00:00,10                    CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,05              Virtual Storage used:    192K         Page-out:     0                          *
*           corr. CPU:  00:00:00,05   CPU time has been corrected by  1 / 1,0  multiplier                                       *
*                                                                                                                               *
*     I/O Operation                                                                                                             *
*     Number of records read via DD * or DD DATA:     53                                                                        *
*     DMY.......0 DMY.......0 FFF.......2 FFF.......0 FFF.......0 FFF......13 DMY.......0                                        *
*                                                                                                                               *
*                                      Charge for step (w/o SYSOUT):          0,08                                          *
*********************************************************************************************************************************
IEF236I ALLOC. FOR T1IV1 LKED IVP1
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I 148  ALLOCATED TO SYSLIB
IEF237I VIO  ALLOCATED TO SYSLMOD
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO
IEF142I T1IV1 LKED IVP1 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09290.SO0104                    SYSOUT
IEF285I   SYS1.ALGLIB                             KEPT         *-------64
IEF285I   VOL SER NOS= MVSRES.
IEF285I   SYS12230.T133417.RA000.T1IV1.GOSET      PASSED       *-------18
IEF285I   SYS12230.T133417.RA000.T1IV1.R0000004   DELETED      *--------0
IEF285I   SYS12230.T133417.RA000.T1IV1.OBJECT     DELETED      *--------3
IEF373I STEP /LKED    / START 12230.1334
IEF374I STEP /LKED    / STOP  12230.1334 CPU    0MIN 00.05SEC SRB    0MIN 00.01SEC VIRT  1024K SYS   280K
*********************************************************************************************************************************
*     2. Jobstep of job: T1IV1       Stepname: LKED        Program name: IEWL       Executed on 17.08.12 from 13.34.17 to 13.34.17 *
*         elapsed time  24:00:00,08                    CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,06              Virtual Storage used:   1024K         Page-out:     0                          *
*           corr. CPU:  00:00:00,06   CPU time has been corrected by  1 / 1,0  multiplier                                       *
*                                                                                                                               *
*     I/O Operation                                                                                                             *
*     Number of records read via DD * or DD DATA:      0                                                                        *
*     DMY.......0 148......64 FFF......18 FFF.......0 FFF.......3 DMY.......0                                                   *
*                                                                                                                               *
*                                      Charge for step (w/o SYSOUT):          0,10                                          *
*********************************************************************************************************************************
IEF236I ALLOC. FOR T1IV1 GO IVP1
IEF237I VIO  ALLOCATED TO STEPLIB
IEF237I JES2 ALLOCATED TO ALGLDD01
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I VIO  ALLOCATED TO SYSUT1
IEF142I T1IV1 GO IVP1 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS12230.T133417.RA000.T1IV1.GOSET      PASSED       *--------0
IEF285I   JES2.JOB09290.SO0105                    SYSOUT
IEF285I   JES2.JOB09290.SO0106                    SYSOUT
IEF285I   SYS12230.T133417.RA000.T1IV1.R0000005   DELETED      *-------12
IEF373I STEP /GO      / START 12230.1334
IEF374I STEP /GO      / STOP  12230.1334 CPU    0MIN 00.05SEC SRB    0MIN 00.00SEC VIRT    28K SYS   300K
*********************************************************************************************************************************
*     3. Jobstep of job: T1IV1       Stepname: GO          Program name: GO         Executed on 17.08.12 from 13.34.17 to 13.34.18 *
*         elapsed time  24:00:00,07                    CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,05              Virtual Storage used:     28K         Page-out:     0                          *
*           corr. CPU:  00:00:00,05   CPU time has been corrected by  1 / 1,0  multiplier                                       *
*                                                                                                                               *
*     I/O Operation                                                                                                             *
*     Number of records read via DD * or DD DATA:      0                                                                        *
*     FFF.......0 DMY.......0 DMY.......0 FFF......12                                                                           *
*                                                                                                                               *
*                                      Charge for step (w/o SYSOUT):          0,08                                          *
*********************************************************************************************************************************
IEF236I ALLOC. FOR T1IV1 AMBLIST
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I VIO  ALLOCATED TO SYSLIB
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I T1IV1 AMBLIST - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09290.SO0107                    SYSOUT
```

```
IEF285I   SYS12230.T133417.RA000.T1IV1.GOSET           PASSED        *--------9
IEF285I   JES2.JOB09290.SI0102                         SYSIN
IEF373I STEP /AMBLIST / START 12230.1334
IEF374I STEP /AMBLIST / STOP  12230.1334 CPU    0MIN 00.02SEC SRB    0MIN 00.00SEC VIRT  1024K SYS   280K
*************************************************************************************************************************************
*     4. Jobstep of job: T1IV1       Stepname: AMBLIST     Program name: AMBLIST    Executed on 17.08.12 from 13.34.18 to 13.34.18 *
*         elapsed time  24:00:00,07                    CPU-Identifier:  SYSA           Page-in:      0                           *
*             CPU time  00:00:00,02               Virtual Storage used:   1024K         Page-out:      0                           *
*           corr. CPU:  00:00:00,02   CPU time has been corrected by  1 / 1,0  multiplier                                          *
*                                                                                                                                   *
*     I/O Operation                                                                                                                 *
*     Number of records read via DD * or DD DATA:      1                                                                            *
*     DMY.......0 FFF.......9 DMY.......0                                                                                           *
*                                                                                                                                   *
*                                       Charge for step (w/o SYSOUT):          0,03                                             *
*************************************************************************************************************************************
IEF285I   SYS12230.T133417.RA000.T1IV1.GOSET           DELETED
IEF375I  JOB /T1IV1   / START 12230.1334
IEF376I  JOB /T1IV1   / STOP  12230.1334 CPU    0MIN 00.17SEC SRB    0MIN 00.01SEC
```

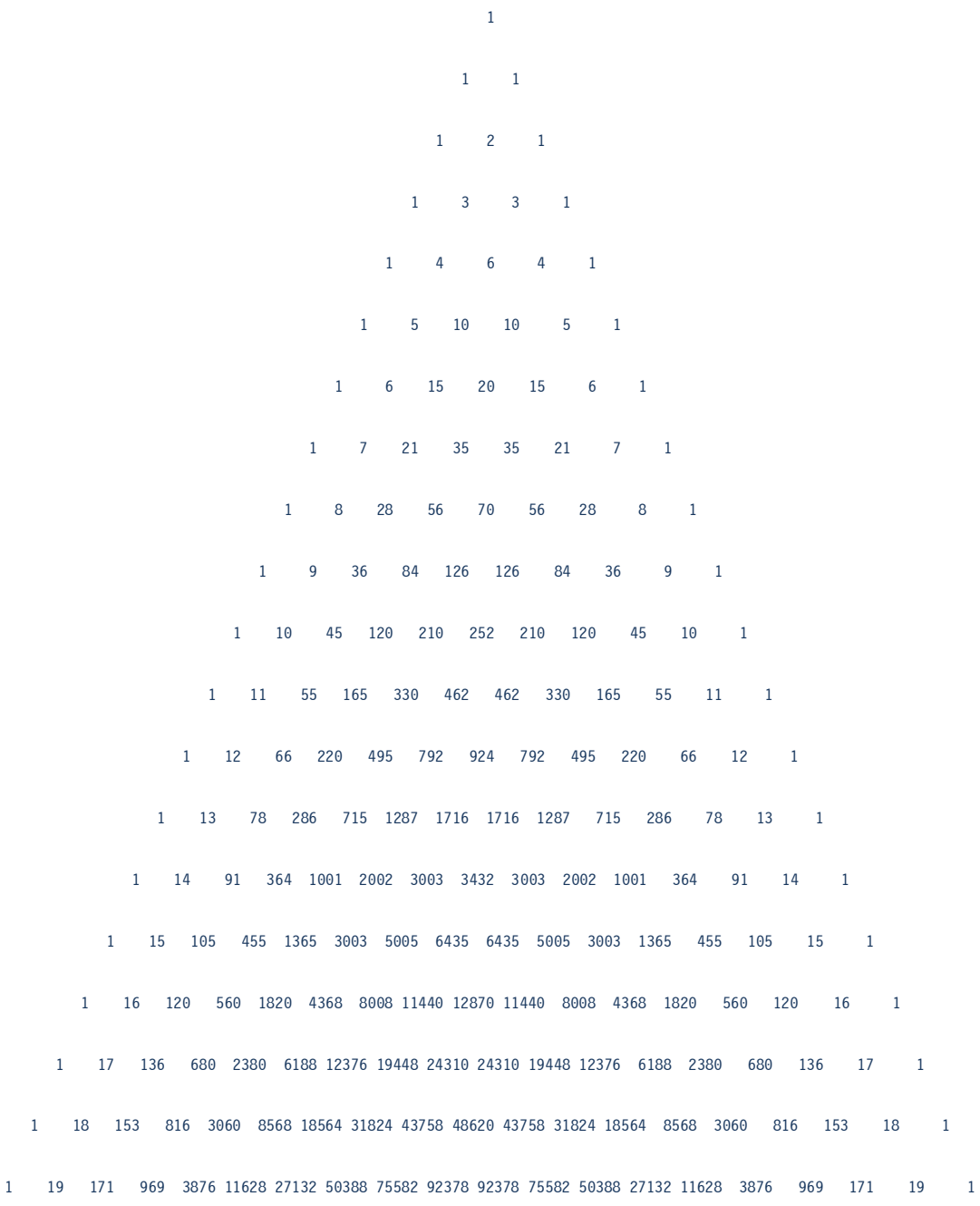
```
SC     SOURCE STATEMENT

           'BEGIN'                                                          00013001
            'COMMENT' TEST PROGRAM Q09                                      00014001
                      MODIFIED FOR IBM ALGOL F LEVEL 2.1 IVP                00015001
                                                                            00016001
                      GENERATE AND PRINTS THE FIRST TWENTY                  00017001
                      LINES OF PASCALS TRIANGLE                             00018001
                                                                            00019001
                THE K TH ELEMENT P(K,J) OF THE J TH LINE SHOULD BE          00020001
                EQUAL TO THE SUM OF P(K-1,J-1) AND P(K,J-1) FOR K ¬= 0      00021001
                AND K ¬= J. P(0,J)=P(J,J)=1                                 00022001
                THUS BY ADDING TWO BY TWO ALL ELEMENTS IN ONE LINE          00023001
                PLACING EACH SUM BELOW AND BETWEEN THE TWO ELEMENTS THE     00024001
                NEXT LINE OF PASCALS TRIANGLE COULD BE EXPANDED ;           00025001
                                                                            00026001
           'INTEGER' l,k,n,i,m,Powerten;                                    00027001
 1         'INTEGER' 'ARRAY' a[0:19];                                       00028001
 2         'BOOLEAN' c;                                                     00029001
 3         SYSACT(1,6,120);                                                 00030001
 4         SYSACT(1,8,62);                                                  00031001
 5         SYSACT(1,12,1);                                                  00032001
 6         SYSACT(1,2,56);                                                  00033001
 7         OUTSTRING (1,'('Pascals Triangle')');                            00034001
 8         'FOR' l := 0 'STEP' 1 'UNTIL' 19 'DO'                            00035001
 8          'BEGIN'                                                         00036001
 8           SYSACT(1,14,3);                                                00037001
 9           'IF' l < 19 'THEN'                                             00038001
 9             SYSACT(1,2,58-3*l);                                          00039001
10           a[l] := 1;                                                     00040001
11           'FOR' k := l-1 'STEP' -1 'UNTIL' 1 'DO'                        00041001
11            a[k] := a[k-1] + a[k];                                        00042001
12            'FOR' K :=0 'STEP' 1 'UNTIL' L 'DO'                           00043001
12             'BEGIN'                                                      00044001
12              c := 'TRUE';                                                00045001
13              m := a[k];                                                  00046001
14              'FOR' I := 5 'STEP' -1 'UNTIL' 0 'DO'                       00047001
14               'BEGIN'                                                    00048001
14                 Powerten := 10 ** I;                                     00049001
15                 n := m '/' Powerten;                                     00050001
16                 m := m-n * Powerten;                                     00051001
17                 'IF' n 'EQUAL' 0 'THEN'                                  00052001
17                  'BEGIN'                                                 00053001
17                   'IF' c 'THEN' OUTSYMBOL (1,'(' ')',1)                  00054001
17                     'ELSE' OUTSYMBOL (1,'('0')',1);                      00055001
18                  'END'                                                   00056001
18                   'ELSE'                                                 00057001
18                    'BEGIN'                                               00058001
18                     c := 'FALSE';                                        00059001
19                     OUTSYMBOL(1,'('123456789')',N);                      00060001
20                    'END'                                                 00061001
20               'END'                                                      00062001
20              'END'                                                       00063001
20           'END'                                                          00064001
20         'END'                                                            00065001
```

```
                                        IDENTIFIER TABLE                                                    PAGE   2
        PBN SC    PBN      NAME   TYPE  DM DSP       NAME   TYPE  DM DSP       NAME   TYPE  DM DSP
                  SURR                  PR LN                     PR LN                     PR LN

        001 00000 000      A      I A   01 030       C      B        048       I      I        024
                           K      I        01C       L      I        018       M      I        028
                           N      I        020       POWERT I        02C
```

```
                                     STORAGE REQUIREMENTS (DECIMAL)                                         PAGE   3


        OBJECT MODULE SIZE  1968 BYTES
        DATA STORAGE AREA SIZES
        PBN   BYTES       PBN   BYTES       PBN   BYTES       PBN   BYTES       PBN   BYTES
        001     132
```

```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LIST,LET
        DEFAULT OPTION(S) USED -  SIZE=(1015808,516096)


                                          CROSS REFERENCE TABLE


 CONTROL SECTION                      ENTRY

   NAME    ORIGIN  LENGTH               NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION
 PROGRAM       00     7B0
                                      IHIDSTAB     758    IHIENTIF     7A4
 IHIFRIXP*    7B0      A0
                                      IHIFRI       7B0
 IHIFSARA*    850     E70
                                      IHIFSAIN    164C
 IHIFSARB*   16C0     690
 IHIOSTRG*   1D50     148
 IHIOSYMB*   1E98     138
 IHISYSCT*   1FD0     780
 IHIIORTN*   2750     D70
                                      IHIIOROQ    2750    IHIIOROP    2836    IHIIORNX    2C04    IHIIORCL    2E4C
                                      IHIIORCP    2FF6    IHIIORGP    30F8    IHIIORCN    30FC    IHIIOREN    315C
                                      IHIIOREV    31DA    IHIIORED    3270    IHIIORCI    3348    IHIIORER    33CC
 IHIERROR*   34C0     6E8
 IHIERMSG*   3BA8     9B8
                                      IHIERM01    3C58


  LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION            LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION
      690           IHISYSCT        IHISYSCT                  6C8           IHIOSYMB        IHIOSYMB
      6E4           IHIOSTRG        IHIOSTRG                  6F4           IHIFRI          IHIFRIXP
     1694           IHIFSARB        IHIFSARB                  AE8           IHIERROR        IHIERROR
     1648           IHIIORER        IHIIORTN                 16A8           IHIIORCP        IHIIORTN
      AFC           IHIIORCP        IHIIORTN                 1644           IHIIORGP        IHIIORTN
     1640           IHIIOREN        IHIIORTN                 163C           IHIIOROQ        IHIIORTN
     1630           IHIIOREV        IHIIORTN                 1628           IHIIORCI        IHIIORTN
     16B0           IHIIORNX        IHIIORTN                 1634           IHIIORNX        IHIIORTN
      B01           IHIIORNX        IHIIORTN                 16B4           IHIIORCL        IHIIORTN
     162C           IHIIORCL        IHIIORTN                 16AC           IHIIOROP        IHIIORTN
     1638           IHIIOROP        IHIIORTN                  AF8           IHIIOROP        IHIIORTN
     16A4           IHIENTIF        PROGRAM                   8FC           IHIDSTAB        PROGRAM
     16C5           IHIFSARA        IHIFSARA                 3B90           IHIERM01        IHIERMSG
     3B8C           IHIERMSG        IHIERMSG
 ENTRY ADDRESS     164C

 TOTAL LENGTH      4560
****GO        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS         0.
```

Pascals Triangle



