# NAG C Library Function Document

# nag_band_real_mat_print (x04cec)

## 1 Purpose

nag_band_real_mat_print (x04cec) is an easy-to-use function to print a real band matrix.

## 2 Specification

```
void nag_band_real_mat_print (Nag_OrderType order, Integer m, Integer n,
     Integer kl, Integer ku, const double a[], Integer pda, const char *title,
     const char *outfile, NagError *fail)
```

## 3 Description

nag_band_real_mat_print (x04cec) prints a real band matrix stored in packed form. It is an easy-to-use driver for nag_band_real_mat_print_comp (x04cfc). The function uses default values for the format in which numbers are printed, for labelling the rows and columns, and for output record length.

nag_band_real_mat_print (x04cec) will choose a format code such that numbers will be printed with a %8.4f, a %11.4f or a %13.4e format. The %8.4f code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 1.0. The %11.4f code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 9999.9999. Otherwise the %13.4e code is chosen.

The matrix is printed with integer row and column labels, and with a maximum record length of 80.

The matrix is output to the file specified by **outfile** or, by default, to standard output.

## 4 References

None.

## 5 Parameters

1: **order** – Nag_OrderType *Input*

*On entry*: the **order** parameter specifies the two-dimensional storage scheme being used, i.e., row-major ordering or column-major ordering. C language defined storage is specified by **order** = **Nag_RowMajor**. See Section 2.2.1.4 of the Essential Introduction for a more detailed explanation of the use of this parameter.

*Constraint*: **order** = **Nag_RowMajor** or **Nag_ColMajor**.

2: **m** – Integer *Input*

3: **n** – Integer *Input*

*On entry*: the number of rows and columns of the band matrix, respectively, to be printed.

If either **m** or **n** is less than 1, nag_band_real_mat_print (x04cec) will exit immediately after printing **title**; no row or column labels are printed.

4: **kl** – Integer *Input*

*On entry*: the number of sub-diagonals of the band matrix $A$.

*Constraint*: **kl** $\geq 0$.

5: **ku** – Integer *Input*

*On entry*: the number of super-diagonals of the band matrix $A$.

*Constraint*: **ku** $\geq 0$.

6: **a**[$dim$] – const double *Input*

**Note:** the dimension, $dim$, of the array **a** must be at least $\max(1, \textbf{pda} \times \textbf{n})$ when **order** = **Nag_ColMajor** and at least $\max(1, \textbf{pda} \times \textbf{m})$ when **order** = **Nag_RowMajor**.

*On entry*: the $m$ by $n$ matrix $A$. This is stored as a notional two-dimensional array with row elements or column elements stored contiguously. The storage of elements $a_{ij}$, for $i = 1, \ldots, m$ and $j = \max(1, i - k_l), \ldots, \min(n, i + k_u)$, depends on the **order** parameter as follows:

if **order** = **Nag_ColMajor**, $a_{ij}$ is stored as **a**$[(j-1) \times \textbf{pda} + \textbf{kl} + \textbf{ku} + i - j]$;

if **order** = **Nag_RowMajor**, $a_{ij}$ is stored as **a**$[(i-1) \times \textbf{pda} + \textbf{kl} + j - i]$.

7: **pda** – Integer *Input*

*On entry*: the stride separating row or column elements (depending on the value of **order**) of the matrix $A$ in the array **a**.

*Constraint*: **pda** $\geq$ **kl** + **ku** + 1.

8: **title** – char * *Input*

*On entry*: a title to be printed above the matrix. If **title** = **NULL**, no title (and no blank line) will be printed.

If **title** contains more than 80 characters, the contents of **title** will be wrapped onto more than one line, with the break after 80 characters.

Any trailing blank characters in **title** are ignored.

9: **outfile** – char * *Input*

*On entry*: the name of a file to which output will be directed. If **outfile** is **NULL** the output will be directed to standard output.

10: **fail** – NagError * *Input/Output*

The NAG error parameter (see the Essential Introduction).

## 6 Error Indicators and Warnings

**NE_ALLOC_FAIL**

Memory allocation failed.

**NE_BAD_PARAM**

On entry, parameter ⟨*value*⟩ had an illegal value.

**NE_NOT_WRITE_FILE**

Cannot open file ⟨*value*⟩ for writing.

**NE_NOT_APPEND_FILE**

Cannot open file ⟨*value*⟩ for appending.

**NE_NOT_CLOSE_FILE**

Cannot close file ⟨*value*⟩.

**NE_INTERNAL_ERROR**

An internal error has occurred in this function. Check the function call and any array sizes. If the call is correct then please consult NAG for assistance.

## 7 Accuracy

Not applicable.

## 8 Further Comments

A call to nag_band_real_mat_print (x04cec) is equivalent to a call to nag_band_real_mat_print_comp (x04cfc) with the following argument values:

```
ncols = 80
indent = 0
labrow = Nag_IntegerLabels
labcol = Nag_IntegerLabels
form = 0
```

## 9 Example

See Section 9 of the document for nag_dpbtrf (f07hdc).