

NAG Toolbox for MATLAB

e04nh

1 Purpose

To supply individual optional parameters to e04nf.

2 Syntax

```
[lwsav, iwsav, rwsav, inform] = e04nh(str, lwsav, iwsav, rwsav)
```

3 Description

e04nh may be used to supply values for optional parameters to e04nf. It is only necessary to call e04nh for those parameters whose values are to be different from their default values. One call to e04nh sets one parameter value.

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 equals 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 double value. Such numbers may be up to 16 contiguous characters in Fortran'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.

For e04nh, each user-specified option is normally printed as it is defined, on the current advisory message unit (see x04ab), but this printing may be suppressed using the keyword **Nolist**. Thus the statement

```
[lwsav, iwsav, rwsav, inform] = e04nh('Nolist', lwsav, iwsav, rwsav);
```

suppresses printing of this and subsequent options. Printing will automatically be turned on again after a call to e04nf and may be turned on again at any time using the keyword **List**.

For e04nh printing is turned off by default, but may be turned on at any time using the keyword **List**.

Optional parameter settings are preserved following a call to e04nf and so the keyword **Defaults** is provided to allow you to reset all the optional parameters to their default values before a subsequent call to e04nf.

A complete list of optional parameters, their abbreviations, synonyms and default values is given in Section 11 of the document for e04nf.

4 References

None.

5 Parameters

5.1 Compulsory Input Parameters

1: **str** – string

A single valid option string (as described in Section 3 and in Section 11 of the document for e04nf).

2: **lwsav(120)** – logical array

3: **iwsav(610)** – int32 array

4: **rwsav(475)** – double array

The arrays **lwsav**, **iwsav** and **rwsav** **must not** be altered between calls to any of the functions e04wb, e04nk or e04nh.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **lwsav(120)** – logical array

2: **iwsav(610)** – int32 array

3: **rwsav(475)** – double array

The arrays **lwsav**, **iwsav** and **rwsav** **must not** be altered between calls to any of the functions e04wb, e04nk or e04nh.

4: **inform** – int32 scalar

Contains zero if a valid option string has been supplied and a value > 0 otherwise (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

inform = 5

The supplied option is invalid. Check that the keywords are neither ambiguous nor misspelt.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

```
e04nf_qphess.m

function [hx, user, iwsav] = qphess(n, jthcol, h, ldh, x, user, iwsav)

    if (iwsav(365) == 3 || iwsav(365) == 4)
        % Problem type QP1 and QP2
```

```

    hx = h*x;
elseif(iwsav(365) == 5 || iwsav(365) == 6)
    hx = transpose(h)*h*x;
else
    hx = zeros(n,1);
end

```

```

a = [1, 1, 1, 1, 1, 1, 1;
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;
0.02, 0.04, 0.01, 0.02, 0.02, 0, 0;
0.02, 0.03, 0, 0, 0.01, 0, 0;
0.7, 0.75, 0.8, 0.75, 0.8, 0.97, 0;
0.02, 0.06, 0.08, 0.12, 0.02, 0.01, 0.97];
bl = [-0.01; -0.1; -0.01; -0.04; -0.1; -0.01; -0.01; -0.13; -
9.999999999999999e+24; -9.999999999999999e+24; -9.999999999999999e+24; -
9.999999999999999e+24; -0.0992; -0.003];
bu = [0.01; 0.15; 0.03; 0.02; 0.05; 9.999999999999999e+24;
9.999999999999999e+24; -0.13; -0.0049000000000000001; -0.0064; -0.0037; -
0.0012; 9.999999999999999e+24; 0.002];
cvec = [-0.02; -0.2; -0.2; -0.2; -0.2; 0.04; 0.04];
h = [2, 0, 0, 0, 0, 0, 0;
0, 2, 0, 0, 0, 0, 0;
0, 0, 2, 2, 0, 0, 0;
0, 0, 2, 2, 0, 0, 0;
0, 0, 0, 0, 2, 0, 0;
0, 0, 0, 0, 0, -2, -2;
0, 0, 0, 0, 0, -2, -2];
istate = zeros(14, 1, 'int32');
x = [-0.01; -0.03; 0; -0.01; -0.1; 0.02; 0.01];
[cwsav,lwsav,iwsav,rwsav,ifail] = e04wb('e04nf');

[lwsav, iwsav, rwsav, inform] = e04nh('Print Level = 1', lwsav, iwsav,
rwsav);
[lwsav, iwsav, rwsav, inform] = e04nh('Check Frequency = 10', lwsav,
iwsav, rwsav);

[istateOut, xOut, iter, obj, ax, clamda, user, lwsavOut, iwsavOut,
rwsavOut, ifail] = ...
    e04nf(a, bl, bu, cvec, h, 'e04nf_qphess', istate, x, lwsav, iwsav,
rwsav)