```
  ALGOL PROGRAM TRACE

MODULE      SEMICOLON NUMBERS

  GO          1    2    3    4    5    6    7    8    9   10   11   12   13
             14   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   19   20
              9   10   11   12   13   14   15   16   17   18   15   16   17
             18   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   19   20   13   14   15   16   17   18   15   16
             17   18   15   16   17   18   15   16   17   18   15   16   17
             18   15   16   17   19   20    9   10   11   12   13   14   15
             16   17   18   15   16   17   18   15   16   17   18   15   16
             17   18   15   16   17   18   15   16   17   19   20   13   14
             15   16   17   18   15   16   17   18   15   16   17   18   15
             16   17   18   15   16   17   18   15   16   17   19   20   13
             14   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   19   20
              9   10   11   12   13   14   15   16   17   18   15   16   17
             18   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   19   20   13   14   15   16   17   18   15   16
             17   18   15   16   17   18   15   16   17   18   15   16   17
             18   15   16   17   19   20   13   14   15   16   17   18   15
             16   17   18   15   16   17   18   15   16   17   18   15   16
             17   18   15   16   17   19   20   13   14   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   18   15
             16   17   18   15   16   17   19   20    9   10   11   12   13
             14   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   19   20
             13   14   15   16   17   18   15   16   17   18   15   16   17
             18   15   16   17   18   15   16   17   18   15   16   17   19
             20   13   14   15   16   17   18   15   16   17   18   15   16
             17   18   15   16   17   18   15   16   17   18   15   16   17
             19   20   13   14   15   16   17   18   15   16   17   18   15
             16   17   18   15   16   17   18   15   16   17   18   15   16
             17   19   20   13   14   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   18   15
             16   17   19   20    9   10   11   12   13   14   15   16   17
             18   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   19   20   13   14   15   16
             17   18   15   16   17   18   15   16   17   18   15   16   17
             18   15   16   17   18   15   16   17   19   20   13   14   15
             16   17   18   15   16   17   18   15   16   17   18   15   16
             17   18   15   16   17   19   20   15   16   17   18   13   14
             15   16   17   18   15   16   17   18   15   16   17   18   15
             16   17   18   15   16   17   19   20   15   16   17   18   13
             14   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   19   20
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20   9  10  11  12  13  14  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  13  14  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  15  16  17  18  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20   9  10  11  12  13  14  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  13  14  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  15  16  17  19  20  13  14
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  18  15  16  17  19  20  15  16  17  19  20
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  15  16  17
 19  20  13  14  15  16  17  18  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  19  20   9  10  11  12  13  14  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  19  20  15  16  17  19
 20  13  14  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  19  20  15  16
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
17  18  13  14  15  16  17  18  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  19  20  15
16  17  19  20  13  14  15  16  17  18  15  16  17
18  15  16  17  18  15  16  17  18  15  16  17  19
20  15  16  17  19  20  13  14  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  18  15  16
17  18  15  16  17  19  20  13  14  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  18  15  16  17  19  20   9  10  11  12  13
14  15  16  17  18  15  16  17  18  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  19  20
13  14  15  16  17  18  15  16  17  18  15  16  17
18  15  16  17  18  15  16  17  18  15  16  17  19
20  13  14  15  16  17  18  15  16  17  18  15  16
17  18  15  16  17  18  15  16  17  19  20  15  16
17  19  20  13  14  15  16  17  18  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  19  20
15  16  17  19  20  13  14  15  16  17  18  15  16
17  18  15  16  17  18  15  16  17  19  20  15  16
17  19  20  15  16  17  19  20  13  14  15  16  17
18  15  16  17  18  15  16  17  18  15  16  17  19
20  15  16  17  19  20  15  16  17  19  20  13  14
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  18  15  16  17  19  20  15  16  17  19  20
13  14  15  16  17  18  15  16  17  18  15  16  17
18  15  16  17  18  15  16  17  19  20  15  16  17
19  20  13  14  15  16  17  18  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  18  15  16
17  19  20  13  14  15  16  17  18  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  19  20   9  10  11  12  13  14  15  16  17
18  15  16  17  18  15  16  17  18  15  16  17  18
15  16  17  18  15  16  17  19  20  13  14  15  16
17  18  15  16  17  18  15  16  17  18  15  16  17
18  15  16  17  19  20  15  16  17  18  13  14  15
16  17  18  15  16  17  18  15  16  17  18  15  16
17  18  15  16  17  19  20  15  16  17  19  20  13
14  15  16  17  18  15  16  17  18  15  16  17  18
15  16  17  19  20  15  16  17  19  20  15  16  17
18  13  14  15  16  17  18  15  16  17  18  15  16
17  18  15  16  17  19  20  15  16  17  19  20  15
16  17  18  13  14  15  16  17  18  15  16  17  18
15  16  17  18  15  16  17  19  20  15  16  17  19
20  15  16  17  19  20  13  14  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  19  20  15
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
 16  17  19  20  15  16  17  18  13  14  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  18  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  19  20  15  16  17  18
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20   9  10  11  12  13  14  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  13  14  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  13  14  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  15  16  17  19  20  15  16
 17  18  13  14  15  16  17  18  15  16  17  18  15
 16  17  18  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  13  14  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  19  20  15  16
 17  19  20  15  16  17  19  20  13  14  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  18  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  15  16  17
 19  20  13  14  15  16  17  18  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  19  20  15
 16  17  19  20  13  14  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  19  20   9  10  11  12  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  19  20  15  16  17  19
 20  13  14  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  15
 16  17  18  13  14  15  16  17  18  15  16  17  18
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
15  16  17  18  15  16  17  19  20  15  16  17  19
20  15  16  17  19  20  13  14  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  19  20  15
16  17  19  20  15  16  17  19  20  13  14  15  16
17  18  15  16  17  18  15  16  17  18  15  16  17
19  20  15  16  17  19  20  15  16  17  19  20  13
14  15  16  17  18  15  16  17  18  15  16  17  18
15  16  17  19  20  15  16  17  19  20  15  16  17
19  20  13  14  15  16  17  18  15  16  17  18  15
16  17  18  15  16  17  19  20  15  16  17  19  20
15  16  17  19  20  13  14  15  16  17  18  15  16
17  18  15  16  17  18  15  16  17  19  20  15  16
17  19  20  15  16  17  18  13  14  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  19  20  15  16  17  19  20  13  14  15  16
17  18  15  16  17  18  15  16  17  18  15  16  17
18  15  16  17  19  20  15  16  17  19  20  13  14
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  19  20   9
10  11  12  13  14  15  16  17  18  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  19  20  13  14  15  16  17  18  15  16  17
18  15  16  17  18  15  16  17  18  15  16  17  19
20  15  16  17  19  20  13  14  15  16  17  18  15
16  17  18  15  16  17  18  15  16  17  18  15  16
17  19  20  15  16  17  19  20  13  14  15  16  17
18  15  16  17  18  15  16  17  18  15  16  17  19
20  15  16  17  19  20  15  16  17  19  20  13  14
15  16  17  18  15  16  17  18  15  16  17  18  15
16  17  19  20  15  16  17  19  20  15  16  17  19
20  13  14  15  16  17  18  15  16  17  18  15  16
17  19  20  15  16  17  19  20  15  16  17  19  20
15  16  17  19  20  13  14  15  16  17  18  15  16
17  18  15  16  17  19  20  15  16  17  19  20  15
16  17  19  20  15  16  17  19  20  13  14  15  16
17  18  15  16  17  18  15  16  17  19  20  15  16
17  19  20  15  16  17  19  20  15  16  17  19  20
13  14  15  16  17  18  15  16  17  18  15  16  17
19  20  15  16  17  19  20  15  16  17  19  20  15
16  17  19  20  13  14  15  16  17  18  15  16  17
18  15  16  17  18  15  16  17  19  20  15  16  17
19  20  15  16  17  19  20  13  14  15  16  17  18
15  16  17  18  15  16  17  18  15  16  17  19  20
15  16  17  19  20  15  16  17  19  20  13  14  15
16  17  18  15  16  17  18  15  16  17  18  15  16
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

17 18 15 16 17 19 20 15 16 17 19 20 13
14 15 16 17 18 15 16 17 18 15 16 17 18
15 16 17 18 15 16 17 19 20 15 16 17 19
20 13 14 15 16 17 18 15 16 17 18 15 16
17 18 15 16 17 18 15 16 17 18 15 16 17
19 20 9 10 11 12 13 14 15 16 17 18 15
16 17 18 15 16 17 18 15 16 17 18 15 16
17 18 15 16 17 19 20 13 14 15 16 17 18
15 16 17 18 15 16 17 18 15 16 17 18 15
16 17 19 20 15 16 17 19 20 13 14 15 16
17 18 15 16 17 18 15 16 17 18 15 16 17
18 15 16 17 19 20 15 16 17 19 20 13 14
15 16 17 18 15 16 17 18 15 16 17 18 15
16 17 19 20 15 16 17 19 20 15 16 17 19
20 13 14 15 16 17 18 15 16 17 18 15 16
17 19 20 15 16 17 18 15 16 17 18 15 16
17 19 20 13 14 15 16 17 18 15 16 17 18
15 16 17 19 20 15 16 17 18 15 16 17 18
15 16 17 19 20 13 14 15 16 17 18 15 16
17 18 15 16 17 19 20 15 16 17 18 15 16
17 18 15 16 17 19 20 13 14 15 16 17 18
15 16 17 18 15 16 17 19 20 15 16 17 19
20 15 16 17 19 20 15 16 17 19 20 13 14
15 16 17 18 15 16 17 18 15 16 17 19 20
15 16 17 18 15 16 17 18 15 16 17 19 20
13 14 15 16 17 18 15 16 17 18 15 16 17
19 20 15 16 17 18 15 16 17 18 15 16 17
19 20 13 14 15 16 17 18 15 16 17 18 15
16 17 19 20 15 16 17 18 15 16 17 18 15
16 17 19 20 13 14 15 16 17 18 15 16 17
18 15 16 17 18 15 16 17 19 20 15 16 17
19 20 15 16 17 19 20 13 14 15 16 17 18
15 16 17 18 15 16 17 18 15 16 17 18 15
16 17 19 20 15 16 17 19 20 13 14 15 16
17 18 15 16 17 18 15 16 17 18 15 16 17
18 15 16 17 19 20 15 16 17 19 20 13 14
15 16 17 18 15 16 17 18 15 16 17 18 15
16 17 18 15 16 17 18 15 16 17 19 20 9
10 11 12 13 14 15 16 17 18 15 16 17 18
15 16 17 18 15 16 17 18 15 16 17 18 15
16 17 19 20 13 14 15 16 17 18 15 16 17
18 15 16 17 18 15 16 17 18 15 16 17 19
20 15 16 17 19 20 13 14 15 16 17 18 15
16 17 18 15 16 17 18 15 16 17 19 20 15
16 17 18 15 16 17 19 20 13 14 15 16 17

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  13  14
 15  16  17  18  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  13  14  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  18  15  16  17  18  15
 16  17  19  20  13  14  15  16  17  18  15  16  17
 18  15  16  17  19  20  15  16  17  18  15  16  17
 18  15  16  17  19  20  13  14  15  16  17  18  15
 16  17  18  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  13  14  15  16  17  18  15  16  17  18  15  16
 17  19  20  15  16  17  18  15  16  17  18  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  18
 15  16  17  19  20  15  16  17  18  15  16  17  18
 15  16  17  19  20  13  14  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 19  20  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  19  20  15  16  17  18  15  16  17  19
 20  13  14  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  19  20  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  19  20   9  10  11  12  13  14  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  15  16  17  19  20  13  14
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  15  16  17  18
 13  14  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  19  20  15  16  17  19  20  15  16
 17  18  13  14  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  15  16  17  18  13  14  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  19  20  15  16
 17  18  15  16  17  18  15  16  17  19  20  13  14
 15  16  17  18  15  16  17  19  20  15  16  17  19
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  18  13  14  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  15  16  17  18  13  14  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  15  16  17  19  20  15  16  17  18  13  14  15
 16  17  18  15  16  17  18  15  16  17  19  20  15
 16  17  18  15  16  17  18  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  18
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  15  16  17  18  13  14  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  19  20  15
 16  17  19  20  15  16  17  18  13  14  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  18  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
  9  10  11  12  13  14  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  19  20  13  14  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 19  20  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  15  16  17  18  13
 14  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  18  13  14  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  15  16  17  19  20  13  14  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  13  14
 15  16  17  18  15  16  17  19  20  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  15  16  17  18  13  14  15  16  17  18
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  15  16  17  18  13  14
 15  16  17  18  15  16  17  19  20  15  16  17  19
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  15  16  17  19  20  13  14  15  16  17
 18  15  16  17  18  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  18  13  14  15  16  17  18  15  16  17  18  15
 16  17  18  15  16  17  19  20  15  16  17  19  20
 15  16  17  18  13  14  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20   9  10  11
 12  13  14  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 19  20  13  14  15  16  17  18  15  16  17  18  15
 16  17  18  15  16  17  18  15  16  17  19  20  15
 16  17  19  20  13  14  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  19  20  15
 16  17  18  15  16  17  19  20  15  16  17  18  13
 14  15  16  17  18  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  13  14  15  16  17  18  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  15  16  17  19  20  13  14  15  16  17
 18  15  16  17  19  20  15  16  17  19  20  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 13  14  15  16  17  18  15  16  17  19  20  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  13  14  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  15  16  17  18  13  14  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  13  14  15  16  17  18  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  15  16  17  19  20  13  14  15  16  17  18  15
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  15  16  17  19  20  15  16  17  19  20  13  14
 15  16  17  18  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  13  14  15  16  17  18  15  16  17  18  15
 16  17  19  20  15  16  17  18  15  16  17  19  20
 15  16  17  18  13  14  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
  9  10  11  12  13  14  15  16  17  18  15  16  17
 18  15  16  17  18  15  16  17  18  15  16  17  18
 15  16  17  19  20  13  14  15  16  17  18  15  16
 17  18  15  16  17  18  15  16  17  18  15  16  17
 19  20  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  18  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  18  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 13  14  15  16  17  18  15  16  17  18  15  16  17
 19  20  15  16  17  19  20  15  16  17  19  20  15
 16  17  19  20  13  14  15  16  17  18  15  16  17
 19  20  15  16  17  19  20  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  13  14  15  16
 17  18  15  16  17  19  20  15  16  17  19  20  15
 16  17  19  20  15  16  17  19  20  15  16  17  19
 20  13  14  15  16  17  18  15  16  17  19  20  15
 16  17  18  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  13  14  15  16  17  18  15  16
 17  19  20  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  13  14  15
 16  17  18  15  16  17  19  20  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  13  14  15  16  17  18  15  16  17  19  20
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  13  14  15  16  17  18
 15  16  17  19  20  15  16  17  19  20  15  16  17
 19  20  15  16  17  19  20  15  16  17  19  20  13
 14  15  16  17  18  15  16  17  19  20  15  16  17
 18  15  16  17  19  20  15  16  17  19  20  15  16
```

```
  ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

             17   19   20   13   14   15   16   17   18   15   16   17   19
             20   15   16   17   19   20   15   16   17   19   20   15   16
             17   19   20   15   16   17   19   20   13   14   15   16   17
             18   15   16   17   19   20   15   16   17   19   20   15   16
             17   19   20   15   16   17   19   20   15   16   17   19   20
             13   14   15   16   17   18   15   16   17   18   15   16   17
             19   20   15   16   17   19   20   15   16   17   19   20   15
             16   17   19   20   13   14   15   16   17   18   15   16   17
             18   15   16   17   18   15   16   17   19   20   15   16   17
             19   20   15   16   17   19   20   13   14   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   19   20
             15   16   17   19   20   15   16   17   19   20   13   14   15
             16   17   18   15   16   17   18   15   16   17   18   15   16
             17   18   15   16   17   19   20   15   16   17   19   20   13
             14   15   16   17   18   15   16   17   18   15   16   17   18
             15   16   17   18   15   16   17   18   15   16   17   19   20
END OF ALGOL PROGRAM EXECUTION
```

```
LISTIDR  MEMBER=GO                                          00075001

                        *****  M O D U L E   S U M M A R Y  *****

 MEMBER NAME   GO                                MAIN ENTRY POINT  00164C

          ** ALIASES **                 SECONDARY ENTRY POINT ADDRESSES ASSOCIATED WITH ALIASES:

-------------------------------------------------------------------------------------------------------------------

                    ****   LINKAGE EDITOR ATTRIBUTES OF MODULE   ****

              **   BIT  STATUS         BIT  STATUS         BIT  STATUS         BIT  STATUS   **

                    0  NOT-RENT         1  NOT-REUS         2  NOT-OVLY         3  NOT-TEST
                    4  NOT-OL           5  BLOCK           6  EXEC             7  MULTI-RCD
                    8  NOT-DC           9  ZERO-ORG        10 EP > ZERO        11 RLD
                    12 EDIT            13 NO-SYMS         14 F-LEVEL          15 NOT-REFR

-------------------------------------------------------------------------------------------------------------------

                                MODULE SSI:  NONE
                                APFCODE      00000000

                *****LOAD MODULE PROCESSED BY VS LINKAGE EDITOR
                                LISTIDR FOR LOAD MODULE GO                          PAGE 0001


                      THIS LOAD MODULE CONTAINS NO INFORMATION SUPPLIED BY IMASPZAP

-------------------------------------------------------------------------------------------------------------------

         THIS LOAD MODULE WAS PRODUCED BY LINKAGE EDITOR 5752SC104  AT LEVEL 03.08 ON DAY 230 OF YEAR 12  AT 13:34:17.

-------------------------------------------------------------------------------------------------------------------

          CSECT        TRANSLATOR              VR.MD                       YR/DY

          PROGRAM      360SAL531               02.01                       12/230
          IHIFRIXP     X390ASM                 31.04                       12/230
          IHIFSARA     X390ASM                 31.04                       12/230
          IHIFSARB     X390ASM                 31.04                       12/230
          IHIOSTRG     X390ASM                 31.04                       12/230
          IHIOSYMB     X390ASM                 31.04                       12/230
          IHISYSCT     X390ASM                 31.04                       12/230
          IHIIORTN     X390ASM                 31.04                       12/230
          IHIERROR     X390ASM                 31.04                       12/230
          IHIERMSG     X390ASM                 31.04                       12/230

-------------------------------------------------------------------------------------------------------------------

          CSECT                     YR/DAY                  USER DATA

          IHIERMSG                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIERROR                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIFRIXP                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIFSARA                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIFSARB                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIIORTN                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIOSTRG                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHIOSYMB                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY
          IHISYSCT                  12/230                  360SLM532 V02 M01 ALGOL F LIBRARY

-------------------------------------------------------------------------------------------------------------------
```

Appendix B. IVP IEXSAMP2 Listing

```
                                    J E S 2   J O B   L O G


13.35.56 JOB 9291  IEF677I WARNING MESSAGE(S) FOR JOB T1IV2    ISSUED
13.35.56 JOB 9291  $HASP373 T1IV2    STARTED - INIT  6 - CLASS S - SYS SYSA
13.35.56 JOB 9291  IEF403I T1IV2 - STARTED - TIME=13.35.56
13.35.57 JOB 9291  IEFACTRT - Stepname  Procstep  Program   Retcode
13.35.57 JOB 9291  T1IV2      IVP2      ALGOL     ALGOL     RC= 0000
13.35.57 JOB 9291  T1IV2      IVP2      LKED      IEWL      RC= 0000
13.35.57 JOB 9291  T1IV2      IVP2      GO        GO        RC= 0016
13.35.57 JOB 9291  IEF404I T1IV2 - ENDED - TIME=13.35.57
13.35.57 JOB 9291  $HASP395 T1IV2    ENDED

   1     //T1IV2   JOB  111,'ALGOL F LVL2.1',   <-- CUSTOMIZE FOR SITE STANDARDS JOB 9291
         //             CLASS=S,MSGCLASS=C,     <-- CUSTOMIZE FOR SITE STANDARDS 00002001
         //             REGION=1024K,COND=(0,NE),MSGLEVEL=(1,1)                  00003001
         ***                                                                    00004001
         ***       IBM ALGOL F LEVEL 2.1 IVP                                    00005001
         ***                                                                    00006001
         ***       360S-AL-531 ALGOL F COMPILER                                 00007001
         ***            AND                                                     00008001
         ***       360S-LM-532 ALGOL F LIBRARY                                  00009001
         ***                                                                    00010001
   2     //IVP2   EXEC  ALGOFCLG,PARM.GO='TRACE,DUMP'                           00011001
         ***                                                                    00001001
         ********************************************************************** 00002001
         ***                                                                    00003001
         ***       IBM ALGOL F LEVEL 2.1                                        00004001
         ***                                                                    00005001
         ***       360S-AL-531 ALGOL F COMPILER                                 00006001
         ***            AND                                                     00007001
         ***       360S-LM-532 ALGOL F LIBRARY                                  00008001
         ***                                                                    00009001
         ***       COMPILE, LINK-EDIT AND EXECUTE A PROGRAM                     00010001
         ***                                                                    00011001
         ********************************************************************** 00012001
         ***                                                                    00013001
   3     XXALGOL   EXEC PGM=ALGOL,REGION=1024K                                  00014001
   4     XXSYSPRINT DD  SYSOUT=*                                                00015001
   5     XXSYSPUNCH DD  DUMMY                                                   00016001
   6     XXSYSLIN   DD  DSN=&&OBJECT,UNIT=VIO,SPACE=(3200,(20,10)),             00017001
         XX             DISP=(,PASS)                                            00018001
   7     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(50,10))                           00019001
   8     XXSYSUT2   DD  UNIT=VIO,SPACE=(2048,(50,10))                           00020001
   9     XXSYSUT3   DD  UNIT=VIO,SPACE=(2048,(40,10))                           00021001
  10     //ALGOL.SYSIN  DD  *                                                   00012001
  11     XXLKED    EXEC PGM=IEWL,PARM='XREF,LIST,LET',COND=(5,LT,ALGOL),        00022001
         XX             REGION=1024K                                            00023001
  12     XXSYSPRINT DD  SYSOUT=*                                                00024001
  13     XXSYSLIB   DD  DSN=SYS1.ALGLIB,DISP=SHR                                00025001
  14     XXSYSLMOD  DD  DSN=&&GOSET(GO),UNIT=VIO,DISP=(,PASS),                  00026001
         XX             SPACE=(2048,(100,20,1))                                 00027001
  15     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(100,20))                          00028001
  16     XXSYSLIN   DD  DSN=&&OBJECT,DISP=(OLD,DELETE)                          00029001
  17     XX         DD  DDNAME=SYSIN                                            00030001
  18     XXGO      EXEC PGM=GO,COND=((5,LT,ALGOL),(5,LT,LKED)),                00031001
         XX             REGION=1024K                                            00032001
  19     XXSTEPLIB  DD  DSN=&&GOSET,DISP=(OLD,PASS)                             00033001
  20     XXALGLDD01 DD  SYSOUT=*                                                00034001
  21     XXSYSPRINT DD  SYSOUT=*                                                00035001
  22     XXSYSUT1   DD  UNIT=VIO,SPACE=(1024,(20,10))                           00036001
 STMT NO. MESSAGE
-
   18     IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR T1IV2 ALGOL IVP2
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I DMY  ALLOCATED TO SYSPUNCH
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSUT2
IEF237I VIO  ALLOCATED TO SYSUT3
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I T1IV2 ALGOL IVP2 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09291.SO0102                        SYSOUT
IEF285I   SYS12230.T133556.RA000.T1IV2.OBJECT         PASSED       *--------2
IEF285I   SYS12230.T133556.RA000.T1IV2.R0000001       DELETED      *--------0
IEF285I   SYS12230.T133556.RA000.T1IV2.R0000002       DELETED      *--------0
```

