ALGORITHM 72
COMPOSITION GENERATOR
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procedure comp (c, k); value k; integer array c;
integer k;
comment Given a k-part composition c of the positive integer n,
comp generates a consequent composition if there is one. If
comp operates on each consequent composition after it is found,
all compositions will be generated, provided that 1, 1, . . . , 1,
and k − 1 is the initial c. If c is of the form 1, 1, . . . , 1,
there is no consequent, and c will be replaced by a k vector of
zeros. Reference: John Riordan, An Introduction to Combinatorial
Analysis, John Wiley and Sons, Inc., New York, 1958,
Chapter 6;

begin integer j; integer array d[1..k];
if k = 1 then go to last;
for j := 1 step 1 until k do d[j] := c[j] − 1;
test: if d[j] > 0 then go to set;
j := j − 1;
go to if j = 1 then last else test;
set: d[j] := 0;
d[j − 1] := d[j] + 1;
d[k] := c[k] − 2;
for j := 1 step 1 until k do c[j] := d[j] + 1;
go to exit;
last: for j := 1 step 1 until k do c[j] := 0;
exit: end comp

CERTIFICATION OF ALGORITHM 72
COMPOSITION GENERATOR [L. Hellerman and S.
Ogden, Comm. ACM, Nov. 1961]
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England

After

for j := 1 step 1 until k do d[j] := c[j] − 1;

the statement

j := k;

should be inserted (see Algol 60 report, para 4.6.5). With this
alteration, the algorithm was successfully run using the Elliott
Algol translator on the National-Elliott 803.