```

*** E04NFF

Parameters

Problem type.....	QP2		
Linear constraints.....	7	Feasibility tolerance..	1.05E-08
Variables.....	7	Optimality tolerance...	1.05E-08
Hessian rows.....	7	Rank tolerance.....	1.11E-14
Infinite bound size....	1.00E+20	COLD start.....	
Infinite step size....	1.00E+20	EPS (machine precision)	1.11E-16
Check frequency.....	10	Expand frequency.....	
Minimum sum of infeas..	NO	Crash tolerance.....	1.00E-02
Max degrees of freedom.	7	Print level.....	
Feasibility phase itns.	70	Monitoring file.....	-

```

1
Optimality phase itns.          70

Workspace provided is      IWORK(      17),  WORK(      189).
To solve problem we need  IWORK(      17),  WORK(      189).

  Varbl State      Value      Lower Bound      Upper Bound      Lagr Mult
Slack

  V   1   LL  -1.000000E-02 -1.000000E-02  1.000000E-02  0.4700      .
  V   2   FR  -6.986465E-02 -0.100000      0.150000      .
3.0135E-02
  V   3   FR   1.825915E-02 -1.000000E-02  3.000000E-02      .
1.1741E-02
  V   4   FR  -2.426081E-02 -4.000000E-02  2.000000E-02      .
1.5739E-02
  V   5   FR  -6.200564E-02 -0.100000      5.000000E-02      .
3.7994E-02
  V   6   FR   1.380544E-02 -1.000000E-02      None      .
2.3805E-02
  V   7   FR   4.066496E-03 -1.000000E-02      None      .
1.4066E-02

  L Con State      Value      Lower Bound      Upper Bound      Lagr Mult
Slack

  L   1   EQ  -0.130000      -0.130000      -0.130000      -1.908      -
5.5511E-17
  L   2   FR  -5.879898E-03      None      -4.900000E-03      .
9.7990E-04
  L   3   UL  -6.400000E-03      None      -6.400000E-03  -0.3144      -
8.6736E-19
  L   4   FR  -4.537323E-03      None      -3.700000E-03      .
8.3732E-04
  L   5   FR  -2.915996E-03      None      -1.200000E-03      .
1.7160E-03
  L   6   LL  -9.920000E-02 -9.920000E-02      None      1.955
2.7756E-17
  L   7   LL  -3.000000E-03 -3.000000E-03  2.000000E-03  1.972      -
8.6736E-19

Exit E04NFF - Optimal QP solution.

Final QP objective value =   0.3703165E-01

Exit from QP problem after      7 iterations.
istateOut =
      1
      0
      0
      0
      0
      0
      0
      3
      0
      2
      0
      0
      1
      1
xOut =
      -0.0100
      -0.0699
       0.0183
      -0.0243
      -0.0620
       0.0138

```

```
0.0041
iter = 7
obj = 0.0370
ax =
-0.1300
-0.0059
-0.0064
-0.0045
-0.0029
-0.0992
-0.0030
clamda =
0.4700
0
0
0
0
0
0
-1.9082
0
-0.3144
0
0
1.9545
1.9716
user =
0
lwsavOut =
array elided
iwsavOut =
array elided
rwsavOut =
array elided
ifail =
0
```