```
IEF285I   SYS12230.T133556.RA000.T1IV2.R0000003        DELETED       *-------16
IEF285I   JES2.JOB09291.SI0101                         SYSIN
IEF373I STEP /ALGOL   / START 12230.1335
IEF374I STEP /ALGOL   / STOP  12230.1335 CPU    0MIN 00.05SEC SRB    0MIN 00.00SEC VIRT   192K SYS   304K
*************************************************************************************************************************************
*     1. Jobstep of job: T1IV2       Stepname: ALGOL       Program name: ALGOL      Executed on 17.08.12 from 13.35.56 to 13.35.57 *
*         elapsed time  24:00:00,10                     CPU-Identifier:  SYSA          Page-in:      0                             *
*             CPU time  00:00:00,05               Virtual Storage used:    192K        Page-out:     0                             *
*           corr. CPU:  00:00:00,05   CPU time has been corrected by  1 / 1,0  multiplier                                          *
*                                                                                                                                  *
*     I/O Operation                                                                                                                *
*     Number of records read via DD * or DD DATA:     36                                                                           *
*     DMY.......0 DMY.......0 FFF.......2 FFF.......0 FFF.......0 FFF......16 DMY.......0                                          *
*                                                                                                                                  *
*                                          Charge for step (w/o SYSOUT):          0,08                                             *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV2 LKED IVP2
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I 148  ALLOCATED TO SYSLIB
IEF237I VIO  ALLOCATED TO SYSLMOD
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO
IEF142I T1IV2 LKED IVP2 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09291.S00103                         SYSOUT
IEF285I   SYS1.ALGLIB                                  KEPT          *-------56
IEF285I   VOL SER NOS= MVSRES.
IEF285I   SYS12230.T133556.RA000.T1IV2.GOSET           PASSED        *-------17
IEF285I   SYS12230.T133556.RA000.T1IV2.R0000004        DELETED       *--------0
IEF285I   SYS12230.T133556.RA000.T1IV2.OBJECT          DELETED       *--------3
IEF373I STEP /LKED    / START 12230.1335
IEF374I STEP /LKED    / STOP  12230.1335 CPU    0MIN 00.05SEC SRB    0MIN 00.01SEC VIRT  1024K SYS   248K
*************************************************************************************************************************************
*     2. Jobstep of job: T1IV2       Stepname: LKED        Program name: IEWL       Executed on 17.08.12 from 13.35.57 to 13.35.57 *
*         elapsed time  24:00:00,07                     CPU-Identifier:  SYSA          Page-in:      0                             *
*             CPU time  00:00:00,06               Virtual Storage used:   1024K        Page-out:     0                             *
*           corr. CPU:  00:00:00,06   CPU time has been corrected by  1 / 1,0  multiplier                                          *
*                                                                                                                                  *
*     I/O Operation                                                                                                                *
*     Number of records read via DD * or DD DATA:      0                                                                           *
*     DMY.......0 148......56 FFF......17 FFF.......0 FFF.......3 DMY.......0                                                      *
*                                                                                                                                  *
*                                          Charge for step (w/o SYSOUT):          0,10                                             *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV2 GO IVP2
IEF237I VIO  ALLOCATED TO STEPLIB
IEF237I JES2 ALLOCATED TO ALGLDD01
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I VIO  ALLOCATED TO SYSUT1
IEF142I T1IV2 GO IVP2 - STEP WAS EXECUTED - COND CODE 0016
IEF285I   SYS12230.T133556.RA000.T1IV2.GOSET           PASSED        *--------0
IEF285I   JES2.JOB09291.S00104                         SYSOUT
IEF285I   JES2.JOB09291.S00105                         SYSOUT
IEF285I   SYS12230.T133556.RA000.T1IV2.R0000005        DELETED       *--------0
IEF373I STEP /GO      / START 12230.1335
IEF374I STEP /GO      / STOP  12230.1335 CPU    0MIN 00.02SEC SRB    0MIN 00.00SEC VIRT    28K SYS   280K
*************************************************************************************************************************************
*     3. Jobstep of job: T1IV2       Stepname: GO          Program name: GO         Executed on 17.08.12 from 13.35.57 to 13.35.57 *
*         elapsed time  24:00:00,04                     CPU-Identifier:  SYSA          Page-in:      0                             *
*             CPU time  00:00:00,02               Virtual Storage used:     28K        Page-out:     0                             *
*           corr. CPU:  00:00:00,02   CPU time has been corrected by  1 / 1,0  multiplier                                          *
*                                                                                                                                  *
*     I/O Operation                                                                                                                *
*     Number of records read via DD * or DD DATA:      0                                                                           *
*     FFF.......0 DMY.......0 DMY.......0 FFF.......0                                                                              *
*                                                                                                                                  *
*                                          Charge for step (w/o SYSOUT):          0,03                                             *
*************************************************************************************************************************************
IEF285I   SYS12230.T133556.RA000.T1IV2.GOSET           DELETED
IEF375I  JOB /T1IV2   / START 12230.1335
IEF376I  JOB /T1IV2   / STOP  12230.1335 CPU    0MIN 00.12SEC SRB    0MIN 00.01SEC
```

```
360S-AL-531 LEVEL 2.1          OS ALGOL SOURCE PROGRAM                                       17 AUG 2012 13:35:56      PAGE    1
              SC     SOURCE STATEMENT

                          'BEGIN'                                                                 00013001
                          'COMMENT'                                                               00014001
                           IBM ALGOL F LEVEL 2.1 IVP                                              00015001
                           SAMPLE PROGRAM TO CREATE DELIBERATE DIVIDE BY ZERO ERROR               00016001
                           TO DEMONSTRATE ALGOL RUN TIME DIAGNOSTIC INFORMATION;                  00017001
                                                                                                  00018001
                          'INTEGER' I;                                                            00019001
               1          'REAL' A;                                                               00020001
               2          'BOOLEAN' B;                                                            00021001
               3          'INTEGER' 'ARRAY' IA[1:5];                                              00022001
               4          'ARRAY' AR[0:3,2:8];                                                    00023001
               5          'BOOLEAN' 'ARRAY' BA[0:1,1:3,3:7];                                      00024001
               6          'INTEGER' 'PROCEDURE' IP;                                               00025001
               7          IP := I + 5;                                                            00026001
               8          'REAL' 'PROCEDURE' RP(A);                                               00027001
               9          'VALUE' A;                                                              00028001
              10          'INTEGER' A;                                                            00029001
              11          RP := A*A;                                                              00030001
              12          'PROCEDURE' P(A,B,C);                                                   00031001
              13          'BOOLEAN' A;                                                            00032001
              14          'REAL' B;                                                               00033001
              15          'INTEGER' C;                                                            00034001
              16          A:= B < C ;                                                             00035001
              17          I := 1;                                                                 00036001
              18          A := 2.6;                                                               00037001
              19          AR[1,1] := IP;                                                          00038001
              20          AR[1,2] := RP(AR[1,1]);                                                 00039001
              21          P(BA[0,1,3],A,I);                                                       00040001
              22          P(B,AR[1,2],IP);                                                        00041001
              23          SYSACT(1,8,50);                                                         00042001
              24          OUTREAL(1,AR[1,1]);                                                     00043001
              25          OUTBOOLEAN(1,BA[0,1,3]);                                                00044001
              26          OUTBOOLEAN(1,B);                                                        00045001
              27          'COMMENT' DELIBERATE DIVIDE BY ZERO ERROR;                              00046001
              27          A := A/0;                                                               00047001
              28          'END'                                                                   00048001
```

```
                                        IDENTIFIER TABLE                                                    PAGE   2
        PBN SC    PBN      NAME   TYPE  DM DSP       NAME   TYPE  DM DSP       NAME   TYPE  DM DSP
                  SURR                  PR LN                     PR LN                     PR LN

        001 00000 000      A      R        01C       AR     R A   02 03C       B      B        020
                           BA     B A   03 058       I      I        018       IA     I A   01 024
                           IP     I P   00 070       P        P   03 078       RP     R P   01 074

        002 00006 001      IP     I P   00 070

        003 00008 001      A      I  V     020       RP     R P   01 074

        004 00012 001      A      B  N     018       B      R  N     020       C      I  N     028
```

```
                                    STORAGE REQUIREMENTS (DECIMAL)                                          PAGE   3


        OBJECT MODULE SIZE  1840 BYTES
        DATA STORAGE AREA SIZES
        PBN   BYTES       PBN   BYTES       PBN   BYTES       PBN   BYTES       PBN   BYTES
        001     136       002      32       003      40       004      60
```

```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LIST,LET
        DEFAULT OPTION(S) USED -  SIZE=(1015808,516096)


                                        CROSS REFERENCE TABLE


 CONTROL SECTION                    ENTRY

   NAME    ORIGIN  LENGTH             NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION
 PROGRAM       00     730
                                    IHIDSTAB     6D8    IHIENTIF     724
 IHIFSARA*    730     E70
                                    IHIFSAIN    152C
 IHIFSARB*   15A0     690
 IHIOBOOL*   1C30     1C8
                                    IHIOBOAR    1C82
 IHISOREA*   1DF8     380
                                    IHISORAR    1DF8    IHISOREL    1E38
 IHISYSCT*   2178     780
 IHIIORTN*   28F8     D70
                                    IHIIOROQ    28F8    IHIIOROP    29DE    IHIIORNX    2DAC    IHIIORCL    2FF4
                                    IHIIORCP    319E    IHIIORGP    32A0    IHIIORCN    32A4    IHIIOREN    3304
                                    IHIIOREV    3382    IHIIORED    3418    IHIIORCI    34F0    IHIIORER    3574
 IHIERROR*   3668     6E8
 IHIERMSG*   3D50     9B8
                                    IHIERM01    3E00


  LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION            LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION
      61C           IHISYSCT       IHISYSCT                   658           IHISOREL       IHISOREA
      660           IHIOBOOL       IHIOBOOL                  1574           IHIFSARB       IHIFSARB
      9C8           IHIERROR       IHIERROR                  1528           IHIIORER       IHIIORTN
     1588           IHIIORCP       IHIIORTN                   9DC           IHIIORCP       IHIIORTN
     1524           IHIIORGP       IHIIORTN                  1520           IHIIOREN       IHIIORTN
     151C           IHIIOROQ       IHIIORTN                  1510           IHIIOREV       IHIIORTN
     1508           IHIIORCI       IHIIORTN                  1590           IHIIORNX       IHIIORTN
     1514           IHIIORNX       IHIIORTN                   9E1           IHIIORNX       IHIIORTN
     1594           IHIIORCL       IHIIORTN                  150C           IHIIORCL       IHIIORTN
     158C           IHIIOROP       IHIIORTN                  1518           IHIIOROP       IHIIORTN
      9D8           IHIIOROP       IHIIORTN                  1584           IHIENTIF       PROGRAM
      7DC           IHIDSTAB       PROGRAM                   15A5           IHIFSARA       IHIFSARA
     3D38           IHIERM01       IHIERMSG                  3D34           IHIERMSG       IHIERMSG

 ENTRY ADDRESS     152C

 TOTAL LENGTH      4708
****GO        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS         0.
```

```
+6.000000'+00  'FALSE'  'FALSE'


IHI031I  SC=    27 PSW= 078D000F 480A5F02 DIVISION BY ZERO, FLOATING POINT


MODULE = GO        PROGRAM BLOCK NUMBER =    1 (BLOCK)

         DECLARED IDENTIFIERS AND OBJECT TIME STACK
000018   00000001  4129999A  00000000  01000000   000A465C  000A4660  000A4674  00000014
000038   00000004  02000024  000A45E8  000A45F0   000A4660  00000070  0000001C  00000004
000058   0300003C  000A45C8  000A45D0  000A45EE   0000001E  0000000F  00000005  00000001
000078   000A460C  000A58FC  000A4698  400A593C

         SMF DISPLACEMENT IN DSA = 000058 DECLARED ARRAY
000000   00000000  00000000  00000000  00000000   00000000  00000000  00000000  00000000

         SMF DISPLACEMENT IN DSA = 00003C DECLARED ARRAY
000000   00000000  00000000  00000000  00000000   00000000  00000000  41600000  42240000
000020   00000000  00000000  00000000  00000000   00000000  00000000  00000000  00000000
000040   00000000  00000000  00000000  00000000   00000000  00000000  00000000  00000000
000060   00000000  00000000  00000000  00000000

         SMF DISPLACEMENT IN DSA = 000024 DECLARED ARRAY
000000   00000000  00000000  00000000  00000000   00000000

   ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

  GO           1     2     3     4     5     6     8    12    17    18    19     7    20
               9    10    11    21    13    14    15    16    22    13    14    15    16
               7    23    24    25    26    27
END OF ALGOL PROGRAM EXECUTION
```

Appendix C. IVP IEXSAMP3 Listing

```
                                    J E S 2   J O B   L O G


13.37.17 JOB 9292  IEF677I WARNING MESSAGE(S) FOR JOB T1IV3    ISSUED
13.37.17 JOB 9292  $HASP373 T1IV3    STARTED - INIT  6 - CLASS S - SYS SYSA
13.37.17 JOB 9292  IEF403I T1IV3 - STARTED - TIME=13.37.17
13.37.18 JOB 9292  IEFACTRT - Stepname  Procstep  Program   Retcode
13.37.18 JOB 9292  T1IV3      IVP3      ALGOL     ALGOL     RC= 0000
13.37.18 JOB 9292  T1IV3      IVP3      LKED      IEWL      RC= 0000
13.37.18 JOB 9292  T1IV3      IVP3      GO        GO        RC= 0000
13.37.18 JOB 9292  IEF404I T1IV3 - ENDED - TIME=13.37.18
13.37.18 JOB 9292  $HASP395 T1IV3    ENDED

   1     //T1IV3   JOB  111,'ALGOL F LVL2.1',   <-- CUSTOMIZE FOR SITE STANDARDS JOB 9292
         //             CLASS=S,MSGCLASS=C,     <-- CUSTOMIZE FOR SITE STANDARDS 00002001
         //             REGION=1024K,COND=(0,NE),MSGLEVEL=(1,1)                  00003001
         ***                                                                    00004001
         ***       IBM ALGOL F LEVEL 2.1 IVP                                    00005001
         ***                                                                    00006001
         ***       360S-AL-531 ALGOL F COMPILER                                 00007001
         ***            AND                                                     00008001
         ***       360S-LM-532 ALGOL F LIBRARY                                  00009001
         ***                                                                    00010001
   2     //IVP3   EXEC  ALGOFCLG,PARM.GO='TRACE'                                00011001
         ***                                                                    00001001
         ********************************************************************** 00002001
         ***                                                                    00003001
         ***       IBM ALGOL F LEVEL 2.1                                        00004001
         ***                                                                    00005001
         ***       360S-AL-531 ALGOL F COMPILER                                 00006001
         ***            AND                                                     00007001
         ***       360S-LM-532 ALGOL F LIBRARY                                  00008001
         ***                                                                    00009001
         ***       COMPILE, LINK-EDIT AND EXECUTE A PROGRAM                     00010001
         ***                                                                    00011001
         ********************************************************************** 00012001
         ***                                                                    00013001
   3     XXALGOL   EXEC PGM=ALGOL,REGION=1024K                                  00014001
   4     XXSYSPRINT DD  SYSOUT=*                                                00015001
   5     XXSYSPUNCH DD  DUMMY                                                   00016001
   6     XXSYSLIN   DD  DSN=&&OBJECT,UNIT=VIO,SPACE=(3200,(20,10)),             00017001
         XX             DISP=(,PASS)                                            00018001
   7     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(50,10))                           00019001
   8     XXSYSUT2   DD  UNIT=VIO,SPACE=(2048,(50,10))                           00020001
   9     XXSYSUT3   DD  UNIT=VIO,SPACE=(2048,(40,10))                           00021001
  10     //ALGOL.SYSIN  DD  *                                                   00012001
  11     XXLKED    EXEC PGM=IEWL,PARM='XREF,LIST,LET',COND=(5,LT,ALGOL),        00022001
         XX             REGION=1024K                                            00023001
  12     XXSYSPRINT DD  SYSOUT=*                                                00024001
  13     XXSYSLIB   DD  DSN=SYS1.ALGLIB,DISP=SHR                                00025001
  14     XXSYSLMOD  DD  DSN=&&GOSET(GO),UNIT=VIO,DISP=(,PASS),                  00026001
         XX             SPACE=(2048,(100,20,1))                                 00027001
  15     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(100,20))                          00028001
  16     XXSYSLIN   DD  DSN=&&OBJECT,DISP=(OLD,DELETE)                          00029001
  17     XX         DD  DDNAME=SYSIN                                            00030001
  18     XXGO      EXEC PGM=GO,COND=((5,LT,ALGOL),(5,LT,LKED)),                00031001
         XX             REGION=1024K                                            00032001
  19     XXSTEPLIB  DD  DSN=&&GOSET,DISP=(OLD,PASS)                             00033001
  20     XXALGLDD01 DD  SYSOUT=*                                                00034001
  21     XXSYSPRINT DD  SYSOUT=*                                                00035001
  22     XXSYSUT1   DD  UNIT=VIO,SPACE=(1024,(20,10))                           00036001
 STMT NO. MESSAGE
-
   18     IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR T1IV3 ALGOL IVP3
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I DMY  ALLOCATED TO SYSPUNCH
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSUT2
IEF237I VIO  ALLOCATED TO SYSUT3
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I T1IV3 ALGOL IVP3 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09292.SO0102                        SYSOUT
IEF285I   SYS12230.T133717.RA000.T1IV3.OBJECT         PASSED       *--------2
IEF285I   SYS12230.T133717.RA000.T1IV3.R0000001       DELETED      *--------0
IEF285I   SYS12230.T133717.RA000.T1IV3.R0000002       DELETED      *--------0
IEF285I   SYS12230.T133717.RA000.T1IV3.R0000003       DELETED      *-------10
```

