NAG Library Routine Document

H02CCF

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

1 Purpose

To supply optional parameters to H02CBF from an external file.

2 Specification

```
SUBROUTINE H02CCF (IOPTNS, INFORM)

INTEGER IOPTNS, INFORM
```

3 Description

H02CCF may be used to supply values for optional parameters to H02CBF. H02CCF reads an external file and each line of the file defines a single optional parameter. It is only necessary to supply values for those parameters whose values are to be different from their default values.

Each optional parameter is defined by a single character string of up to 72 characters, consisting of one or more items. The items associated with a given option must be separated by spaces, or equal signs [=]. Alphabetic characters may be upper or lower case. The string

```
Print level = 1
```

is an example of a string used to set an optional parameter. For each option the string contains one or more of the following items:

– a mandatory keyword;

– a phrase that qualifies the keyword;

– a number that specifies an integer or real value. Such numbers may be up to 16 contiguous characters in Fortran 77's I, F, E or D formats, terminated by a space if this is not the last item on the line.

Blank strings and comments are ignored. A comment begins with an asterisk (*) and all subsequent characters in the string are regarded as part of the comment.

The file containing the options must start with `Begin` and must finish with `End`. An example of a valid options file is:

```
Begin * Example options file
 Print level = 10
End
```

Normally each line of the file is printed as it is read, on the current advisory message unit (see X04ABF), but printing may be suppressed using the keyword **Nolist**. To suppress printing of `Begin`, **Nolist** must be the first option supplied as in the file:

```
Begin
 Nolist
 Print level = 10
End
```

Printing will automatically be turned on again after a call to H02CBF and may be turned on again at any time by you by using the keyword **List**.

Optional parameter settings are preserved following a call to H02CBF, and so the keyword **Defaults** is provided to allow you to reset all the optional parameters to their default values prior to a subsequent call to H02CBF.

A complete list of optional parameters, their abbreviations, synonyms and default values is given in Section 11 in H02CBF.

4 References

None.

5 Parameters

1: IOPTNS – INTEGER *Input*

On entry: the unit number of the options file to be read.

Constraint: $0 \leq \text{IOPTNS} \leq 99$.

2: INFORM – INTEGER *Output*

On exit: contains zero if the options file has been successfully read and a value > 0 otherwise, as indicated below.

INFORM $= 1$
IOPTNS is not in the range $[0, 99]$.

INFORM $= 2$
`Begin` was found, but end-of-file was found before `End` was found.

INFORM $= 3$
end-of-file was found before `Begin` was found.

6 Error Indicators and Warnings

If a line is not recognized as a valid option, then a warning message is output on the current advisory message unit (see X04ABF).

7 Accuracy

Not applicable.

8 Further Comments

H02CDF may also be used to supply optional parameters to H02CBF. Note that if E04NFF/E04NFA is used in the same program as H02CBF, then in general H02CCF will also affect the options used by E04NFF/E04NFA.

9 Example

This example solves the same problem as the example for H02CBF, but in addition illustrates the use of H02CCF and H02CDF to set optional parameters for H02CBF.

In this example the options file read by H02CCF is appended to the data file for the program (see Section 9.2). It would usually be more convenient in practice to keep the data file and the options file separate.

