

**NAG Toolbox for MATLAB****Chapter Introduction****X04 – Input/Output Utilities****Contents**

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## 1 Scope of the Chapter

This chapter contains utility functions concerned with input and output to or from an external file.

## 2 Background to the Problems

### 2.1 Output from NAG Library Functions

Output from NAG library functions to an external file falls into two categories.

(a) **Error messages**

which are always associated with an error exit from a function, that is, with a nonzero value of **ifail** as specified in Section 6 of the function document.

(b) **Advisory messages**

which include output of final results, output of intermediate results to monitor the course of a computation, and various warning or informative messages.

Since the NAG Library is written in Fortran it uses Fortran I/O features. In particular output is directed to an *output unit* identified by a unique *unit number*. To allow output to be redirected to files from within Matlab, we provide two routines for connecting and disconnecting a file to and from a Fortran unit: x04ac and x04ad. Fortran unit numbers should be between 1 and 99. The numbers 5 and 6 are reserved for standard input and output respectively.

At present only formatted records are output from the Library. All formatted output to an external file from within the Library is performed by x04ba. Similarly, all formatted input from an external file is performed by x04bb.

### 2.2 Matrix Printing Functions

Functions are provided to allow formatted output of

- (a) general matrices stored in a two-dimensional array (real, complex and integer data types);
- (b) triangular matrices stored in a packed one-dimensional array (real and complex data types);
- (c) band matrices stored in a packed two-dimensional array (real and complex data types).

Functions in (b) and (c) allow printing of matrices stored in formats used in particular by Chapters F06 and F07 of the Library.

By appropriate choice of arguments you can specify titles, labels, maximum output record length, and the format of individual matrix elements. All output is directed to the unit number for output of advisory messages, which may be altered by a call to x04ab.

## 3 Recommendations on Choice and Use of Available Functions

Apart from the obvious utility of the matrix printing functions, users of the Library may need to call functions in Chapter x04 for the following purposes.

If the default unit number for error messages is not satisfactory, it may be changed to a new value **nerr** by the statement

```
[nerr] = x04aa(int32(1),nerr)
```

Similarly the unit number for advisory messages may be changed to a new value **nadv** by the statement

```
[nadv] = x04ab(int32(1),nadv)
```

Note that both x04aa and x04ab use a Fortran SAVE statement to retain the value of the unit number and so neither function is safe to use in a multithreaded environment.

## 4 Index

Accessing external formatted file:

|                        |       |
|------------------------|-------|
| reading a record ..... | x04bb |
| writing a record ..... | x04ba |

Accessing unit number:

|                                |       |
|--------------------------------|-------|
| of advisory message unit ..... | x04ab |
| of error message unit .....    | x04aa |

Disconnecting an external file ..... x04ad

Connecting an external file ..... x04ac

Printing matrices:

Comprehensive functions:

|                                        |       |
|----------------------------------------|-------|
| general complex matrix .....           | x04db |
| general integer matrix .....           | x04eb |
| general real matrix .....              | x04cb |
| packed complex band matrix .....       | x04df |
| packed complex triangular matrix ..... | x04dd |
| packed real band matrix .....          | x04cf |
| packed real triangular matrix .....    | x04cd |

Easy-to-use functions:

|                                        |       |
|----------------------------------------|-------|
| general complex matrix .....           | x04da |
| general integer matrix .....           | x04ea |
| general real matrix .....              | x04ca |
| packed complex band matrix .....       | x04de |
| packed complex triangular matrix ..... | x04dc |
| packed real band matrix .....          | x04ce |
| packed real triangular matrix .....    | x04cc |

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