```
IEF285I   JES2.JOB09292.SI0101                        SYSIN
IEF373I STEP /ALGOL   / START 12230.1337
IEF374I STEP /ALGOL   / STOP  12230.1337 CPU    0MIN 00.05SEC SRB    0MIN 00.00SEC VIRT   192K SYS   304K
*************************************************************************************************************************************
*     1. Jobstep of job: T1IV3       Stepname: ALGOL       Program name: ALGOL      Executed on 17.08.12 from 13.37.17 to 13.37.18 *
*         elapsed time  24:00:00,10                    CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,05               Virtual Storage used:    192K         Page-out:     0                          *
*           corr. CPU:  00:00:00,05   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:     67                                                                          *
*     DMY.......0 DMY.......0 FFF.......2 FFF.......0 FFF.......0 FFF......10 DMY.......0                                          *
*                                                                                                                                 *
*                                       Charge for step (w/o SYSOUT):          0,08                                           *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV3 LKED IVP3
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I 148  ALLOCATED TO SYSLIB
IEF237I VIO  ALLOCATED TO SYSLMOD
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO
IEF142I T1IV3 LKED IVP3 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09292.SO0103                        SYSOUT
IEF285I   SYS1.ALGLIB                                 KEPT          *-------55
IEF285I   VOL SER NOS= MVSRES.
IEF285I   SYS12230.T133717.RA000.T1IV3.GOSET          PASSED        *-------18
IEF285I   SYS12230.T133717.RA000.T1IV3.R0000004       DELETED       *--------0
IEF285I   SYS12230.T133717.RA000.T1IV3.OBJECT         DELETED       *--------3
IEF373I STEP /LKED    / START 12230.1337
IEF374I STEP /LKED    / STOP  12230.1337 CPU    0MIN 00.05SEC SRB    0MIN 00.01SEC VIRT  1024K SYS   244K
*************************************************************************************************************************************
*     2. Jobstep of job: T1IV3       Stepname: LKED        Program name: IEWL       Executed on 17.08.12 from 13.37.18 to 13.37.18 *
*         elapsed time  24:00:00,07                    CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,06               Virtual Storage used:   1024K         Page-out:     0                          *
*           corr. CPU:  00:00:00,06   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:      0                                                                          *
*     DMY.......0 148......55 FFF......18 FFF.......0 FFF.......3 DMY.......0                                                     *
*                                                                                                                                 *
*                                       Charge for step (w/o SYSOUT):          0,10                                           *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV3 GO IVP3
IEF237I VIO  ALLOCATED TO STEPLIB
IEF237I JES2 ALLOCATED TO ALGLDD01
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I VIO  ALLOCATED TO SYSUT1
IEF142I T1IV3 GO IVP3 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS12230.T133717.RA000.T1IV3.GOSET          PASSED        *--------0
IEF285I   JES2.JOB09292.SO0104                        SYSOUT
IEF285I   JES2.JOB09292.SO0105                        SYSOUT
IEF285I   SYS12230.T133717.RA000.T1IV3.R0000005       DELETED       *-------18
IEF373I STEP /GO      / START 12230.1337
IEF374I STEP /GO      / STOP  12230.1337 CPU    0MIN 00.06SEC SRB    0MIN 00.00SEC VIRT    32K SYS   284K
*************************************************************************************************************************************
*     3. Jobstep of job: T1IV3       Stepname: GO          Program name: GO         Executed on 17.08.12 from 13.37.18 to 13.37.18 *
*         elapsed time  24:00:00,08                    CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,06               Virtual Storage used:     32K         Page-out:     0                          *
*           corr. CPU:  00:00:00,06   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:      0                                                                          *
*     FFF.......0 DMY.......0 DMY.......0 FFF......18                                                                             *
*                                                                                                                                 *
*                                       Charge for step (w/o SYSOUT):          0,10                                           *
*************************************************************************************************************************************
IEF285I   SYS12230.T133717.RA000.T1IV3.GOSET          DELETED
IEF375I  JOB /T1IV3   / START 12230.1337
IEF376I  JOB /T1IV3   / STOP  12230.1337 CPU    0MIN 00.16SEC SRB    0MIN 00.01SEC
```

```
360S-AL-531 LEVEL 2.1          OS ALGOL SOURCE PROGRAM                              17 AUG 2012 13:37:18      PAGE   1
             SC     SOURCE STATEMENT

                    'BEGIN'                                                                                    00013001
                    'COMMENT'                                                                                  00014001
                    ////////////////////////////////////////////////////////////////////////                   00015001
                    // NAME: PETER M. MAURER                                                                   00016001
                    // Program: Sieve of Eratosthenes                                                          00017001
                    // DUE: NEVER                                                                              00018001
                    // LANGUAGE: ALGOL 60 ALA IBM ALGOL F                                                      00019001
                    // IBM Algol F IVP Contribution                                                            00020001
                    // by the kind permission of PETER M. MAURER                                               00021001
                    ////////////////////////////////////////////////////////////////////////                   00022001
                    ;                                                                                          00023001
                       'COMMENT' Define the Sieve Data Structure ;                                             00024001
                       'INTEGER' 'ARRAY' Candidates [0:1000];                                                  00025001
                1      'INTEGER' i,j,k;                                                                        00026001
                2      'COMMENT' Set line-length = 120, Set lines-per-page = 62, OPEN;                         00027001
                2      SYSACT(1,6,120);                                                                        00028001
                3      SYSACT(1,8,62);                                                                         00029001
                4      SYSACT(1,12,1);                                                                         00030001
                5      'COMMENT' 1000 to protect against strict evaluation of and ;                            00031001
                5      'FOR' i := 0 'STEP' 1 'UNTIL' 1000 'DO'                                                 00032001
                5      'BEGIN'                                                                                 00033001
                5          'COMMENT' everything is potentially prime                                           00034001
                5                           until proven otherwise ;                                           00035001
                5          Candidates[i] := 1;                                                                 00036001
                6      'END';                                                                                  00037001
                7      'COMMENT' Neither 1 nor 0 is Prime, so flag them off  ;                                 00038001
                7      Candidates[0] := 0;                                                                     00039001
                8      Candidates[1] := 0;                                                                     00040001
                9      'COMMENT' Start the Sieve with the Integer 0 ;                                          00041001
                9      i := 0;                                                                                 00042001
               10      'FOR' i := i 'WHILE' i 'LESS' 1000 'DO'                                                 00043001
               10      'BEGIN'                                                                                 00044001
               10          'COMMENT' Advance to the next un-crossed out. ;                                     00045001
               10          'COMMENT' this number must be a prime;                                              00046001
               10          'FOR' i := i 'WHILE' i 'LESS' 1000                                                  00047001
               10                               'AND' Candidates[i] 'EQUAL' 0 'DO'                             00048001
               10          'BEGIN'                                                                             00049001
               10              i := i+1;                                                                       00050001
               11          'END';                                                                              00051001
               12          'COMMENT' insure against running off the end;                                       00052001
               12          'IF' i 'LESS' 1000 'THEN'                                                           00053001
               12          'BEGIN'                                                                             00054001
               12              'COMMENT' Cross out all multiples of the Prime.;                                00055001
               12              j := 2;                                                                         00056001
               13              k := j*i;                                                                       00057001
               14              'FOR' k := k 'WHILE' k 'LESS' 1000 'DO'                                         00058001
               14              'BEGIN'                                                                         00059001
               14                  Candidates[k] := 0;                                                         00060001
               15                  j := j + 1;                                                                 00061001
               16                  k := j*i;                                                                   00062001
               17              'END';                                                                          00063001
               18              'COMMENT' Advance to the next candidate ;                                       00064001
               18              i := i+1;                                                                       00065001
               19              'END'                                                                           00066001
```

```
SC     SOURCE STATEMENT

19           'END';                                                    00067001
20           'COMMENT' All uncrossed out numbers are prime;            00068001
20           'COMMENT' Print all Primes ;                              00069001
20           'FOR' i := 0 'STEP' 1 'UNTIL' 999 'DO'                    00070001
20           'BEGIN'                                                   00071001
20           'IF' Candidates[i] ¬= 0  'THEN'                           00072001
20           'BEGIN'                                                   00073001
20               OUTINTEGER(1,i);                                      00074001
21               OUTSTRING(1,'(' Is Prime')');                         00075001
22               SYSACT(1,14,1)                                        00076001
22           'END'                                                     00077001
22       'END'                                                         00078001
22    'END'                                                            00079001
```

```
                                        IDENTIFIER TABLE                                                    PAGE   3
        PBN SC    PBN      NAME   TYPE  DM DSP       NAME   TYPE  DM DSP       NAME   TYPE  DM DSP
                  SURR                  PR LN                     PR LN                     PR LN

        001 00000 000      CANDID I A   01 018       I      I        030       J      I        034
                           K      I        038
```

```
                                     STORAGE REQUIREMENTS (DECIMAL)                                         PAGE   4


        OBJECT MODULE SIZE  1656 BYTES
        DATA STORAGE AREA SIZES
        PBN   BYTES       PBN   BYTES       PBN   BYTES       PBN   BYTES       PBN   BYTES
        001      80
```

```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LIST,LET
        DEFAULT OPTION(S) USED -  SIZE=(1015808,516096)


                                        CROSS REFERENCE TABLE


 CONTROL SECTION                      ENTRY

   NAME    ORIGIN  LENGTH               NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION
 PROGRAM       00     678
                                     IHIDSTAB     620    IHIENTIF     66C
 IHIFSARA*    678     E70
                                     IHIFSAIN    1474
 IHIFSARB*   14E8     690
 IHIOINTE*   1B78     1F8
                                     IHIOINAR    1B78    IHIOINTG    1BB8
 IHIOSTRG*   1D70     148
 IHISYSCT*   1EB8     780
 IHIIORTN*   2638     D70
                                     IHIIOROQ    2638    IHIIOROP    271E    IHIIORNX    2AEC    IHIIORCL    2D34
                                     IHIIORCP    2EDE    IHIIORGP    2FE0    IHIIORCN    2FE4    IHIIOREN    3044
                                     IHIIOREV    30C2    IHIIORED    3158    IHIIORCI    3230    IHIIORER    32B4
 IHIERROR*   33A8     6E8
 IHIERMSG*   3A90     9B8
                                     IHIERM01    3B40


  LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION            LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION
      558           IHISYSCT        IHISYSCT                  598           IHIOINTG        IHIOINTE
      5AC           IHIOSTRG        IHIOSTRG                 14BC           IHIFSARB        IHIFSARB
      910           IHIERROR        IHIERROR                 1470           IHIIORER        IHIIORTN
     14D0           IHIIORCP        IHIIORTN                  924           IHIIORCP        IHIIORTN
     146C           IHIIORGP        IHIIORTN                 1468           IHIIOREN        IHIIORTN
     1464           IHIIOROQ        IHIIORTN                 1458           IHIIOREV        IHIIORTN
     1450           IHIIORCI        IHIIORTN                 14D8           IHIIORNX        IHIIORTN
     145C           IHIIORNX        IHIIORTN                  929           IHIIORNX        IHIIORTN
     14DC           IHIIORCL        IHIIORTN                 1454           IHIIORCL        IHIIORTN
     14D4           IHIIOROP        IHIIORTN                 1460           IHIIOROP        IHIIORTN
      920           IHIIOROP        IHIIORTN                 14CC           IHIENTIF        PROGRAM
      724           IHIDSTAB        PROGRAM                  14ED           IHIFSARA        IHIFSARA
     3A78           IHIERM01        IHIERMSG                 3A74           IHIERMSG        IHIERMSG

 ENTRY ADDRESS     1474

 TOTAL LENGTH      4448
****GO        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS         0.
```

```
  +2   Is Prime
  +3   Is Prime
  +5   Is Prime
  +7   Is Prime
 +11   Is Prime
 +13   Is Prime
 +17   Is Prime
 +19   Is Prime
 +23   Is Prime
 +29   Is Prime
 +31   Is Prime
 +37   Is Prime
 +41   Is Prime
 +43   Is Prime
 +47   Is Prime
 +53   Is Prime
 +59   Is Prime
 +61   Is Prime
 +67   Is Prime
 +71   Is Prime
 +73   Is Prime
 +79   Is Prime
 +83   Is Prime
 +89   Is Prime
 +97   Is Prime
+101   Is Prime
+103   Is Prime
+107   Is Prime
+109   Is Prime
+113   Is Prime
+127   Is Prime
+131   Is Prime
+137   Is Prime
+139   Is Prime
+149   Is Prime
+151   Is Prime
+157   Is Prime
+163   Is Prime
+167   Is Prime
+173   Is Prime
+179   Is Prime
+181   Is Prime
+191   Is Prime
+193   Is Prime
+197   Is Prime
+199   Is Prime
+211   Is Prime
+223   Is Prime
+227   Is Prime
+229   Is Prime
+233   Is Prime
+239   Is Prime
+241   Is Prime
+251   Is Prime
+257   Is Prime
+263   Is Prime
+269   Is Prime
+271   Is Prime
+277   Is Prime
+281   Is Prime
+283   Is Prime
+293   Is Prime
```

```
+307   Is Prime
+311   Is Prime
+313   Is Prime
+317   Is Prime
+331   Is Prime
+337   Is Prime
+347   Is Prime
+349   Is Prime
+353   Is Prime
+359   Is Prime
+367   Is Prime
+373   Is Prime
+379   Is Prime
+383   Is Prime
+389   Is Prime
+397   Is Prime
+401   Is Prime
+409   Is Prime
+419   Is Prime
+421   Is Prime
+431   Is Prime
+433   Is Prime
+439   Is Prime
+443   Is Prime
+449   Is Prime
+457   Is Prime
+461   Is Prime
+463   Is Prime
+467   Is Prime
+479   Is Prime
+487   Is Prime
+491   Is Prime
+499   Is Prime
+503   Is Prime
+509   Is Prime
+521   Is Prime
+523   Is Prime
+541   Is Prime
+547   Is Prime
+557   Is Prime
+563   Is Prime
+569   Is Prime
+571   Is Prime
+577   Is Prime
+587   Is Prime
+593   Is Prime
+599   Is Prime
+601   Is Prime
+607   Is Prime
+613   Is Prime
+617   Is Prime
+619   Is Prime
+631   Is Prime
+641   Is Prime
+643   Is Prime
+647   Is Prime
+653   Is Prime
+659   Is Prime
+661   Is Prime
+673   Is Prime
+677   Is Prime
+683   Is Prime
```

```
+691   Is Prime
+701   Is Prime
+709   Is Prime
+719   Is Prime
+727   Is Prime
+733   Is Prime
+739   Is Prime
+743   Is Prime
+751   Is Prime
+757   Is Prime
+761   Is Prime
+769   Is Prime
+773   Is Prime
+787   Is Prime
+797   Is Prime
+809   Is Prime
+811   Is Prime
+821   Is Prime
+823   Is Prime
+827   Is Prime
+829   Is Prime
+839   Is Prime
+853   Is Prime
+857   Is Prime
+859   Is Prime
+863   Is Prime
+877   Is Prime
+881   Is Prime
+883   Is Prime
+887   Is Prime
+907   Is Prime
+911   Is Prime
+919   Is Prime
+929   Is Prime
+937   Is Prime
+941   Is Prime
+947   Is Prime
+953   Is Prime
+967   Is Prime
+971   Is Prime
+977   Is Prime
+983   Is Prime
+991   Is Prime
+997   Is Prime
```

```
  ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

  GO          1    2    3    4    5    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
              6    6    6    6    6    6    6    6    6    6    6    6    6
```

```
  ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     6     6     6     6     6     6     6     6
              6     6     6     6     6     7     8     9    10    11    11    12    13
             14    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
```

```
 ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
```

```
  ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
             16    17    15    16    17    15    16    17    15    16    17    15    16
             17    15    16    17    15    16    17    15    16    17    15    16    17
             15    16    17    15    16    17    15    16    17    15    16    17    15
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
18	19	12	13	14	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

17	15	16	17	15	16	17	15	16	17	15	16	17
18	19	11	12	13	14	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	18	19	11	12	13	14	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	18	19	11	11	11	12	13	14	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	18	19	11	12	13	14	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	18	19	11	11	11	12	13	14	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	15	16
17	15	16	17	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15
16	17	15	16	17	15	16	17	15	16	17	18	19
11	12	13	14	15	16	17	15	16	17	15	16	17
15	16	17	15	16	17	15	16	17	15	16	17	15

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 18 19 11 11 11 12 13 14 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 11 11 12
13 14 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 18 19 11
12 13 14 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 11 11 12
13 14 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 18 19 11 11 11 12 13 14 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 18 19 11 12 13 14 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 18 19 11 11 11
12 13 14 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 18 19
11 11 11 11 11 12 13 14 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 18 19 11 11 11 11
11 12 13 14 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 18 19 11
12 13 14 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 18 19 11 11
11 11 11 12 13 14 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 18 19 11 11 11 12 13
14 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 18 19 11 12 13 14 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 18 19 11 11 11 11 11 12 13
14 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 18 19 11 11 11
12 13 14 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 15 16 17 18 19 11

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

11 11 11 11 12 13 14 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 18 19
11 11 11 11 11 11 11 12 13 14 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 18 19
11 11 11 12 13 14 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 18 19 11 12 13 14 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 18 19 11 11 11
12 13 14 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 18 19 11 12 13 14 15 16 17 15 16 17
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 12 13 14
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 18 19 11 11 11
11 11 11 11 11 11 11 11 11 11 12 13 14
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 12 13 14
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 11 11 12
13 14 15 16 17 15 16 17 15 16 17 15 16
17 15 16 17 15 16 17 18 19 11 12 13 14
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 11 11 11
11 11 11 12 13 14 15 16 17 15 16 17 15
16 17 15 16 17 15 16 17 18 19 11 12 13
14 15 16 17 15 16 17 15 16 17 15 16 17
15 16 17 18 19 11 11 11 11 11 12 13 14
15 16 17 15 16 17 15 16 17 15 16 17 15
16 17 18 19 11 11 11 11 11 12 13 14 15
16 17 15 16 17 15 16 17 15 16 17 15 16
17 18 19 11 11 11 12 13 14 15 16 17 15
16 17 15 16 17 15 16 17 18 19 11 11 11
11 11 12 13 14 15 16 17 15 16 17 15 16
17 15 16 17 18 19 11 11 11 11 11 12 13
14 15 16 17 15 16 17 15 16 17 15 16 17
18 19 11 12 13 14 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 11 11 11 11 11
11 11 11 12 13 14 15 16 17 15 16 17 15
16 17 15 16 17 18 19 11 12 13 14 15 16
17 15 16 17 15 16 17 15 16 17 18 19 11
11 11 12 13 14 15 16 17 15 16 17 15 16

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

17 15 16 17 18 19 11 12 13 14 15 16 17
15 16 17 15 16 17 15 16 17 18 19 11 11
11 11 11 11 11 11 11 11 11 12 13 14 15
16 17 15 16 17 15 16 17 18 19 11 11 11
11 11 11 11 11 11 11 11 12 13 14 15 16
17 15 16 17 15 16 17 18 19 11 11 11 12
13 14 15 16 17 15 16 17 15 16 17 18 19
11 12 13 14 15 16 17 15 16 17 15 16 17
18 19 11 11 11 12 13 14 15 16 17 15 16
17 15 16 17 18 19 11 11 11 11 11 12 13
14 15 16 17 15 16 17 15 16 17 18 19 11
12 13 14 15 16 17 15 16 17 15 16 17 18
19 11 11 11 11 11 11 11 11 11 12 13 14
15 16 17 15 16 17 18 19 11 11 11 11 11
12 13 14 15 16 17 15 16 17 18 19 11 11
11 11 11 12 13 14 15 16 17 15 16 17 18
19 11 11 11 11 11 12 13 14 15 16 17 15
16 17 18 19 11 12 13 14 15 16 17 15 16
17 18 19 11 11 11 11 11 12 13 14 15 16
17 15 16 17 18 19 11 11 11 12 13 14 15
16 17 15 16 17 18 19 11 12 13 14 15 16
17 15 16 17 18 19 11 11 11 11 11 11 11
11 11 12 13 14 15 16 17 15 16 17 18 19
11 11 11 11 11 11 11 11 11 11 11 11 11
12 13 14 15 16 17 15 16 17 18 19 11 11
11 12 13 14 15 16 17 15 16 17 18 19 11
12 13 14 15 16 17 15 16 17 18 19 11 11
11 12 13 14 15 16 17 15 16 17 18 19 11
11 11 11 11 11 11 11 11 11 11 11 11 12
13 14 15 16 17 15 16 17 18 19 11 11 11
11 11 12 13 14 15 16 17 18 19 11 11 11
11 11 11 11 11 11 12 13 14 15 16 17 18
19 11 12 13 14 15 16 17 18 19 11 11 11
12 13 14 15 16 17 18 19 11 11 11 11 11
12 13 14 15 16 17 18 19 11 11 11 11 11
11 11 12 13 14 15 16 17 18 19 11 11 11
11 11 12 13 14 15 16 17 18 19 11 11 11
11 11 12 13 14 15 16 17 18 19 11 11 11
12 13 14 15 16 17 18 19 11 11 11 11 11
12 13 14 15 16 17 18 19 11 11 11 11 11
11 11 12 13 14 15 16 17 18 19 11 11 11
12 13 14 15 16 17 18 19 11 11 11 11 11
11 11 12 13 14 15 16 17 18 19 11 11 11
11 11 11 11 11 11 12 13 14 15 16 17 18
19 11 12 13 14 15 16 17 18 19 11 11 11