9.1 Program Text

```
    Program h02ccfe

!     H02CCF Example Program Text

!     Mark 24 Release. NAG Copyright 2012.

!     .. Use Statements ..
```

```
      Use nag_library, Only: e04nfu, h02cbf, h02cbu, h02ccf, h02cdf, nag_wp,   &
                             x04abf, x04acf, x04baf
!     .. Implicit None Statement ..
      Implicit None
!     .. Parameters ..
      Integer, Parameter               :: iset = 1, lintvr = 1, mdepth = 30,   &
                                          nin = 5, ninopt = 7, nout = 6
      Character (*), Parameter         :: fname = 'h02ccfe.opt'
!     .. Local Scalars ..
      Real (Kind=nag_wp)               :: obj
      Integer                          :: i, ifail, inform, j, lda, ldh,       &
                                          liwork, lwork, mode, n, nclin,       &
                                          outchn, strtgy
      Character (80)                   :: rec
!     .. Local Arrays ..
      Real (Kind=nag_wp), Allocatable  :: a(:,:), ax(:), bl(:), bu(:),         &
                                          clamda(:), cvec(:), h(:,:), work(:), &
                                          x(:)
      Integer, Allocatable             :: intvar(:), istate(:), iwork(:)
!     .. Executable Statements ..
      Write (rec,99996) 'H02CCF Example Program Results'
      Call x04baf(nout,rec)

!     Skip heading in data file
      Read (nin,*)

      Read (nin,*) n, nclin
      lda = nclin
      ldh = n

      liwork = 2*n + 3 + 2*mdepth

!     LWRK for default problem-type QP2

      If (nclin==0) Then
        lwork = n**2 + 9*n + 4*mdepth
      Else
        lwork = 2*n**2 + 9*n + 5*nclin + 4*mdepth
      End If

      Allocate (a(lda,n),ax(nclin),bl(n+nclin),bu(n+nclin),clamda(n+nclin), &
        cvec(n),h(ldh,n),x(n+nclin),intvar(lintvr),istate(n+nclin), &
        iwork(liwork),work(lwork))

      Read (nin,*)(cvec(i),i=1,n)
      Read (nin,*)((a(i,j),j=1,n),i=1,nclin)
      Read (nin,*)(bl(i),i=1,n+nclin)
      Read (nin,*)(bu(i),i=1,n+nclin)
      Read (nin,*)(x(i),i=1,n)
      Read (nin,*)((h(i,j),j=1,n),i=1,n)

!     Set four options using H02CDF

      Call h02cdf(' Print Level = 1 ')

      Call h02cdf(' Check Frequency = 10 ')

      Call h02cdf(' Crash Tolerance = 0.05 ')

      Call h02cdf(' Infinite Bound Size = 1.0D+25 ')

!     Set the unit number for advisory messages to OUTCHN

      outchn = nout

      Call x04abf(iset,outchn)

!     Open the options file for reading

      mode = 0
```

```
      ifail = 0
      Call x04acf(ninopt,fname,mode,ifail)

!     Read the options file for the remaining options

      Call h02ccf(ninopt,inform)

      If (inform/=0) Then
        Write (rec,99997) 'H02CCF terminated with INFORM = ', inform
        Call x04baf(nout,rec)
        Go To 100
      End If

      strtgy = 2
      intvar(1) = 4

      Call h02cdf('Nolist')

      Call h02cdf('Print Level = 0')

!     Solve the problem

      ifail = 0
      Call h02cbf(n,nclin,a,lda,bl,bu,cvec,h,ldh,e04nfu,intvar,lintvr,mdepth, &
        istate,x,obj,ax,clamda,strtgy,iwork,liwork,work,lwork,h02cbu,ifail)

!     Print out the best integer solution found

      Write (rec,'()')
      Call x04baf(nout,rec)
      Write (rec,'()')
      Call x04baf(nout,rec)
      Write (rec,99999) obj
      Call x04baf(nout,rec)
      Call x04baf(nout,' Components are ')

      Do i = 1, n
        Write (rec,99998) i, x(i)
        Call x04baf(nout,rec)
      End Do

100   Continue

99999 Format (1X,'Optimal Integer Value is = ',E20.8)
99998 Format (1X,'X(',I3,') = ',F15.8)
99997 Format (A,I5)
99996 Format (1X,A)
    End Program h02ccfe
```

9.2 Program Data

```
Begin   Example options file for H02CCF
   Feasibility Phase Iteration Limit = 5  *  (Default = 70)
   Optimality Phase Iteration Limit = 10  *  (Default = 70)
End


H02CCF Example Program Data
  7  7                                              :Values of N and NCLIN
 -0.02  -0.20  -0.20  -0.20  -0.20   0.04   0.04   :End of CVEC
  1.00   1.00   1.00   1.00   1.00   1.00   1.00
  0.15   0.04   0.02   0.04   0.02   0.01   0.03
  0.03   0.05   0.08   0.02   0.06   0.01   0.00
  0.02   0.04   0.01   0.02   0.02   0.00   0.00
  0.02   0.03   0.00   0.00   0.01   0.00   0.00
  0.70   0.75   0.80   0.75   0.80   0.97   0.00
  0.02   0.06   0.08   0.12   0.02   0.01   0.97   :End of matrix A
 -0.01  -0.10     -0.01     -0.04     -0.10     -0.01     -0.01
 -0.13  -1.0D+25  -1.0D+25  -1.0D+25  -1.0D+25  -9.92D-02 -3.0D-03 :End of BL
  0.01   0.15      0.03      0.02      0.05      1.0D+25   1.0D+25
```

```
-0.13  -4.9D-03  -6.4D-03  -3.7D-03  -1.2D-03   1.0D+25   2.0D-03 :End of BU
-0.01  -0.03   0.00  -0.01  -0.10   0.02   0.01   :End of X
 2.00   0.00   0.00   0.00   0.00   0.00   0.00
 0.00   2.00   0.00   0.00   0.00   0.00   0.00
 0.00   0.00   2.00   2.00   0.00   0.00   0.00
 0.00   0.00   2.00   2.00   0.00   0.00   0.00
 0.00   0.00   0.00   0.00   2.00   0.00   0.00
 0.00   0.00   0.00   0.00   0.00  -2.00  -2.00
 0.00   0.00   0.00   0.00   0.00  -2.00  -2.00   :End of matrix H
```

9.3 Program Results

```
H02CCF Example Program Results


Calls to H02CDF
---------------

      Print Level = 1
      Check Frequency = 10
      Crash Tolerance = 0.05
      Infinite Bound Size = 1.0D+25


OPTIONS file
------------

     Begin   Example options file for H02CCF
        Feasibility Phase Iteration Limit = 5  *  (Default = 70)
        Optimality Phase Iteration Limit = 10  *  (Default = 70)
     End


Optimal Integer Value is =       0.37469662E-01
Components are
X(  1) =     -0.01000000
X(  2) =     -0.07332830
X(  3) =     -0.00025809
X(  4) =      0.00000000
X(  5) =     -0.06335433
X(  6) =      0.01410944
X(  7) =      0.00283128
```