# NAG Library Routine Document

# D02NPF

**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

D02NPF is a setup routine which you must call prior to D02NEF and after a call to D02MWF, if the Jacobian is to be considered as having a banded structure.

## 2 Specification

```
SUBROUTINE D02NPF(NEQ, ML, MU, ICOM, LICOM, IFAIL)
INTEGER           NEQ, ML, MU, ICOM(LICOM), LICOM, IFAIL
```

## 3 Description

A call to D02NPF specifies that the Jacobian to be used is banded in structure. If D02NPF is not called before a call to D02NEF then the Jacobian is assumed to be full.

## 4 References

None.

## 5 Parameters

1: NEQ – INTEGER *Input*

*On entry*: the number of differential-algebraic equations to be solved.

*Constraint*: $1 \leq \text{NEQ}$.

2: ML – INTEGER *Input*

*On entry*: $m_L$, the number of subdiagonals in the band.

*Constraint*: $0 \leq \text{ML} \leq \text{NEQ} - 1$.

3: MU – INTEGER *Input*

*On entry*: $m_U$, the number of superdiagonals in the band.

*Constraint*: $0 \leq \text{MU} \leq \text{NEQ} - 1$.

4: ICOM(LICOM) – INTEGER array *Communication Array*

ICOM is used to communicate details of the integration from D02MWF and details of the banded structure of the Jacobian to D02NEF.

5: LICOM – INTEGER *Input*

*On entry*: the dimension of the array ICOM as declared in the (sub)program from which D02NPF is called.

*Constraint*: $\text{LICOM} \geq 50 + \text{NEQ}$.

6: IFAIL – INTEGER *Input/Output*

*On entry*: IFAIL must be set to 0, −1 or 1. If you are unfamiliar with this parameter you should refer to Section 3.3 in the Essential Introduction for details.

*On exit*: IFAIL = 0 unless the routine detects an error (see Section 6).

For environments where it might be inappropriate to halt program execution when an error is detected, the value −1 or 1 is recommended. If the output of error messages is undesirable, then the value 1 is recommended. Otherwise, if you are not familiar with this parameter, the recommended value is 0. **When the value −1 or 1 is used it is essential to test the value of IFAIL on exit.**

## 6 Error Indicators and Warnings

If on entry IFAIL = 0 or −1, explanatory error messages are output on the current error message unit (as defined by X04AAF).

Errors or warnings detected by the routine:

IFAIL = 1

On entry, NEQ < 1.

IFAIL = 2

On entry, ML < 0 or ML > NEQ − 1.

IFAIL = 3

On entry, MU < 0 or MU > NEQ − 1.

IFAIL = 4

Either D02MWF has not been called before this call or the communication array ICOM has been corrupted.

IFAIL = 5

On entry, LICOM < 50 + NEQ.

## 7 Accuracy

Not applicable.

## 8 Further Comments

None.

## 9 Example

See Section 9 in D02NEF and D02MWF.