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

```
11  11  11  11  11  11  12  13  14  15  16  17  18
19  11  12  13  14  15  16  17  18  19  11  11  11
11  11  12  13  14  15  16  17  18  19  11  11  11
12  13  14  15  16  17  18  19  11  11  11  11  11
12  13  14  15  16  17  18  19  11  11  11  11  11
11  11  12  13  14  15  16  17  18  19  11  11  11
12  13  14  15  16  17  18  19  11  12  13  14  15
16  17  18  19  11  11  11  12  13  14  15  16  17
18  19  11  11  11  11  11  11  11  11  11  11  11
12  13  14  15  16  17  18  19  11  11  11  11  11
11  11  12  13  14  15  16  17  18  19  11  11  11
12  13  14  15  16  17  18  19  11  11  11  11  11
11  11  12  13  14  15  16  17  18  19  11  11  11
12  13  14  18  19  11  11  11  11  11  12  13  14
18  19  11  11  11  11  11  11  11  11  11  11  11
12  13  14  18  19  11  12  13  14  18  19  11  11
11  11  11  11  11  11  11  11  11  11  11  11  11
11  11  12  13  14  18  19  11  11  11  11  11  12
13  14  18  19  11  11  11  11  11  11  11  11  11
12  13  14  18  19  11  11  11  11  11  12  13  14
18  19  11  11  11  11  11  12  13  14  18  19  11
12  13  14  18  19  11  11  11  11  11  12  13  14
18  19  11  11  11  11  11  11  11  11  11  12  13
14  18  19  11  11  11  11  11  12  13  14  18  19
11  11  11  11  11  12  13  14  18  19  11  12  13
14  18  19  11  11  11  11  11  12  13  14  18  19
11  11  11  11  11  12  13  14  18  19  11  11  11
12  13  14  18  19  11  12  13  14  18  19  11  11
11  11  11  11  11  11  11  11  11  12  13  14  18
19  11  11  11  11  11  11  11  11  11  12  13  14
18  19  11  12  13  14  18  19  11  11  11  12  13
14  18  19  11  11  11  11  11  12  13  14  18  19
11  11  11  11  11  12  13  14  18  19  11  12  13
14  18  19  11  11  11  11  11  11  11  11  11  11
11  12  13  14  18  19  11  11  11  12  13  14  18
19  11  11  11  11  11  12  13  14  18  19  11  11
11  11  11  11  11  12  13  14  18  19  11  11  11
11  11  11  11  11  11  12  13  14  18  19  11  11
11  11  11  11  11  12  13  14  18  19  11  11  11
11  11  11  11  11  11  12  13  14  18  19  11  11
11  11  11  11  11  12  13  14  18  19  11  11  11
11  11  12  13  14  18  19  11  11  11  11  11  12
13  14  18  19  11  11  11  12  13  14  18  19  11
11  11  11  11  11  11  12  13  14  18  19  11  11
11  11  11  12  13  14  18  19  11  11  11  12  13
```

ALGOL PROGRAM TRACE

MODULE SEMICOLON NUMBERS

14	18	19	11	11	11	11	11	11	11	12	13	14
18	19	11	11	11	12	13	14	18	19	11	11	11
11	11	11	11	11	11	11	11	11	11	12	13	14
18	19	11	11	11	11	11	11	11	11	11	12	13
14	18	19	11	11	11	11	11	11	11	11	11	11
11	12	13	14	18	19	11	12	13	14	18	19	11
11	11	11	11	11	11	11	11	12	13	14	18	19
11	12	13	14	18	19	11	11	11	12	13	14	18
19	11	12	13	14	18	19	11	11	11	11	11	11
11	11	11	12	13	14	18	19	11	11	11	11	11
11	11	11	11	11	11	11	11	12	13	14	18	19
11	11	11	12	13	14	18	19	11	12	13	14	18
19	11	11	11	12	13	14	18	19	11	11	11	11
11	11	11	11	11	11	11	11	11	12	13	14	18
19	11	11	11	12	13	14	18	19	11	12	13	14
18	19	11	11	11	12	13	14	18	19	11	11	11
11	11	11	11	11	11	11	11	11	11	11	11	11
11	11	11	12	13	14	18	19	11	11	11	12	13
14	18	19	11	11	11	11	11	11	11	12	13	14
18	19	11	11	11	11	11	11	11	11	11	12	13
14	18	19	11	11	11	11	11	11	11	12	13	14
18	19	11	11	11	12	13	14	18	19	11	11	11
11	11	12	13	14	18	19	11	11	11	11	11	12
13	14	18	19	11	11	11	11	11	11	11	11	11
11	11	11	11	12	13	14	18	19	11	11	11	12
13	14	18	19	11	11	11	11	11	12	13	14	18
19	11	11	11	11	11	12	13	14	18	19	11	11
11	11	11	11	11	12	13	14	18	19	11	11	11
11	11	12	13	14	18	19	11	11	12	20	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22
21	22	21	22	21	22	21	22	21	22	21	22	21
22	21	22	21	22	21	22	21	22	21	22	21	22

```
  ALGOL PROGRAM TRACE

MODULE     SEMICOLON NUMBERS

             21   22   21   22   21   22   21   22   21   22   21   22   21
             22   21   22   21   22   21   22   21   22   21   22   21   22
             21   22   21   22   21   22   21   22   21   22   21   22   21
             22   21   22   21   22   21   22   21   22   21   22   21   22
             21   22   21   22   21   22   21   22   21   22   21   22   21
             22   21   22   21   22   21   22   21   22   21   22   21   22
             21   22   21   22   21   22   21   22   21   22   21   22   21
             22   21   22   21   22   21   22   21   22   21   22   21   22
             21   22   21   22   21   22   21   22   21   22   21   22   21
             22   21   22   21   22   21   22   21   22
END OF ALGOL PROGRAM EXECUTION
```

