

1 SUMMARY

To compute values of the **Bessel functions** $J_1(x)$ and $Y_1(x)$. A Chebyshev series in x is used if $0 \leq x \leq 8$ and a similar series in $\frac{1}{x}$ if $x > 8$, see, C.W. Clenshaw, 'Mathematical Tables', Vol. 5, NPL.

ATTRIBUTES — **Version:** 1.0.0. **Types:** FF02A; FF02AD. **Calls:** FD05. **Original date:** June 1963. **Origin:** S.Marlow, Harwell.

2 HOW TO USE THE PACKAGE

The single precision version

```
CALL FF02A(VJ1, VY1, X, N)
```

The double precision version

```
CALL FF02AD(VJ1, VY1, X, N)
```

VJ1 is a REAL (DOUBLE PRECISION in the D version) variable which is set by the subroutine to the computed value of $J_1(x)$.

VY1 is a REAL (DOUBLE PRECISION in the D version) variable which is set by the subroutine to the computed value of $Y_1(x)$.

X is a REAL (DOUBLE PRECISION in the D version) variable which must be set by the user to the value of the argument x . **Restriction:** $x \geq 0$; and $x \neq 0$, for a value of $Y_1(x)$. Note: if $x < 0$ then $|x|$ is used.

N is an INTEGER variable which must be set by the user to select $J_1(x)$ or $Y_1(x)$, or both, i.e. the allowed values of N are

- 0 only $J_1(x)$ is calculated.
- 1 only $Y_1(x)$ is calculated.
- 2 both $J_1(x)$ and $Y_1(x)$ are calculated.

3 GENERAL INFORMATION

Use of common: none.

Workspace: none.

Other subroutines: none.

Input/Output: none.

Restrictions:

$x \geq 0$ for $J_1(x)$,

$x > 0$ for $Y_1(x)$.

Accuracies:

6 sig. figs using 4-byte arithmetic.

9 sig. figs using 8-byte arithmetic.

4 METHOD

A Chebyshev series in x is used if $0 \leq x \leq 8$ and a similar series in $\frac{1}{x}$ if $x > 8$, see, C.W. Clenshaw, 'Mathematical Tables', Vol. 5, NPL.