



## 1 SUMMARY

To compute values of the **Bessel functions**  $I_1(x)$  and  $K_1(x)$ . 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:** FF04A; FF04AD. **Calls:** FD05. **Original date:** December 1966. **Origin:** S.Marlow, Harwell.

## 2 HOW TO USE THE PACKAGE

*The single precision version*

```
CALL FF04A(VI1, VK1, X, N)
```

*The double precision version*

```
CALL FF04AD(VI1, VK1, X, N)
```

VI1 is a REAL (DOUBLE PRECISION in the D version) variable which is set by the subroutine to the computed value of  $I_1(x)$ .

VK1 is a REAL (DOUBLE PRECISION in the D version) variable which is set by the subroutine to the computed value of  $K_1(x)$ .

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  $K_1(x)$ . Note: if  $x < 0$  then  $|x|$  is used.

N is an INTEGER variable which must be set by the user to select  $I_1(x)$  or  $K_1(x)$ , or both, i.e. the allowed values of N are

- 0 only  $I_1(x)$  is calculated.
- 1 only  $K_1(x)$  is calculated.
- 2 both  $I_1(x)$  and  $K_1(x)$  are calculated.

## 3 GENERAL INFORMATION

**Use of common:** none.

**Workspace:** none.

**Other subroutines:** none.

**Input/Output:** none.

**Restrictions:**

$x \geq 0$  for  $I_1(x)$ ,

$x > 0$  for  $K_1(x)$ .

**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.