Appendix D. IVP IEXSAMP4 Listing

```
                                    J E S 2   J O B   L O G

13.38.53 JOB 9293  IEF677I WARNING MESSAGE(S) FOR JOB T1IV4    ISSUED
13.38.53 JOB 9293  $HASP373 T1IV4    STARTED - INIT  6 - CLASS S - SYS SYSA
13.38.53 JOB 9293  IEF403I T1IV4 - STARTED - TIME=13.38.53
13.38.53 JOB 9293  IEFACTRT - Stepname  Procstep  Program   Retcode
13.38.53 JOB 9293  T1IV4      IVP4      ALGOL     ALGOL     RC= 0000
13.38.53 JOB 9293  T1IV4      IVP4      LKED      IEWL      RC= 0000
13.38.53 JOB 9293  T1IV4      ASMTIM    ASM       IFOX00    RC= 0000
13.38.54 JOB 9293  T1IV4      ASMTIM    LKED      IEWL      RC= 0000
13.42.09 JOB 9293  T1IV4      GOIVP4              GO        RC= 0000
13.42.09 JOB 9293  IEF404I T1IV4 - ENDED - TIME=13.42.09
13.42.09 JOB 9293  $HASP395 T1IV4    ENDED

   1     //T1IV4   JOB  111,'ALGOL F LVL2.1',   <-- CUSTOMIZE FOR SITE STANDARDS JOB 9293
         //             CLASS=S,MSGCLASS=C,     <-- CUSTOMIZE FOR SITE STANDARDS 00002001
         //             REGION=1024K,COND=(0,NE),MSGLEVEL=(1,1)                  00003001
         ***                                                                    00004001
         ***       IBM Algol F Level 2.1 IVP                                    00005001
         ***                                                                    00006001
         ***       360S-AL-531 Algol F Compiler                                 00007001
         ***            and                                                     00008001
         ***       360S-LM-532 Algol F Library                                  00009001
         ***                                                                    00010001
   2     //IVP4    EXEC ALGOFCL                                                 00011001
         ***                                                                    00001001
         ********************************************************************** 00002001
         ***                                                                    00003001
         ***       IBM ALGOL F LEVEL 2.1                                        00004001
         ***                                                                    00005001
         ***       360S-AL-531 ALGOL F COMPILER                                 00006001
         ***            AND                                                     00007001
         ***       360S-LM-532 ALGOL F LIBRARY                                  00008001
         ***                                                                    00009001
         ***       COMPILE AND LINK-EDIT A PROGRAM                              00010001
         ***                                                                    00011001
         ********************************************************************** 00012001
         ***                                                                    00013001
   3     XXALGOL   EXEC PGM=ALGOL,REGION=1024K                                  00014001
   4     XXSYSPRINT DD  SYSOUT=*                                                00015001
   5     XXSYSPUNCH DD  DUMMY                                                   00016001
   6     XXSYSLIN   DD  DSN=&&OBJECT,UNIT=VIO,SPACE=(3200,(20,10)),             00017001
         XX             DISP=(,PASS)                                            00018001
   7     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(50,10))                           00019001
   8     XXSYSUT2   DD  UNIT=VIO,SPACE=(2048,(50,10))                           00020001
   9     XXSYSUT3   DD  UNIT=VIO,SPACE=(2048,(40,10))                           00021001
  10     //ALGOL.SYSIN  DD  *                                                   00012001
  11     XXLKED    EXEC PGM=IEWL,PARM='XREF,LIST,LET',COND=(5,LT,ALGOL),        00022001
         XX             REGION=1024K                                            00023001
  12     XXSYSPRINT DD  SYSOUT=*                                                00024001
  13     XXSYSLIB   DD  DSN=SYS1.ALGLIB,DISP=SHR                                00025001
  14     XXSYSLMOD  DD  DSN=&&GOSET(GO),UNIT=VIO,DISP=(,PASS),                  00026001
         XX             SPACE=(2048,(100,20,1))                                 00027001
  15     XXSYSUT1   DD  UNIT=VIO,SPACE=(2048,(100,20))                          00028001
  16     XXSYSLIN   DD  DSN=&&OBJECT,DISP=(OLD,DELETE)                          00029001
  17     XX         DD  DDNAME=SYSIN                                            00030001
  18     //ASMTIM   EXEC ASMFCL                                                 00789001
  19     XXASMFCL  PROC SOUT='*'                                                00000107
  20     XXASM     EXEC PGM=IFOX00,PARM=OBJ,REGION=512K                         00000204
  21     //ASM.SYSLIB DD DSN=SYS1.MACLIB,DISP=SHR                               00790001
         X/SYSLIB   DD  DSN=SYS1.MACLIB,DISP=SHR                                00000307
  22     //           DD DSN=SYS1.AMODGEN,DISP=SHR                              00791001
         X/         DD  DSN=SYS1.AMODGEN,DISP=SHR                              00000407
  23     XXSYSUT1   DD  UNIT=VIO,SPACE=(TRK,(30,30))                            00000504
  24     XXSYSUT2   DD  UNIT=VIO,SPACE=(TRK,(30,30))                            00000604
  25     XXSYSUT3   DD  UNIT=VIO,SPACE=(TRK,(30,30))                            00000704
  26     XXSYSPRINT DD  SYSOUT=&SOUT                                            00000805
  27     XXSYSPUNCH DD  DUMMY                                                   00000904
  28     XXSYSGO    DD  DSN=&&OBJECT,UNIT=VIO,SPACE=(TRK,(3,30)),               00001004
         XX             DISP=(MOD,PASS)                                         00001104
  29     //ASM.SYSIN  DD *                                                      00792001
  30     XXLKED    EXEC PGM=IEWL,PARM='XREF,LET,LIST,NCAL',REGION=2048K,        00001204
         XX             COND=(8,LT,ASM)                                         00001304
  31     XXSYSPRINT DD  SYSOUT=&SOUT                                            00001406
  32     XXSYSUT1   DD  UNIT=VIO,SPACE=(2024,(50,20))                           00001506
  33     XXSYSLIN   DD  DSN=&&OBJECT,DISP=(OLD,DELETE)                          00001604
  34     XX         DD  DDNAME=SYSIN                                            00001704
```

```
  35     //LKED.SYSLMOD DD DSN=&&GOSET(CPUTIM),DISP=(OLD,PASS)                   00882001
         X/SYSLMOD  DD  DSN=&&GOSET(GO),UNIT=SYSDA,SPACE=(2048,(50,20,1)),      00001804
         XX             DISP=(MOD,PASS)                                        00001904
  36     //GOIVP4  EXEC PGM=GO                                                  00883001
  37     //STEPLIB  DD  DSN=&&GOSET,DISP=(OLD,PASS)                             00884001
  38     //ALGLDD01 DD  SYSOUT=*                                                00885001
  39     //SYSPRINT DD  SYSOUT=*                                                00886001
  40     //SYSUT1   DD  UNIT=VIO,SPACE=(1024,(20,10))                           00887001
 STMT NO. MESSAGE
-
   26     IEF653I SUBSTITUTION JCL - SYSOUT=*
   31     IEF653I SUBSTITUTION JCL - SYSOUT=*
   18     IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
   36     IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVED
IEF236I ALLOC. FOR T1IV4 ALGOL IVP4
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I DMY  ALLOCATED TO SYSPUNCH
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSUT2
IEF237I VIO  ALLOCATED TO SYSUT3
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I T1IV4 ALGOL IVP4 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09293.SO0103                        SYSOUT
IEF285I   SYS12230.T133853.RA000.T1IV4.OBJECT         PASSED        *-------17
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000001       DELETED       *-------11
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000002       DELETED       *-------17
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000003       DELETED       *-------77
IEF285I   JES2.JOB09293.SI0101                        SYSIN
IEF373I STEP /ALGOL   / START 12230.1338
IEF374I STEP /ALGOL   / STOP  12230.1338 CPU    0MIN 00.11SEC SRB    0MIN 00.01SEC VIRT   192K SYS   308K
*************************************************************************************************************************************
*     1. Jobstep of job: T1IV4       Stepname: ALGOL       Program name: ALGOL      Executed on 17.08.12 from 13.38.53 to 13.38.53 *
*         elapsed time  24:00:00,15                     CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,12               Virtual Storage used:    192K         Page-out:     0                          *
*           corr. CPU:  00:00:00,12   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:    775                                                                          *
*     DMY.......0 DMY.......0 FFF......17 FFF......11 FFF......17 FFF......77 DMY.......0                                          *
*                                                                                                                                 *
*                                     Charge for step (w/o SYSOUT):          0,20                                               *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV4 LKED IVP4
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I 148  ALLOCATED TO SYSLIB
IEF237I VIO  ALLOCATED TO SYSLMOD
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO
IEF142I T1IV4 LKED IVP4 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09293.SO0104                        SYSOUT
IEF285I   SYS1.ALGLIB                                 KEPT          *------107
IEF285I   VOL SER NOS= MVSRES.
IEF285I   SYS12230.T133853.RA000.T1IV4.GOSET          PASSED        *-------26
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000004       DELETED       *--------0
IEF285I   SYS12230.T133853.RA000.T1IV4.OBJECT         DELETED       *-------18
IEF373I STEP /LKED    / START 12230.1338
IEF374I STEP /LKED    / STOP  12230.1338 CPU    0MIN 00.07SEC SRB    0MIN 00.01SEC VIRT  1024K SYS   280K
*************************************************************************************************************************************
*     2. Jobstep of job: T1IV4       Stepname: LKED        Program name: IEWL       Executed on 17.08.12 from 13.38.53 to 13.38.53 *
*         elapsed time  24:00:00,09                     CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,08               Virtual Storage used:   1024K         Page-out:     0                          *
*           corr. CPU:  00:00:00,08   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:      0                                                                          *
*     DMY.......0 148.....107 FFF......26 FFF.......0 FFF......18 DMY.......0                                                     *
*                                                                                                                                 *
*                                     Charge for step (w/o SYSOUT):          0,13                                               *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV4 ASM ASMTIM
IEF237I 148  ALLOCATED TO SYSLIB
IEF237I 248  ALLOCATED TO
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSUT2
IEF237I VIO  ALLOCATED TO SYSUT3
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I DMY  ALLOCATED TO SYSPUNCH
IEF237I VIO  ALLOCATED TO SYSGO
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I T1IV4 ASM ASMTIM - STEP WAS EXECUTED - COND CODE 0000
```

```
IEF285I   SYS1.MACLIB                                KEPT         *--------4
IEF285I   VOL SER NOS= MVSRES.
IEF285I   SYS1.AMODGEN                               KEPT         *--------7
IEF285I   VOL SER NOS= MVSDLB.
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000005      DELETED      *-------31
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000006      DELETED      *-------15
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000007      DELETED      *--------8
IEF285I   JES2.JOB09293.SO0105                       SYSOUT
IEF285I   SYS12230.T133853.RA000.T1IV4.OBJECT        PASSED       *--------7
IEF285I   JES2.JOB09293.SI0102                       SYSIN
IEF373I STEP /ASM     / START 12230.1338
IEF374I STEP /ASM     / STOP  12230.1338 CPU    0MIN 00.17SEC SRB    0MIN 00.00SEC VIRT  1024K SYS   344K
*************************************************************************************************************************************
*     3. Jobstep of job: T1IV4       Stepname: ASM         Program name: IFOX00     Executed on 17.08.12 from 13.38.53 to 13.38.53 *
*         elapsed time  24:00:00,30                     CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,17              Virtual Storage used:   1024K         Page-out:     0                          *
*           corr. CPU:  00:00:00,17   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:     88                                                                          *
*     148.......4 248.......7 FFF......31 FFF......15 FFF.......8 DMY.......0 DMY.......0 FFF.......7 DMY.......0                 *
*                                                                                                                                 *
*                                      Charge for step (w/o SYSOUT):          0,28                                              *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV4 LKED ASMTIM
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I VIO  ALLOCATED TO SYSUT1
IEF237I VIO  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO
IEF237I VIO  ALLOCATED TO SYSLMOD
IEF142I T1IV4 LKED ASMTIM - STEP WAS EXECUTED - COND CODE 0000
IEF285I   JES2.JOB09293.SO0106                       SYSOUT
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000008      DELETED      *--------0
IEF285I   SYS12230.T133853.RA000.T1IV4.OBJECT        DELETED      *--------8
IEF285I   SYS12230.T133853.RA000.T1IV4.GOSET         PASSED       *-------10
IEF373I STEP /LKED    / START 12230.1338
IEF374I STEP /LKED    / STOP  12230.1338 CPU    0MIN 00.03SEC SRB    0MIN 00.00SEC VIRT  1024K SYS   280K
*************************************************************************************************************************************
*     4. Jobstep of job: T1IV4       Stepname: LKED        Program name: IEWL       Executed on 17.08.12 from 13.38.53 to 13.38.54 *
*         elapsed time  24:00:00,04                     CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:00:00,03              Virtual Storage used:   1024K         Page-out:     0                          *
*           corr. CPU:  00:00:00,03   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:      0                                                                          *
*     DMY.......0 FFF.......0 FFF.......8 DMY.......0 FFF......10                                                                 *
*                                                                                                                                 *
*                                      Charge for step (w/o SYSOUT):          0,05                                              *
*************************************************************************************************************************************
IEF236I ALLOC. FOR T1IV4 GOIVP4
IEF237I VIO  ALLOCATED TO STEPLIB
IEF237I JES2 ALLOCATED TO ALGLDD01
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I VIO  ALLOCATED TO SYSUT1
IEF142I T1IV4 GOIVP4 - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS12230.T133853.RA000.T1IV4.GOSET         PASSED       *--------0
IEF285I   JES2.JOB09293.SO0107                       SYSOUT
IEF285I   JES2.JOB09293.SO0108                       SYSOUT
IEF285I   SYS12230.T133853.RA000.T1IV4.R0000009      DELETED      *--------0
IEF373I STEP /GOIVP4  / START 12230.1338
IEF374I STEP /GOIVP4  / STOP  12230.1342 CPU    3MIN 15.31SEC SRB    0MIN 00.00SEC VIRT    56K SYS   280K
*************************************************************************************************************************************
*     5. Jobstep of job: T1IV4       Stepname: GOIVP4      Program name: GO         Executed on 17.08.12 from 13.38.54 to 13.42.09 *
*         elapsed time  24:03:15,49                     CPU-Identifier:  SYSA           Page-in:      0                          *
*             CPU time  00:03:15,31              Virtual Storage used:     56K         Page-out:     0                          *
*           corr. CPU:  00:03:15,31   CPU time has been corrected by  1 / 1,0  multiplier                                        *
*                                                                                                                                 *
*     I/O Operation                                                                                                               *
*     Number of records read via DD * or DD DATA:      0                                                                          *
*     FFF.......0 DMY.......0 DMY.......0 FFF.......0                                                                             *
*                                                                                                                                 *
*                                      Charge for step (w/o SYSOUT):        325,51                                              *
*************************************************************************************************************************************
IEF285I   SYS12230.T133853.RA000.T1IV4.GOSET         DELETED
IEF375I  JOB /T1IV4   / START 12230.1338
IEF376I  JOB /T1IV4   / STOP  12230.1342 CPU    3MIN 15.69SEC SRB    0MIN 00.02SEC
```

```
             SC     SOURCE STATEMENT

                      'BEGIN'                                                          00013001
                      'COMMENT'  Basic Statement Times for Algol 60                    00014001
                                 B A Wichmann                                          00015001
                                 National Physics laboratory                           00016001
                                 Teddington, Middlesex                                 00017001
                                 November 1973;                                        00018001
                                                                                       00019001
                      'COMMENT'  Modified for IBM Algol F Level 2.1 IVP                00020001
                                 This program will execute for aproximately 4 minutes  00021001
                                 on an MVS 3.8 system running on a Hercules 3.07       00022001
                                 system averaging 25 mips.                             00023001
                                                                                       00024001
                                 Timings are guidelines only due to the PC, Windows    00025001
                                 and the Hercules timer implementations and will       00026001
                                 therefore vary for each execution;                    00027001
                                                                                       00028001
                      'REAL' x, y, z;                                                  00029001
              1       'INTEGER' i, j, n, k, l, m, case;                                00030001
              2       'INTEGER' 'ARRAY' e1[1:1], e2[1:1,1:1], e3[1:1,1:1,1:1];         00031001
              3                                                                        00032001
              3       'PROCEDURE' p0;                                                  00033001
              4         ;                                                              00034001
              5                                                                        00035001
              5       'PROCEDURE' p1(x);                                               00036001
              6         'VALUE' x;                                                     00037001
              7         'REAL' x;                                                      00038001
              8         ;                                                              00039001
              9                                                                        00040001
              9       'PROCEDURE' p2(x,y);                                             00041001
             10         'VALUE' x, y;                                                  00042001
             11         'REAL' x, y;                                                   00043001
             12         ;                                                              00044001
             13                                                                        00045001
             13       'PROCEDURE' p3(x,y,z);                                           00046001
             14         'VALUE' x, y, z;                                               00047001
             15         'REAL' x, y, z;                                                00048001
             16         ;                                                              00049001
             17                                                                        00050001
             17       'INTEGER' 'ARRAY' #TT[1:43];                                     00051001
             18                                                                        00052001
             18       'PROCEDURE' printt;                                              00053001
             19            'BEGIN'                                                     00054001
             19                'INTEGER' i;                                            00055001
             20                'REAL' x, mix, loop;                                    00056001
             21                'COMMENT' calculate time differences;                   00057001
             21                'FOR' i := 43 'STEP' -1 'UNTIL' 2 'DO'                  00058001
             21                     'BEGIN'                                            00059001
             21                          #TT[i] := #TT[i] - #TT[i-1];                  00060001
             22                          'COMMENT' subtract previous accum cpu time    00061001
             22                                    to derive case timing;              00062001
             22                     'END';                                             00063001
             23                'FOR' i := 2 'STEP'  1 'UNTIL' 42 'DO'                  00064001
             23                     'BEGIN'                                            00065001
             23                          #TT[i] := (#TT[i] - #TT[43])/ ((n * 10)/1000); 00066001
```

```
SC     SOURCE STATEMENT

24                          'COMMENT' subtract loop overhead and           00067001
24                                    convert to picroseconds;             00068001
24                     'END';                                              00069001
25                 'COMMENT' Print results;                                00070001
25                 SYSACT(1,14,1);                                         00071001
26                 OUTINTEGER(1,#TT[2]);                                   00072001
27                 OUTSTRING(1,'('x := 1.0 ')');                           00073001
28                 SYSACT(1,14,1);                                         00074001
29                 OUTINTEGER(1,#TT[3]);                                   00075001
30                 OUTSTRING(1,'('x := 1 ')');                             00076001
31                 SYSACT(1,14,1);                                         00077001
32                 OUTINTEGER(1,#TT[4]);                                   00078001
33                 OUTSTRING(1,'('x := y ')');                             00079001
34                 SYSACT(1,14,1);                                         00080001
35                 OUTINTEGER(1,#TT[5]);                                   00081001
36                 OUTSTRING(1,'('x := y + z')');                          00082001
37                 SYSACT(1,14,1);                                         00083001
38                 OUTINTEGER(1,#TT[6]);                                   00084001
39                 OUTSTRING(1,'('x := y * z')');                          00085001
40                 SYSACT(1,14,1);                                         00086001
41                 OUTINTEGER(1,#TT[7]);                                   00087001
42                 OUTSTRING(1,'('x := y / z')');                          00088001
43                 SYSACT(1,14,1);                                         00089001
44                 OUTINTEGER(1,#TT[8]);                                   00090001
45                 OUTSTRING(1,'('k := 1')');                              00091001
46                 SYSACT(1,14,1);                                         00092001
47                 OUTINTEGER(1,#TT[9]);                                   00093001
48                 OUTSTRING(1,'('k := 1.0')');                            00094001
49                 SYSACT(1,14,1);                                         00095001
50                 OUTINTEGER(1,#TT[10]);                                  00096001
51                 OUTSTRING(1,'('k := l + m')');                          00097001
52                 SYSACT(1,14,1);                                         00098001
53                 OUTINTEGER(1,#TT[11]);                                  00099001
54                 OUTSTRING(1,'('k := l * m')');                          00100001
55                 SYSACT(1,14,1);                                         00101001
56                 OUTINTEGER(1,#TT[12]);                                  00102001
57                 OUTSTRING(1,'('k := l / m')');                          00103001
58                 SYSACT(1,14,1);                                         00104001
59                 OUTINTEGER(1,#TT[13]);                                  00105001
60                 OUTSTRING(1,'('k := l')');                              00106001
61                 SYSACT(1,14,1);                                         00107001
62                 OUTINTEGER(1,#TT[14]);                                  00108001
63                 OUTSTRING(1,'('x := l')');                              00109001
64                 SYSACT(1,14,1);                                         00110001
65                 OUTINTEGER(1,#TT[15]);                                  00111001
66                 OUTSTRING(1,'('l := y')');                              00112001
67                 SYSACT(1,14,1);                                         00113001
68                 OUTINTEGER(1,#TT[16]);                                  00114001
69                 OUTSTRING(1,'('x := y ** 2')');                         00115001
70                 SYSACT(1,14,1);                                         00116001
71                 OUTINTEGER(1,#TT[17]);                                  00117001
72                 OUTSTRING(1,'('x := y ** 3')');                         00118001
73                 SYSACT(1,14,1);                                         00119001
74                 OUTINTEGER(1,#TT[18]);                                  00120001
```

```
SC     SOURCE STATEMENT

 75                OUTSTRING(1,'('x := y ** z')');                          00121001
 76                SYSACT(1,14,1);                                          00122001
 77                OUTINTEGER(1,#TT[19]);                                   00123001
 78                OUTSTRING(1,'('e1[1] := 1')');                           00124001
 79                SYSACT(1,14,1);                                          00125001
 80                OUTINTEGER(1,#TT[20]);                                   00126001
 81                OUTSTRING(1,'('e2[1,1] := 1')');                         00127001
 82                SYSACT(1,14,1);                                          00128001
 83                OUTINTEGER(1,#TT[21]);                                   00129001
 84                OUTSTRING(1,'('e3[1,1,1] := 1')');                       00130001
 85                SYSACT(1,14,1);                                          00131001
 86                OUTINTEGER(1,#TT[22]);                                   00132001
 87                OUTSTRING(1,'('l := e1[1]')');                           00133001
 88                SYSACT(1,14,1);                                          00134001
 89                OUTINTEGER(1,#TT[23]);                                   00135001
 90                OUTSTRING(1,'('begin real a; end')');                    00136001
 91                SYSACT(1,14,1);                                          00137001
 92                OUTINTEGER(1,#TT[24]);                                   00138001
 93                OUTSTRING(1,'('begin real a[1:1]; end')');               00139001
 94                SYSACT(1,14,1);                                          00140001
 95                OUTINTEGER(1,#TT[25]);                                   00141001
 96                OUTSTRING(1,'('begin real a[1:500]; end')');             00142001
 97                SYSACT(1,14,1);                                          00143001
 98                OUTINTEGER(1,#TT[26]);                                   00144001
 99                OUTSTRING(1,'('begin real a[1:1,1:1]; end')');           00145001
100                SYSACT(1,14,1);                                          00146001
101                OUTINTEGER(1,#TT[27]);                                   00147001
102                OUTSTRING(1,'('begin real a[1:1,1:1,1:1]; end')');       00148001
103                SYSACT(1,14,1);                                          00149001
104                OUTINTEGER(1,#TT[28]);                                   00150001
105                OUTSTRING(1,'('begin goto lab; lab: end')');             00151001
106                SYSACT(1,14,1);                                          00152001
107                OUTINTEGER(1,#TT[29]);                                   00153001
108                OUTSTRING(1,'('begin switch s := q; goto s[1]; q: end')');00154001
109                SYSACT(1,14,1);                                          00155001
110                OUTINTEGER(1,#TT[30]);                                   00156001
111                OUTSTRING(1,'('x := sin(y)')');                          00157001
112                SYSACT(1,14,1);                                          00158001
113                OUTINTEGER(1,#TT[31]);                                   00159001
114                OUTSTRING(1,'('x := cos(y)')');                          00160001
115                SYSACT(1,14,1);                                          00161001
116                OUTINTEGER(1,#TT[32]);                                   00162001
117                OUTSTRING(1,'('x := abs(y)')');                          00163001
118                SYSACT(1,14,1);                                          00164001
119                OUTINTEGER(1,#TT[33]);                                   00165001
120                OUTSTRING(1,'('x := exp(y)')');                          00166001
121                SYSACT(1,14,1);                                          00167001
122                OUTINTEGER(1,#TT[34]);                                   00168001
123                OUTSTRING(1,'('x := ln(y)')');                           00169001
124                SYSACT(1,14,1);                                          00170001
125                OUTINTEGER(1,#TT[35]);                                   00171001
126                OUTSTRING(1,'('x := sqrt(y)')');                         00172001
127                SYSACT(1,14,1);                                          00173001
128                OUTINTEGER(1,#TT[36]);                                   00174001
```

```
 SC     SOURCE STATEMENT

129                 OUTSTRING(1,'('x := arctan(y)')');                      00175001
130                 SYSACT(1,14,1);                                         00176001
131                 OUTINTEGER(1,#TT[37]);                                  00177001
132                 OUTSTRING(1,'('x := sign(y)')');                        00178001
133                 SYSACT(1,14,1);                                         00179001
134                 OUTINTEGER(1,#TT[38]);                                  00180001
135                 OUTSTRING(1,'('x := entier(y)')');                      00181001
136                 SYSACT(1,14,1);                                         00182001
137                 OUTINTEGER(1,#TT[39]);                                  00183001
138                 OUTSTRING(1,'('p0')');                                  00184001
139                 SYSACT(1,14,1);                                         00185001
140                 OUTINTEGER(1,#TT[40]);                                  00186001
141                 OUTSTRING(1,'('p1(x)')');                               00187001
142                 SYSACT(1,14,1);                                         00188001
143                 OUTINTEGER(1,#TT[41]);                                  00189001
144                 OUTSTRING(1,'('p2(x,y)')');                             00190001
145                 SYSACT(1,14,1);                                         00191001
146                 OUTINTEGER(1,#TT[42]);                                  00192001
147                 OUTSTRING(1,'('p3(x,y,z)')');                           00193001
148                 'COMMENT' print DO loop overhead;                       00194001
148                 SYSACT(1,14,1);                                         00195001
149                 OUTINTEGER(1,#TT[43]);                                  00196001
150                 OUTSTRING(1,'('DO Loop overhead')');                    00197001
151             'END';                                                      00198001
152                                                                         00199001
152         'INTEGER' 'PROCEDURE' CPUTIM; 'CODE';                           00200001
154               'COMMENT' Procedure that returns the current accumulated  00201001
154                         job step processor time in microseconds in the  00202001
154                         MVS 3.8J environment;                           00203001
154                                                                         00204001
154         'COMMENT' Set line-length = 120, Set lines-per-page = 62, OPEN; 00205001
154         SYSACT(1,6,120);                                                00206001
155         SYSACT(1,8,62);                                                 00207001
156         SYSACT(1,12,1);                                                 00208001
157         SYSACT(1,2,10);                                                 00209001
158         OUTSTRING (1,'('Algol F Statement Timings')');                  00210001
159         SYSACT(1,14,1);                                                 00211001
160         OUTSTRING(1,'('Picoseconds  Statement')');                      00212001
161                                                                         00213001
161         x := y := z := 1.0;                                             00214001
162         l := k := m := 1;                                               00215001
163         e1[1] := 1;                                                     00216001
164         case := 1;                                                      00217001
165                                                                         00218001
165              'COMMENT' Case 01;                                         00219001
165         n := 100000;                                                    00220001
166              'COMMENT' n should be given a large enough value           00221001
166                        for the resolution of the clock not to           00222001
166                        be a limiting factor to the accuracy.            00223001
166                        If n is made too large then processor time       00224001
