


```

        SORT(I)=i
    ENDDO
C-----END INSERTATION

C-----BEGIN MODIFICATION GRS
C old code:
C     CALL QS2I1D( JA, IA, A, NELT, 1,IUNIT )
C new code:
    ! modified routine QS2I1D will also sort SORT
    CALL QS2I1D( JA, IA, A, NELT, 1,IUNIT,SORT )
    ! A/IA/JA/SORT are now sorted
C-----END MODIFICATION GRS
    JA(1) = 1
    DO 20 ICOL = 1, N-1
        DO 10 J = JA(ICOL)+1, NELT
            IF( JA(J).NE.ICOL ) THEN
                JA(ICOL+1) = J
                GOTO 20
            ENDIF
        10 CONTINUE
    20 CONTINUE
    JA(N+1) = NELT+1

C
    JA(N+2) = 0

C
    DO 70 ICOL = 1, N
        IBGN = JA(ICOL)
        IEND = JA(ICOL+1)-1
        DO 30 I = IBGN, IEND
            IF( IA(I).EQ.ICOL ) THEN
                ITEMP = IA(I)
                IA(I) = IA(IBGN)
                IA(IBGN) = ITEMP
                TEMP = A(I)
                A(I) = A(IBGN)
                A(IBGN) = TEMP
C-----BEGIN INSERTATION GRS
                ST = SORT(I)
                SORT(I) = SORT(IBGN)
                SORT(IBGN) = ST
C-----END INSERTATION

                GOTO 40
            ENDIF
        30 CONTINUE
    40 IBGN = IBGN + 1
        IF( IBGN.LT.IEND ) THEN
            DO 60 I = IBGN, IEND
                DO 50 J = I+1, IEND
                    IF( IA(I).GT.IA(J) ) THEN
                        ITEMP = IA(I)
                        IA(I) = IA(J)
                        IA(J) = ITEMP
                        TEMP = A(I)
                        A(I) = A(J)
                        A(J) = TEMP
C-----BEGIN INSERTATION GRS
                        ST = SORT(I)
                        SORT(I) = SORT(J)
                        SORT(J) = ST
C-----END INSERTATION

                    ENDIF
                50 CONTINUE
            60 CONTINUE
        ENDIF
    70 CONTINUE

```



```

        NN = N
        IF (NN.LT.1) THEN
            WRITE(IUNIT,6100)
6100 FORMAT(/,'QS2I1D- the number of values to',
            &      ' be sorted was NOT POSITIVE.')
            RETURN
        ENDIF
        IF( N.EQ.1 ) RETURN
        KK = IABS(KFLAG)
        IF ( KK.NE.1 ) THEN
            WRITE(IUNIT,6101)
6101 FORMAT(/,'QS2I1D- the sort control parameter, k, ',
            &      'was not 1 OR -1.')
            RETURN
        ENDIF
C
        IF( KFLAG.LT.1 ) THEN
            DO 20 I=1,NN
                IA(I) = -IA(I)
20         CONTINUE
            ENDIF
C
            M = 1
            I = 1
            J = NN
            R = 3.75D-1
210        IF( R.LE.5.898437D-1 ) THEN
                R = R + 3.90625D-2
            ELSE
                R = R-2.1875D-1
            ENDIF
225        K = I
C
C
            IJ = I + IDINT( DBLE(J-I)*R )
            IT = IA(IJ)
            JT = JA(IJ)
            TA = A(IJ)
C-----BEGIN INSERTATION GRS
            ST = SORT(IJ)
C-----END INSERTATION
C
C
            IF( IA(I).GT.IT ) THEN
                IA(IJ) = IA(I)
                IA(I) = IT
                IT = IA(IJ)
                JA(IJ) = JA(I)
                JA(I) = JT
                JT = JA(IJ)
                A(IJ) = A(I)
                A(I) = TA
                TA = A(IJ)
C-----BEGIN INSERTATION GRS
                SORT(IJ) = SORT(I)
                SORT(I) = ST
                ST = SORT(IJ)
C-----END INSERTATION
            ENDIF
            L=J
C
C
            IF( IA(J).LT.IT ) THEN
                IA(IJ) = IA(J)
                IA(J) = IT
                IT = IA(IJ)
                JA(IJ) = JA(J)

```

```

        JA(J) = JT
        JT    = JA(IJ)
        A(IJ) = A(J)
        A(J)  = TA
        TA    = A(IJ)
C-----BEGIN INSERTATION GRS
        SORT(IJ) = SORT(J)
        SORT(J)  = ST
        ST       = SORT(IJ)
C-----END INSERTATION
C
C
        IF ( IA(I).GT.IT ) THEN
            IA(IJ) = IA(I)
            IA(I)  = IT
            IT     = IA(IJ)
            JA(IJ) = JA(I)
            JA(I)  = JT
            JT     = JA(IJ)
            A(IJ)  = A(I)
            A(I)   = TA
            TA     = A(IJ)
C-----BEGIN INSERTATION GRS
            SORT(IJ) = SORT(I)
            SORT(I)  = ST
            ST       = SORT(IJ)
C-----END INSERTATION
            ENDIF
        ENDIF
C
C
        240 L=L-1
            IF( IA(L).GT.IT ) GO TO 240
C
C
        245 K=K+1
            IF( IA(K).LT.IT ) GO TO 245
C
C
        IF( K.LE.L ) THEN
            IIT = IA(L)
            IA(L) = IA(K)
            IA(K) = IIT
            JJT = JA(L)
            JA(L) = JA(K)
            JA(K) = JJT
            TTA = A(L)
            A(L) = A(K)
            A(K) = TTA
C-----BEGIN INSERTATION GRS
            ST = SORT(L)
            SORT(L) = SORT(K)
            SORT(K) = ST
C-----END INSERTATION
            GOTO 240
        ENDIF
C
C
        IF( L-I.GT.J-K ) THEN
            IL(M) = I
            IU(M) = L
            I = K
            M = M+1
        ELSE
            IL(M) = K
            IU(M) = J
            J = L

```

```

        M = M+1
    ENDIF
    GO TO 260
C
C
255 M = M-1
    IF( M.EQ.0 ) GO TO 300
    I = IL(M)
    J = IU(M)
260 IF( J-I.GE.1 ) GO TO 225
    IF( I.EQ.J ) GO TO 255
    IF( I.EQ.1 ) GO TO 210
    I = I-1
265 I = I+1
    IF( I.EQ.J ) GO TO 255
    IT = IA(I+1)
    JT = JA(I+1)
    TA = A(I+1)
C-----BEGIN INSERTATION GRS
    ST = SORT(I+1)
C-----END INSERTATION
    IF( IA(I).LE.IT ) GO TO 265
    K=I
270 IA(K+1) = IA(K)
    JA(K+1) = JA(K)
    A(K+1) = A(K)
C-----BEGIN INSERTATION GRS
    SORT(K+1) = SORT(K)
C-----END INSERTATION
    K = K-1
    IF( IT.LT.IA(K) ) GO TO 270
    IA(K+1) = IT
    JA(K+1) = JT
    A(K+1) = TA
C-----BEGIN INSERTATION GRS
    SORT(K+1) = ST
C-----END INSERTATION
    GO TO 265
C
C
300 IF( KFLAG.LT.1 ) THEN
        DO 310 I=1,NN
            IA(I) = -IA(I)
310     CONTINUE
    ENDIF
    RETURN
    END

```