

ALGORITHM 24
SOLUTION OF TRI-DIAGONAL LINEAR EQUATIONS

B. LEAVENWORTH
American Machine & Foundry Co., Greenwich, Conn.

```

procedure TRIDAG (n, A, B, C, D) ; integer n ;
array A, B, C, D ;
comment: This procedure1 finds the solution of an  $n \times n$  system
of linear equations whose matrix is in tridiagonal form, that
is,  $a_{ij} = 0$  for  $|i - j| \geq 2$ . Parameters are: the main diagonal
 $B_p$ , the diagonal just below  $A_r$ , the diagonal just above  $C_r$ ,
the right-hand side  $D$ : (where  $p = 1, \dots, n$  and  $r = 1, \dots, n - 1$ )
and the matrix order  $n$ . The solution vector replaces
the input vector  $D$  and the vector  $B$  is also destroyed in the
process ;
begin
  real w ; integer j ;
  D[1] := D[1]/B[1] ; w := B[1] ;
  for j := 2 step 1 until n do
    begin B[j - 1] := C[j - 1]/w ; w := B[j] - A[j - 1]
      × B[j - 1] ;
      D[j] := (D[j] - A[j - 1] × D[j - 1])/w end ;
    for j := 1 step 1 until n - 1 do
      D[n - j] := D[n - j] - B[n - j] × D[n - j + 1]
end TRIDAG

```

¹D. W. PEACEMAN AND H. H. RACHFORD, JR., The Numerical Solution of Parabolic and Elliptic Differential Equations, Journal of the Soc. for Ind. and Applied Math. Vol. 3 March 1955.