166                        is wasted;                                       00225001
166         #TT[1] := CPUTIM;                                               00226001
167              'COMMENT' #TT[1] equals program initialization overhead;   00227001
167                                                                         00228001
```

```
 SC     SOURCE STATEMENT

167             'COMMENT' Case 02;                                              00229001
167        case := case + 1;                                                    00230001
168        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                 00231001
168             'BEGIN'                                                         00232001
168                  x := 1.0; x := 1.0; x := 1.0; x := 1.0; x := 1.0;          00233001
173                  x := 1.0; x := 1.0; x := 1.0; x := 1.0; x := 1.0;          00234001
178             'END';                                                          00235001
179        #TT[case] := CPUTIM;                                                 00236001
180                                                                             00237001
180        case := case + 1;                                                    00238001
181             'COMMENT' Case 03;                                              00239001
181        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                 00240001
181             'BEGIN'                                                         00241001
181                  x := 1; x := 1; x := 1; x := 1; x := 1;                    00242001
186                  x := 1; x := 1; x := 1; x := 1; x := 1;                    00243001
191             'END';                                                          00244001
192        #TT[case] := CPUTIM;                                                 00245001
193                                                                             00246001
193        case := case + 1;                                                    00247001
194             'COMMENT' Case 04;                                              00248001
194        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                 00249001
194             'BEGIN'                                                         00250001
194                  x := y; x := y; x := y; x := y;                            00251001
198                  x := y; x := y; x := y; x := y;                            00252001
202                  x := y; x := y; x := y; x := y;                            00253001
206                  x := y;                                                    00254001
207             'END';                                                          00255001
208        #TT[case] := CPUTIM;                                                 00256001
209                                                                             00257001
209        case := case + 1;                                                    00258001
210             'COMMENT' Case 05;                                              00259001
210        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                 00260001
210             'BEGIN'                                                         00261001
210                  x := y + z; x := y + z; x := y + z; x := y + z;            00262001
214                  x := y + z; x := y + z; x := y + z; x := y + z;            00263001
218                  x := y + z; x := y + z;                                    00264001
220             'END';                                                          00265001
221        #TT[case] := CPUTIM;                                                 00266001
222                                                                             00267001
222        case := case + 1;                                                    00268001
223             'COMMENT' Case 06;                                              00269001
223        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                 00270001
223             'BEGIN'                                                         00271001
223                  x := y * z; x := y * z; x := y * z; x := y * z;            00272001
227                  x := y * z; x := y * z; x := y * z; x := y * z;            00273001
231                  x := y * z; x := y * z;                                    00274001
233             'END';                                                          00275001
234        #TT[case] := CPUTIM;                                                 00276001
235                                                                             00277001
235        case := case + 1;                                                    00278001
236             'COMMENT' Case 07;                                              00279001
236        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                 00280001
236             'BEGIN'                                                         00281001
236                  x := y/z; x := y/z; x := y/z; x := y/z;                    00282001
```

```
 SC     SOURCE STATEMENT

240                 x := y/z; x := y/z; x := y/z; x := y/z;                  00283001
244                 x := y/z; x := y/z;                                      00284001
246            'END';                                                        00285001
247       #TT[case] := CPUTIM;                                               00286001
248                                                                          00287001
248       case := case + 1;                                                  00288001
249            'COMMENT' Case 08;                                            00289001
249       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00290001
249            'BEGIN'                                                       00291001
249                 k := 1; k := 1; k := 1; k := 1;                          00292001
253                 k := 1; k := 1; k := 1; k := 1;                          00293001
257                 k := 1; k := 1;                                          00294001
259            'END';                                                        00295001
260       #TT[case] := CPUTIM;                                               00296001
261                                                                          00297001
261       case := case + 1;                                                  00298001
262            'COMMENT' Case 09;                                            00299001
262       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00300001
262            'BEGIN'                                                       00301001
262                 k := 1.0; k := 1.0; k := 1.0; k := 1.0;                  00302001
266                 k := 1.0; k := 1.0; k := 1.0; k := 1.0;                  00303001
270                 k := 1.0; k := 1.0;                                      00304001
272            'END';                                                        00305001
273       #TT[case] := CPUTIM;                                               00306001
274                                                                          00307001
274       case := case + 1;                                                  00308001
275            'COMMENT' Case 10;                                            00309001
275       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00310001
275            'BEGIN'                                                       00311001
275                 k := l + m; k := l + m;                                  00312001
277                 k := l + m; k := l + m;                                  00313001
279                 k := l + m; k := l + m;                                  00314001
281                 k := l + m; k := l + m;                                  00315001
283                 k := l + m; k := l + m;                                  00316001
285            'END';                                                        00317001
286       #TT[case] := CPUTIM;                                               00318001
287                                                                          00319001
287       case := case + 1;                                                  00320001
288            'COMMENT' Case 11;                                            00321001
288       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00322001
288            'BEGIN'                                                       00323001
288                 k := l * m; k := l * m; k := l * m;                      00324001
291                 k := l * m; k := l * m; k := l * m;                      00325001
294                 k := l * m; k := l * m; k := l * m;                      00326001
297                 k := l * m;                                              00327001
298            'END';                                                        00328001
299       #TT[case] := CPUTIM;                                               00329001
300                                                                          00330001
300       case := case + 1;                                                  00331001
301            'COMMENT' Case 12;                                            00332001
301       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00333001
301            'BEGIN'                                                       00334001
301                 k := l / m; k := l / m; k := l / m;                      00335001
304                 k := l / m; k := l / m; k := l / m;                      00336001
```

```
             SC     SOURCE STATEMENT

            307                 k := l / m; k := l / m; k := l / m;                    00337001
            310                 k := l / m;                                            00338001
            311            'END';                                                      00339001
            312       #TT[case] := CPUTIM;                                             00340001
            313                                                                        00341001
            313       case := case + 1;                                                00342001
            314            'COMMENT' Case 13;                                          00343001
            314       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00344001
            314            'BEGIN'                                                     00345001
            314                 k := l; k := l; k := l;                                00346001
            317                 k := l; k := l; k := l;                                00347001
            320                 k := l; k := l; k := l;                                00348001
            323                 k := l; k := l; k := l;                                00349001
            326                 k := l;                                                00350001
            327            'END';                                                      00351001
            328       #TT[case] := CPUTIM;                                             00352001
            329                                                                        00353001
            329       case := case + 1;                                                00354001
            330            'COMMENT' Case 14;                                          00355001
            330       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00356001
            330            'BEGIN'                                                     00357001
            330                 x := l; x := l; x := l; x := l;                        00358001
            334                 x := l; x := l; x := l; x := l;                        00359001
            338                 x := l; x := l;                                        00360001
            340            'END';                                                      00361001
            341       #TT[case] := CPUTIM;                                             00362001
            342                                                                        00363001
            342       case := case + 1;                                                00364001
            343            'COMMENT' Case 15;                                          00365001
            343       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00366001
            343            'BEGIN'                                                     00367001
            343                 l := y; l := y; l := y;                                00368001
            346                 l := y; l := y; l := y;                                00369001
            349                 l := y; l := y; l := y;                                00370001
            352                 l := y;                                                00371001
            353            'END';                                                      00372001
            354       #TT[case] := CPUTIM;                                             00373001
            355                                                                        00374001
            355       case := case + 1;                                                00375001
            356            'COMMENT' Case 16;                                          00376001
            356       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00377001
            356            'BEGIN'                                                     00378001
            356                 x := y ** 2; x := y ** 2;                              00379001
            358                 x := y ** 2; x := y ** 2;                              00380001
            360                 x := y ** 2; x := y ** 2;                              00381001
            362                 x := y ** 2; x := y ** 2;                              00382001
            364                 x := y ** 2; x := y ** 2;                              00383001
            366            'END';                                                      00384001
            367       #TT[case] := CPUTIM;                                             00385001
            368                                                                        00386001
            368       case := case + 1;                                                00387001
            369            'COMMENT' Case 17;                                          00388001
            369       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00389001
            369            'BEGIN'                                                     00390001
```

```
 SC     SOURCE STATEMENT

369                 x := y ** 3; x := y ** 3;                                00391001
371                 x := y ** 3; x := y ** 3;                                00392001
373                 x := y ** 3; x := y ** 3;                                00393001
375                 x := y ** 3; x := y ** 3;                                00394001
377                 x := y ** 3; x := y ** 3;                                00395001
379            'END';                                                        00396001
380       #TT[case] := CPUTIM;                                               00397001
381                                                                          00398001
381       case := case + 1;                                                  00399001
382            'COMMENT' Case 18;                                            00400001
382       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00401001
382            'BEGIN'                                                       00402001
382                 x := y ** z;       x := y ** z;                          00403001
384                 x := y ** z;       x := y ** z;                          00404001
386                 x := y ** z;       x := y ** z;                          00405001
388                 x := y ** z;       x := y ** z;                          00406001
390                 x := y ** z;       x := y ** z;                          00407001
392            'END';                                                        00408001
393       #TT[case] := CPUTIM;                                               00409001
394                                                                          00410001
394       case := case + 1;                                                  00411001
395            'COMMENT' Case 19;                                            00412001
395       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00413001
395            'BEGIN'                                                       00414001
395                 e1[1] := 1; e1[1] := 1; e1[1] := 1;                      00415001
398                 e1[1] := 1; e1[1] := 1; e1[1] := 1;                      00416001
401                 e1[1] := 1; e1[1] := 1; e1[1] := 1;                      00417001
404                 e1[1] := 1;                                              00418001
405            'END';                                                        00419001
406       #TT[case] := CPUTIM;                                               00420001
407                                                                          00421001
407       case := case + 1;                                                  00422001
408            'COMMENT' Case 20;                                            00423001
408       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00424001
408            'BEGIN'                                                       00425001
408                 e2[1,1]:= 1; e2[1,1]:= 1; e2[1,1]:= 1;                   00426001
411                 e2[1,1]:= 1; e2[1,1]:= 1; e2[1,1]:= 1;                   00427001
414                 e2[1,1]:= 1; e2[1,1]:= 1; e2[1,1]:= 1;                   00428001
417                 e2[1,1]:= 1; e2[1,1]:= 1;                                00429001
419            'END';                                                        00430001
420       #TT[case] := CPUTIM;                                               00431001
421                                                                          00432001
421       case := case + 1;                                                  00433001
422            'COMMENT' Case 21;                                            00434001
422       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                               00435001
422            'BEGIN'                                                       00436001
422                 e3[1,1,1]:= 1; e3[1,1,1] := 1;                           00437001
424                 e3[1,1,1]:= 1; e3[1,1,1] := 1;                           00438001
426                 e3[1,1,1]:= 1; e3[1,1,1] := 1;                           00439001
428                 e3[1,1,1]:= 1; e3[1,1,1] := 1;                           00440001
430                 e3[1,1,1]:= 1; e3[1,1,1] := 1;                           00441001
432            'END';                                                        00442001
433       #TT[case] := CPUTIM;                                               00443001
434                                                                          00444001
```

```
              SC     SOURCE STATEMENT

              434        case := case + 1;                                          00445001
              435             'COMMENT' Case 22;                                    00446001
              435        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00447001
              435             'BEGIN'                                               00448001
              435                  l := e1[1]; l := e1[1]; l := e1[1];              00449001
              438                  l := e1[1]; l := e1[1]; l := e1[1];              00450001
              441                  l := e1[1]; l := e1[1]; l := e1[1];              00451001
              444                  l := e1[1];                                      00452001
              445             'END';                                                00453001
              446        #TT[case] := CPUTIM;                                       00454001
              447                                                                   00455001
              447        case := case + 1;                                          00456001
              448             'COMMENT' Case 23;                                    00457001
              448        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00458001
              448             'BEGIN'                                               00459001
              448                  'BEGIN'                                          00460001
              448                       'REAL' a;                                   00461001
              449                  'END';                                           00462001
              450                  'BEGIN'                                          00463001
              450                       'REAL' a;                                   00464001
              451                  'END';                                           00465001
              452                  'BEGIN'                                          00466001
              452                       'REAL' a;                                   00467001
              453                  'END';                                           00468001
              454                  'BEGIN'                                          00469001
              454                       'REAL' a;                                   00470001
              455                  'END';                                           00471001
              456                  'BEGIN'                                          00472001
              456                       'REAL' a;                                   00473001
              457                  'END';                                           00474001
              458             'END';                                                00475001
              459        #TT[case] := CPUTIM;                                       00476001
              460                                                                   00477001
              460        case := case + 1;                                          00478001
              461             'COMMENT' Case 24;                                    00479001
              461        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00480001
              461             'BEGIN'                                               00481001
              461                  'BEGIN'                                          00482001
              461                       'ARRAY' a[1:1];                             00483001
              462                  'END';                                           00484001
              463             'END';                                                00485001
              464        #TT[case] := CPUTIM;                                       00486001
              465                                                                   00487001
              465        case := case + 1;                                          00488001
              466             'COMMENT' Case 25;                                    00489001
              466        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00490001
              466             'BEGIN'                                               00491001
              466                  'BEGIN'                                          00492001
              466                       'ARRAY' a[1:500];                           00493001
              467                  'END';                                           00494001
              468             'END';                                                00495001
              469        #TT[case] := CPUTIM;                                       00496001
              470                                                                   00497001
              470        case := case + 1;                                          00498001
```

```
              SC     SOURCE STATEMENT

              471            'COMMENT' Case 26;                                    00499001
              471       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00500001
              471            'BEGIN'                                               00501001
              471                'BEGIN'                                           00502001
              471                     'ARRAY' a[1:1,1:1];                          00503001
              472                'END';                                            00504001
              473            'END';                                                00505001
              474       #TT[case] := CPUTIM;                                       00506001
              475                                                                  00507001
              475       case := case + 1;                                          00508001
              476            'COMMENT' Case 27;                                    00509001
              476       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00510001
              476            'BEGIN'                                               00511001
              476                'BEGIN'                                           00512001
              476                     'ARRAY' a[1:1,1:1,1:1];                      00513001
              477                'END';                                            00514001
              478            'END';                                                00515001
              479       #TT[case] := CPUTIM;                                       00516001
              480                                                                  00517001
              480       case := case + 1;                                          00518001
              481            'COMMENT' Case 28;                                    00519001
              481       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00520001
              481            'BEGIN'                                               00521001
              481                'GOTO' l0;                                        00522001
              482                l0: ;                                             00523001
              483                'GOTO' l1;                                        00524001
              484                l1: ;                                             00525001
              485                'GOTO' l2;                                        00526001
              486                l2: ;                                             00527001
              487                'GOTO' l3;                                        00528001
              488                l3: ;                                             00529001
              489                'GOTO' l4;                                        00530001
              490                l4: ;                                             00531001
              491                'GOTO' l5;                                        00532001
              492                l5: ;                                             00533001
              493                'GOTO' l6;                                        00534001
              494                l6: ;                                             00535001
              495                'GOTO' l7;                                        00536001
              496                l7: ;                                             00537001
              497                'GOTO' l8;                                        00538001
              498                l8: ;                                             00539001
              499                'GOTO' l9;                                        00540001
              500                l9: ;                                             00541001
              501                p0;                                               00542001
              502            'END';                                                00543001
              503       #TT[case] := CPUTIM;                                       00544001
              504                                                                  00545001
              504       case := case + 1;                                          00546001
              505            'COMMENT' Case 29;                                    00547001
              505       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                       00548001
              505            'BEGIN'                                               00549001
              505                'BEGIN'                                           00550001
              505                     'SWITCH' s := q; 'GOTO' s[1];                00551001
              507                     q:  ;                                        00552001
```

```
 SC     SOURCE STATEMENT

508                 'END';                                                  00553001
509            'END';                                                       00554001
510        #TT[case] := CPUTIM;                                             00555001
511                                                                         00556001
511        case := case + 1;                                                00557001
512             'COMMENT' Case 30;                                          00558001
512        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00559001
512             'BEGIN'                                                     00560001
512                 x := sin(y);                                            00561001
513                 x := sin(y);                                            00562001
514                 x := sin(y);                                            00563001
515                 x := sin(y);                                            00564001
516                 x := sin(y);                                            00565001
517                 x := sin(y);                                            00566001
518                 x := sin(y);                                            00567001
519                 x := sin(y);                                            00568001
520                 x := sin(y);                                            00569001
521                 x := sin(y);                                            00570001
522            'END';                                                       00571001
523        #TT[case] := CPUTIM;                                             00572001
524                                                                         00573001
524        case := case + 1;                                                00574001
525             'COMMENT' Case 31;                                          00575001
525        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00576001
525             'BEGIN'                                                     00577001
525                 x := cos(y);                                            00578001
526                 x := cos(y);                                            00579001
527                 x := cos(y);                                            00580001
528                 x := cos(y);                                            00581001
529                 x := cos(y);                                            00582001
530                 x := cos(y);                                            00583001
531                 x := cos(y);                                            00584001
532                 x := cos(y);                                            00585001
533                 x := cos(y);                                            00586001
534                 x := cos(y);                                            00587001
535            'END';                                                       00588001
536        #TT[case] := CPUTIM;                                             00589001
537                                                                         00590001
537        case := case + 1;                                                00591001
538             'COMMENT' Case 32;                                          00592001
538        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00593001
538             'BEGIN'                                                     00594001
538                 x := abs(y); x := abs(y); x := abs(y);                  00595001
541                 x := abs(y); x := abs(y); x := abs(y);                  00596001
544                 x := abs(y); x := abs(y); x := abs(y);                  00597001
547                 x := abs(y);                                            00598001
548            'END';                                                       00599001
549        #TT[case] := CPUTIM;                                             00600001
550                                                                         00601001
550        case := case + 1;                                                00602001
551             'COMMENT' Case 33;                                          00603001
551        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                             00604001
551             'BEGIN'                                                     00605001
551                 x := exp(y);                                            00606001
```

```
 SC     SOURCE STATEMENT

552                 x := exp(y);                                    00607001
553                 x := exp(y);                                    00608001
554                 x := exp(y);                                    00609001
555                 x := exp(y);                                    00610001
556                 x := exp(y);                                    00611001
557                 x := exp(y);                                    00612001
558                 x := exp(y);                                    00613001
559                 x := exp(y);                                    00614001
560                 x := exp(y);                                    00615001
561            'END';                                               00616001
562       #TT[case] := CPUTIM;                                      00617001
563                                                                 00618001
563       case := case + 1;                                         00619001
564            'COMMENT' Case 34;                                   00620001
564       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                      00621001
564            'BEGIN'                                              00622001
564                 x := ln(y);                                     00623001
565                 x := ln(y);                                     00624001
566                 x := ln(y);                                     00625001
567                 x := ln(y);                                     00626001
568                 x := ln(y);                                     00627001
569                 x := ln(y);                                     00628001
570                 x := ln(y);                                     00629001
571                 x := ln(y);                                     00630001
572                 x := ln(y);                                     00631001
573                 x := ln(y);                                     00632001
574            'END';                                               00633001
575       #TT[case] := CPUTIM;                                      00634001
576                                                                 00635001
576       case := case + 1;                                         00636001
577            'COMMENT' Case 35;                                   00637001
577       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                      00638001
