

NAG Library Routine Document

F01VGF (DTFTTR)

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

F01VGF (DTFTTR) unpacks a real triangular matrix stored in Rectangular Full Packed (RFP) format to full format in a two-dimensional array. The RFP storage format is described in Section 3.3.3 in the F07 Chapter Introduction.

2 Specification

```
SUBROUTINE F01VGF (TRANSR, UPLO, N, ARF, A, LDA, INFO)
  INTEGER          N, LDA, INFO
  REAL (KIND=nag_wp) ARF(N*(N+1)/2), A(LDA,*)
  CHARACTER(1)    TRANSR, UPLO
```

The routine may be called by its LAPACK name *dtfttr*.

3 Description

F01VGF (DTFTTR) unpacks a real n by n triangular matrix A , stored in RFP format to conventional storage in a two-dimensional array. This routine is intended for possible use in conjunction with routines from Chapters F06 and F07 where some routines that use triangular matrices store them in RFP format.

4 References

None.

5 Parameters

- 1: TRANSR – CHARACTER(1) *Input*
On entry: specifies whether the RFP representation of A is normal or transposed.
 TRANSR = 'N'
 The matrix A is stored in normal RFP format.
 TRANSR = 'T'
 The matrix A is stored in transposed RFP format.
Constraint: TRANSR = 'N' or 'T'.
- 2: UPLO – CHARACTER(1) *Input*
On entry: specifies whether A is upper or lower triangular.
 UPLO = 'U'
 A is upper triangular.
 UPLO = 'L'
 A is lower triangular.
Constraint: UPLO = 'U' or 'L'.

- 3: N – INTEGER *Input*
On entry: n , the order of the matrix A .
Constraint: $N \geq 0$.
- 4: ARF($N \times (N + 1)/2$) – REAL (KIND=nag_wp) array *Input*
On entry: the n by n triangular matrix A in RFP format, as described in Section 3.3.3 in the F07 Chapter Introduction.
- 5: A(LDA,*) – REAL (KIND=nag_wp) array *Output*
Note: the second dimension of the array A must be at least N .
On exit: the triangular matrix A .
 If UPLO = 'U', A is upper triangular and the elements of the array below the diagonal are not referenced.
 If UPLO = 'L', A is lower triangular and the elements of the array above the diagonal are not referenced.
- 6: LDA – INTEGER *Input*
On entry: the first dimension of the array A as declared in the (sub)program from which F01VGF (DTFTTR) is called.
Constraint: $LDA \geq \max(1, N)$.
- 7: INFO – INTEGER *Output*
On exit: INFO = 0 unless the routine detects an error (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the routine:

INFO < 0

If INFO = $-i$, argument i had an illegal value. An explanatory message is output, and execution of the program is terminated.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

This example reads in a triangular matrix in RFP format and unpacks it to full format.

9.1 Program Text

```

Program f01vgfe
!      F01VGF Example Program Text
!
!      Mark 24 Release. NAG Copyright 2012.
!
!      .. Use Statements ..
!      Use nag_library, Only: dtfttr, nag_wp, x04cbf

```

```

! .. Implicit None Statement ..
Implicit None
! .. Parameters ..
Integer, Parameter      :: incl = 1, indent = 0, ncols = 80,    &
                        nin = 5, nout = 6
Character (1), Parameter :: diag = 'N', intlabel = 'I', matrix = &
                        'G', nolabel = 'N'
Character (4), Parameter :: form = 'F5.2'
! .. Local Scalars ..
Integer                :: ifail, info, lda, lenarf, n
Character (21)         :: title
Character (1)          :: transr, uplo
! .. Local Arrays ..
Real (Kind=nag_wp), Allocatable :: a(:, :), arf(:)
Character (1)          :: clabs(1), rlabs(1)
! .. Executable Statements ..
Write (nout,*) 'F01VGF Example Program Results'
Skip heading in data file
Read (nin,*)
Write (nout,*)
Flush (nout)
Read (nin,*) n, uplo, transr
lda = n
lenarf = n*(n+1)/2
Allocate (a(lda,n),arf(lenarf))

! Read an RFP matrix into array ARF
Read (nin,*) arf

! Print the Rectangular Full Packed array
title = 'RFP Packed Array ARF:'
ifail = 0
Call x04cbf(matrix,diag,lenarf,incl,arf,lenarf,form,title,intlabel, &
            rlabs,nolabel,clabs,ncols,indent,ifail)

Write (nout,*)
Flush (nout)

! Convert to triangular form
info = 0
! The NAG name equivalent of dtfttr is f01vgf
Call dtfttr(transr,uplo,n,arf,a,lda,info)

! Print the unpacked array
ifail = 0
title = 'Unpacked Matrix A:  '
ifail = 0
Call x04cbf(uplo,diag,n,n,a,lda,form,title,intlabel,rlabs,intlabel, &
            clabs,ncols,indent,ifail)

End Program f01vgfe

```

9.2 Program Data

F01VGF Example Program Data

```

4 'U' 'N'                : n, uplo, transr
1.30 2.30 3.30 1.10 1.20 1.40 2.40 3.40 4.40 2.20 : RFP Matrix ARF

```

9.3 Program Results

F01VGF Example Program Results

RFP Packed Array ARF:

```

1 1.30
2 2.30
3 3.30
4 1.10
5 1.20
6 1.40
7 2.40

```

8 3.40
9 4.40
10 2.20

Unpacked Matrix A:

	1	2	3	4
1	1.10	1.20	1.30	1.40
2		2.20	2.30	2.40
3			3.30	3.40
4				4.40