577            'BEGIN'                                              00639001
577                 x := sqrt(y);                                   00640001
578                 x := sqrt(y);                                   00641001
579                 x := sqrt(y);                                   00642001
580                 x := sqrt(y);                                   00643001
581                 x := sqrt(y);                                   00644001
582                 x := sqrt(y);                                   00645001
583                 x := sqrt(y);                                   00646001
584                 x := sqrt(y);                                   00647001
585                 x := sqrt(y);                                   00648001
586                 x := sqrt(y);                                   00649001
587            'END';                                               00650001
588       #TT[case] := CPUTIM;                                      00651001
589                                                                 00652001
589       case := case + 1;                                         00653001
590            'COMMENT' Case 36;                                   00654001
590       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                      00655001
590            'BEGIN'                                              00656001
590                 x := arctan(y);                                 00657001
591                 x := arctan(y);                                 00658001
592                 x := arctan(y);                                 00659001
593                 x := arctan(y);                                 00660001
```

```
   SC     SOURCE STATEMENT

  594                x := arctan(y);                                                    00661001
  595                x := arctan(y);                                                    00662001
  596                x := arctan(y);                                                    00663001
  597                x := arctan(y);                                                    00664001
  598                x := arctan(y);                                                    00665001
  599                x := arctan(y);                                                    00666001
  600           'END';                                                                  00667001
  601       #TT[case] := CPUTIM;                                                        00668001
  602                                                                                   00669001
  602       case := case + 1;                                                           00670001
  603           'COMMENT' Case 37;                                                      00671001
  603       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                        00672001
  603           'BEGIN'                                                                 00673001
  603                x := sign(y); x := sign(y); x := sign(y);                          00674001
  606                x := sign(y); x := sign(y); x := sign(y);                          00675001
  609                x := sign(y); x := sign(y); x := sign(y);                          00676001
  612                x := sign(y);                                                      00677001
  613           'END';                                                                  00678001
  614       #TT[case] := CPUTIM;                                                        00679001
  615                                                                                   00680001
  615       case := case + 1;                                                           00681001
  616           'COMMENT' Case 38;                                                      00682001
  616       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                        00683001
  616           'BEGIN'                                                                 00684001
  616                x := entier(y); x := entier(y);                                    00685001
  618                x := entier(y); x := entier(y);                                    00686001
  620                x := entier(y); x := entier(y);                                    00687001
  622                x := entier(y); x := entier(y);                                    00688001
  624                x := entier(y); x := entier(y);                                    00689001
  626           'END';                                                                  00690001
  627       #TT[case] := CPUTIM;                                                        00691001
  628                                                                                   00692001
  628       case := case + 1;                                                           00693001
  629           'COMMENT' Case 39;                                                      00694001
  629       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                        00695001
  629           'BEGIN'                                                                 00696001
  629                p0;                                                                00697001
  630                p0;                                                                00698001
  631                p0;                                                                00699001
  632                p0;                                                                00700001
  633                p0;                                                                00701001
  634                p0;                                                                00702001
  635                p0;                                                                00703001
  636                p0;                                                                00704001
  637                p0;                                                                00705001
  638                p0;                                                                00706001
  639           'END';                                                                  00707001
  640       #TT[case] := CPUTIM;                                                        00708001
  641                                                                                   00709001
  641       case := case + 1;                                                           00710001
  642           'COMMENT' Case 40;                                                      00711001
  642       'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                                        00712001
  642           'BEGIN'                                                                 00713001
  642                p1(x);                                                             00714001
```

```
 SC     SOURCE STATEMENT

643                 p1(x);                                          00715001
644                 p1(x);                                          00716001
645                 p1(x);                                          00717001
646                 p1(x);                                          00718001
647                 p1(x);                                          00719001
648                 p1(x);                                          00720001
649                 p1(x);                                          00721001
650                 p1(x);                                          00722001
651                 p1(x);                                          00723001
652             'END';                                              00724001
653         #TT[case] := CPUTIM;                                    00725001
654                                                                 00726001
654         case := case + 1;                                       00727001
655             'COMMENT' Case 41;                                  00728001
655         'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00729001
655             'BEGIN'                                             00730001
655                 p2(x,y);                                        00731001
656                 p2(x,y);                                        00732001
657                 p2(x,y);                                        00733001
658                 p2(x,y);                                        00734001
659                 p2(x,y);                                        00735001
660                 p2(x,y);                                        00736001
661                 p2(x,y);                                        00737001
662                 p2(x,y);                                        00738001
663                 p2(x,y);                                        00739001
664                 p2(x,y);                                        00740001
665             'END';                                              00741001
666         #TT[case] := CPUTIM;                                    00742001
667                                                                 00743001
667         case := case + 1;                                       00744001
668             'COMMENT' Case 42;                                  00745001
668         'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00746001
668             'BEGIN'                                             00747001
668                 p3(x,y,z);                                      00748001
669                 p3(x,y,z);                                      00749001
670                 p3(x,y,z);                                      00750001
671                 p3(x,y,z);                                      00751001
672                 p3(x,y,z);                                      00752001
673                 p3(x,y,z);                                      00753001
674                 p3(x,y,z);                                      00754001
675                 p3(x,y,z);                                      00755001
676                 p3(x,y,z);                                      00756001
677                 p3(x,y,z);                                      00757001
678             'END';                                              00758001
679         #TT[case] := CPUTIM;                                    00759001
680                                                                 00760001
680         case := case + 1;                                       00761001
681             'COMMENT' Case 43;                                  00762001
681         'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00763001
681             ;                                                   00764001
682         'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00765001
682             ;                                                   00766001
683         'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00767001
683             ;                                                   00768001
```

```
              SC     SOURCE STATEMENT

              684        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00769001
              684             ;                                                  00770001
              685        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00771001
              685             ;                                                  00772001
              686        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00773001
              686             ;                                                  00774001
              687        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00775001
              687             ;                                                  00776001
              688        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00777001
              688             ;                                                  00778001
              689        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00779001
              689             ;                                                  00780001
              690        'FOR' i := 1 'STEP' 1 'UNTIL' n 'DO'                    00781001
              690             ;                                                  00782001
              691        #TT[case] := CPUTIM;                                    00783001
              692                                                                00784001
              692        printt;                                                 00785001
              693                                                                00786001
              693        'END';                                                  00787001
```

```
                                        IDENTIFIER TABLE                                                PAGE  16
PBN SC     PBN      NAME   TYPE  DM DSP      NAME   TYPE  DM DSP      NAME   TYPE  DM DSP
           SURR                  PR LN                    PR LN                    PR LN

001 00000 000       CASE   I        03C      CPUTIM I P C 00 084      E1     I A   01 040
                    E2     I A   02 058      E3     I A   03 074      I      I        024
                    J      I        028      K      I        030      L      I        034
                    L0      L       088      L1      L       08C      L2      L       090
                    L3      L       094      L4      L       098      L5      L       09C
                    L6      L       0A0      L7      L       0A4      L8      L       0A8
                    L9      L       0AC      M      I        038      N      I        02C
                    P0       P   00 070      P1       P   01 074      P2       P   02 078
                    P3       P   03 07C      PRINTT   P   00 080      X      R        018
                    Y      R        01C      Z      R        020      #TT    I A   01 094

002 00003 001

003 00005 001       X      R  V     018

004 00009 001       X      R  V     018      Y      R  V     020

005 00013 001       X      R  V     018      Y      R  V     020      Z      R  V     028

006 00018 001       I      I        018      LOOP   R        024      MIX    R        020
                    X      R        01C

007 00152 001       CPUTIM I P C 00 084

008 00448 001       A      R        018

009 00450 001       A      R        018

010 00452 001       A      R        018

011 00454 001       A      R        018

012 00456 001       A      R        018

013 00461 001       A      R A   01 018

014 00466 001       A      R A   01 018

015 00471 001       A      R A   02 018

016 00476 001       A      R A   03 018

017 00505 001       Q       L       0B4      S       S    01 0B0
```

```
                                   STORAGE REQUIREMENTS (DECIMAL)                                      PAGE  17


OBJECT MODULE SIZE 29752 BYTES
DATA STORAGE AREA SIZES
PBN    BYTES        PBN    BYTES        PBN    BYTES        PBN    BYTES        PBN    BYTES
001      348        002       24        003       32        004       40        005       48
006       92        007       32        008       28        009       28        010       28
011       28        012       28        013       56        014       56        015       64
016       72        017       24
```

```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LIST,LET
         DEFAULT OPTION(S) USED -  SIZE=(1015808,516096)

                                      CROSS REFERENCE TABLE

 CONTROL SECTION                      ENTRY

   NAME    ORIGIN  LENGTH               NAME    LOCATION     NAME    LOCATION     NAME    LOCATION     NAME    LOCATION
 PROGRAM       00    7438
                                      IHIDSTAB    71E8    IHIENTIF    742C

 IHIFRIXP*   7438      A0
                                      IHIFRI      7438

 IHIOINTE*   74D8     1F8
                                      IHIOINAR    74D8    IHIOINTG    7518

 IHIOSTRG*   76D0     148
 IHISATAN*   7818      E0
                                      IHISAT      7818

 IHISEXPT*   78F8     138
                                      IHISEX      78F8
```

```
  IHISLOGM*   7A30      E8
                                  IHISLO      7A30
  IHISSCSN*   7B18     140
                                  IHISSCC     7B18    IHISSCS     7B52
  IHISSQRT*   7C58      C8
                                  IHISSQ      7C58
  IHISYSCT*   7D20     780
  IHIFRRXP*   84A0      F8
                                  IHIFRR      84A0
  IHIFSARA*   8598     E70
                                  IHIFSAIN    9394
  IHIFSARB*   9408     690
  IHIIORTN*   9A98     D70
                                  IHIIOROQ    9A98    IHIIOROP    9B7E    IHIIORNX    9F4C    IHIIORCL    A194
                                  IHIIORCP    A33E    IHIIORGP    A440    IHIIORCN    A444    IHIIOREN    A4A4
                                  IHIIOREV    A522    IHIIORED    A5B8    IHIIORCI    A690    IHIIORER    A714
  IHIERROR*   A808     6E8
  IHIERMSG*   AEF0     9B8
                                  IHIERM01    AFA0


  LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION            LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION
     6D88           IHISYSCT        IHISYSCT                  6D8C           IHISSQ          IHISSQRT
     6D90           IHISSCS         IHISSCSN                  6D94           IHISSCC         IHISSCSN
     6D98           IHISAT          IHISATAN                  6D9C           IHISLO          IHISLOGM
     6DA0           IHISEX          IHISEXPT                  6DC8           IHIOINTG        IHIOINTE
     6DDC           IHIOSTRG        IHIOSTRG                  6DEC           IHIFRI          IHIFRIXP
     6DF0           IHIFRR          IHIFRRXP                  8590           IHISEX          IHISEXPT
     858C           IHISLO          IHISLOGM                  93DC           IHIFSARB        IHIFSARB
     8830           IHIERROR        IHIERROR                  9390           IHIIORER        IHIIORTN
     93F0           IHIIORCP        IHIIORTN                  8844           IHIIORCP        IHIIORTN
     938C           IHIIORGP        IHIIORTN                  9388           IHIIOREN        IHIIORTN
     9384           IHIIOROQ        IHIIORTN                  9378           IHIIOREV        IHIIORTN
     9370           IHIIORCI        IHIIORTN                  93F8           IHIIORNX        IHIIORTN
     937C           IHIIORNX        IHIIORTN                  8849           IHIIORNX        IHIIORTN
     93FC           IHIIORCL        IHIIORTN                  9374           IHIIORCL        IHIIORTN
     93F4           IHIIOROP        IHIIORTN                  9380           IHIIOROP        IHIIORTN
     8840           IHIIOROP        IHIIORTN                  93EC           IHIENTIF        PROGRAM
     8644           IHIDSTAB        PROGRAM                   940D           IHIFSARA        IHIFSARA
     AED8           IHIERM01        IHIERMSG                  AED4           IHIERMSG        IHIERMSG

 ENTRY ADDRESS     9394

 TOTAL LENGTH      B8A8
****GO        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS         0.
```

```
CPU                                     EXTERNAL SYMBOL DICTIONARY                                      PAGE    1

SYMBOL   TYPE  ID   ADDR  LENGTH LDID                                                          ASM 0201 13.38 08/17/12

CPUTIM    SD  0001 000000 0000AC
```

```
CPU      CPUTIM - ALGOL F FUNCTION TO RETURN ACCUMULATED STEP CPU TIME                                  PAGE    2

  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                        ASM 0201 13.38 08/17/12

                                    2 *                                                                  00795001
                                    3 *        FUNCTION -                                                00796001
                                    4 *        RETURN THE ACCUMULATED STEP CPU TIME IN MICROSECONDS WHEN  00797001
                                    5 *        CALLED AS AN ALGOL F FUNCTION DECLARED AS -               00798001
                                    6 *        'INTEGER' 'PROCEDURE' CPUTIM; 'CODE';                     00799001
                                    7 *        THIS ALGOL F FUNCTION IS DESIGNED TO OPERATE IN THE       00800001
                                    8 *        MVS 3.8 ENVIRONMENT                                       00801001
                                    9 *                                                                  00802001
                                   10 *        ENVIRONMENT -                                             00803001
                                   11 *        SEE OS/360 ALGOL F PROGRAMMERS GUIDE GC33-4000 FOR A      00804001
                                   12 *        DESCRIPTION OF THE INVOKING ENVIRONMENT                   00805001
                                   13 *                                                                  00806001
                                   14 *        STATUS -                                                  00807001
                                   15 *        THIS FUNCTION IS SERIALLY REUSEABLE BUT NOT               00808001
                                   16 *        RECURSIVE OR REENTRANT                                    00809001
                                   17 *                                                                  00810001
000000                             18 CPUTIM   CSECT                                                    00811001
                                   19 *                                                                  00812001
                                   20 *        FSA OFFSETS                                               00813001
                                   21 *                                                                  00814001
                          000D4    22 CAP1     EQU   X'0D4'                                              00815001
                          000D8    23 CAP2     EQU   X'0D8'                                              00816001
                          000DC    24 PROLOGFP EQU   X'0DC'                                              00817001
                          000E4    25 RETPROG  EQU   X'0E4'                                              00818001
                          000E8    26 EPILOGP  EQU   X'0E8'                                              00819001
                          000F4    27 CSWE1    EQU   X'0F4'                                              00820001
                          00118    28 VALUCALL EQU   X'118'                                              00821001
                                   29 *                                                                  00822001
                          00000    30          USING PBTAB,R11                                           00823001
                                   31 *                                                                  00824001
                                   32 *        PROGRAM BLOCK TABLE                                       00825001
                                   33 *                                                                  00826001
000000 00000000                    34 PBTAB    DC    A(0)                                                00827001
000004 C3D7E4E3                    35          DC    CL4'CPUT'           NAME                            00828001
000008 00000000                    36          DC    A(0)                                                00829001
00000C 0020                        37          DC    H'32'               L'DSA FOR TYPED PROCEDURE (FUNCTION) 00830001
00000E 08                          38          DC    X'08'               TYPE PROCEDURE INTEGER          00831001
00000F 00                          39          DC    AL1(0)              NUMBER OF FORMAL PARAMETERS     00832001
                                   40 *                                                                  00833001
                                   41 *        ENTRY BLOCK                                               00834001
                                   42 *                                                                  00835001
000010 00000000                    43 CPUENT   DC    A(PBTAB)                                            00836001
000014 00000000                    44          DC    A(0)                                                00837001
000018 0000001C                    45          DC    A(CPUCODE)                                          00838001
                                   46 *                                                                  00839001
                                   47 *        ESTABLISH ADDRESSABILITY TO THE PSA, ASCB                 00840001
                                   48 *                                                                  00841001
                          00000    49          USING PSA,R0                                              00842001
                          00000    50          USING ASCB,R4                                             00843001
                                   51 *                                                                  00844001
00001C 47F0 B036      00036        52 CPUCODE  B     CPUCODEA                                            00845001
                                   53 *                                                                  00846001
000020 15                          54          DC    AL1(L'ID)                                           00847001
                                   55 ID       DC    C'CPUTIM &SYSDATE &SYSTIME'                         00848001
000021 C3D7E4E3C9D440F0            56+ID       DC    C'CPUTIM 08/17/12 13.38'                            00848001
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                      ASM 0201 13.38 08/17/12

                                     57 *                                                                    00849001
000036 90EA B070      00070          58 CPUCODEA STM   R14,R10,SAVEAREA+12                                     00850001
00003A 5840 0224      00224          59          L     R4,PSAAOLD          R4 -> CURRENT ASCB               00851001
00003E 9823 4040      00040          60          LM    R2,R3,ASCBEJST      ACCUM STEP TCB CPU TIME          00852001
000042 5E30 40CC      000CC          61          AL    R3,ASCBSRBT+4       ADD ACCUM SRB CPU TIME           00853001
000046 47C0 B04E      0004E          62          BC    12,CPUCODEB         OVERFLOW ? NO, BRANCH            00854001
00004A 4120 2001      00001          63          LA    R2,1(,R2)           YES, ADD CARRY                   00855001
00004E 5A20 40C8      000C8          64 CPUCODEB A     R2,ASCBSRBT         TOTAL CPU TIME (TCB + SRB)       00856001
000052 8C20 000C      0000C          65          SRDL  R2,(63-51)          SHIFT TO CONVERT TO MICROSECONDS 00857001
000056 5030 A018      00018          66          ST    R3,24(,R10)         STORE RESULT IN DSA+24           00858001
00005A 98EA B070      00070          67          LM    R14,R10,SAVEAREA+12                              00859001
00005E 47F0 D0E8      000E8          68          B     EPILOGP(,R13)       RETURN VIA EPILOG CODE IN FSA    00860001
                                     69 *                                                                    00861001
000062 0000
000064 0000000000000000              70 SAVEAREA DC    18F'0'                                                00862001
                                     71 *                                                                    00863001
                                     72          PRINT NOGEN                                               00864001
                                     73 *                                                                    00865001
                                     74 *        PREFIXED SAVE AREA                                        00866001
                                     75 *                                                                    00867001
                                     76          IHAPSA                                                    00868001
                                    544 *                                                                    00869001
                                    545 *        ADDRESS SPACE CONTROL BLOCK                               00870001
                                    546 *                                                                    00871001
                                    547          IHAASCB                                                   00872001
                                    780 *                                                                    00873001
                                    781          PRINT GEN                                                 00874001
                                    782 *                                                                    00875001
                                    783 *        REGISTER EQUATES                                          00876001
                                    784 *                                                                    00877001
                                    785          IEZREGS                                                   00878001
                          00000     786+R0       EQU   0                                                   00000600
                          00001     787+R1       EQU   1                                                   00000700
                          00002     788+R2       EQU   2                                                   00000800
                          00003     789+R3       EQU   3                                                   00000900
                          00004     790+R4       EQU   4                                                   00001000
                          00005     791+R5       EQU   5                                                   00001100
                          00006     792+R6       EQU   6                                                   00001200
                          00007     793+R7       EQU   7                                                   00001300
                          00008     794+R8       EQU   8                                                   00001400
                          00009     795+R9       EQU   9                                                   00001500
                          0000A     796+R10      EQU   10                                                  00001600
                          0000B     797+R11      EQU   11                                                  00001700
                          0000C     798+R12      EQU   12                                                  00001800
                          0000D     799+R13      EQU   13                                                  00001900
                          0000E     800+R14      EQU   14                                                  00002000
                          0000F     801+R15      EQU   15                                                  00002100
                                    802 *                                                                    00879001
000010                              803          END CPUENT                                                00880001
```

```
CPU                                          RELOCATION DICTIONARY                                          PAGE    4

POS.ID   REL.ID   FLAGS   ADDRESS                                                                ASM 0201 13.38 08/17/12

 0001     0001      0C     000010
 0001     0001      0C     000018
```

```
CPU                                          CROSS-REFERENCE                                                PAGE    5

SYMBOL    LEN   VALUE   DEFN    REFERENCES                                                     ASM 0201 13.38 08/17/12

ASCB     00001 00000000 00564  00050
ASCBEJST 00008 00000040 00619  00060
ASCBSRBT 00008 000000C8 00778  00061 00064
CPUCODE  00004 0000001C 00052  00045
CPUCODEA 00004 00000036 00058  00052
CPUCODEB 00004 0000004E 00064  00062
CPUENT   00004 00000010 00043  00803
EPILOGP  00001 000000E8 00026  00068
FLCEICOD 00002 00000086 00150  00151
FLCENPSW 00004 00000058 00129  00131
FLCEOPSW 00008 00000018 00112  00113
FLCINPSW 00004 00000078 00142  00144
FLCIOPSW 00008 00000038 00120  00121
FLCIPPSW 00008 00000000 00103  00106
FLCMNPSW 00004 00000070 00138  00141
FLCMOPSW 00008 00000030 00118  00119
FLCPICOD 00002 0000008E 00170  00171
FLCPIILC 00001 0000008D 00164  00169
FLCPNPSW 00004 00000068 00135  00137
FLCPOPSW 00008 00000028 00116  00117
FLCSNPSW 00004 00000060 00132  00134
FLCSOPSW 00008 00000020 00114  00115
FLCSVCN  00002 0000008A 00160  00161
FLCSVILC 00001 00000089 00155  00159
FLCTIMER 00004 00000050 00126  00127
ID       00021 00000021 00056  00054
PBTAB    00004 00000000 00034  00030 00043
PSA      00001 00000000 00101  00049 00313 00318
PSAAOLD  00004 00000224 00250  00059
PSAIPCDM 00001 0000026C 00319  00318
PSAIPCRM 00001 00000264 00314  00313
PSATNEW  00004 00000218 00246  00247
R0       00001 00000000 00786  00049
R10      00001 0000000A 00796  00058 00066 00067
R11      00001 0000000B 00797  00030
R13      00001 0000000D 00799  00068
R14      00001 0000000E 00800  00058 00067
R2       00001 00000002 00788  00060 00063 00063 00064 00065
R3       00001 00000003 00789  00060 00061 00066
R4       00001 00000004 00790  00050 00059
SAVEAREA 00004 00000064 00070  00058 00067
```

```
CPU                                          ASSEMBLER DIAGNOSTICS AND STATISTICS                           PAGE    6

                                                                                                ASM 0201 13.38 08/17/12

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
HIGHEST SEVERITY WAS    0
OPTIONS FOR THIS ASSEMBLY
  ALIGN, ALOGIC, BUFSIZE(STD), DECK, ESD, FLAG(0), LINECOUNT(55), LIST, NOMCALL, YFLAG, WORKSIZE(2097152)
  NOMLOGIC, NONUMBER, OBJECT, NORENT, RLD, NOSTMT, NOLIBMAC, NOTERMINAL, NOTEST, XREF(SHORT)
  SYSPARM()
WORK FILE BUFFER SIZE/NUMBER =19066/ 1
TOTAL RECORDS READ FROM SYSTEM INPUT         88
TOTAL RECORDS READ FROM SYSTEM LIBRARY      762
TOTAL RECORDS PUNCHED                         7
TOTAL RECORDS PRINTED                       172
```

```
 F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED XREF,LET,LIST,NCAL
          DEFAULT OPTION(S) USED -  SIZE=(1015808,516096)

                                              CROSS REFERENCE TABLE


  CONTROL SECTION                       ENTRY

    NAME    ORIGIN  LENGTH                NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION
  CPUTIM        00      AC


  LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION            LOCATION  REFERS TO SYMBOL  IN CONTROL SECTION

 ENTRY ADDRESS       10

 TOTAL LENGTH        B0
****CPUTIM    DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS         0.
```

```
        Algol F Statement Timings
Picoseconds  Statement
        +14  x := 1.0
       +492  x := 1
       +327  x := y
       +164  x := y + z
       +164  x := y * z
       +163  x := y / z
       +164  k := 1
       +655  k := 1.0
       +164  k := l + m
       +327  k := l * m
      +1638  k := l / m
       +164  k := l
       +492  x := l
       +659  l := y
       +818  x := y ** 2
       +820  x := y ** 3
      +2625  x := y ** z
       +164  e1[1] := 1
       +328  e2[1,1] := 1
       +163  e3[1,1,1] := 1
       +328  l := e1[1]
     +13454  begin real a; end
      +5732  begin real a[1:1]; end
      +8846  begin real a[1:500]; end
      +5896  begin real a[1:1,1:1]; end
      +5898  begin real a[1:1,1:1,1:1]; end
      +3112  begin goto lab; lab: end
      +2783  begin switch s := q; goto s[1]; q: end
      +1638  x := sin(y)
      +1473  x := cos(y)
       +164  x := abs(y)
      +1309  x := exp(y)
      +1310  x := ln(y)
       +982  x := sqrt(y)
      +1475  x := arctan(y)
       +491  x := sign(y)
       +983  x := entier(y)
     +27542  p0
     +31601  p1(x)
     +33736  p2(x,y)
     +35911  p3(x,y,z)
          0  DO Loop overhead

END OF ALGOL PROGRAM EXECUTION
```