```
(ch5-table5-4_HO-batch2.out)
 FILENAME file1 URL "http://www.uvm.edu/~rsingle/stat231/data/other/kuehl-table5-4.dat";
 DATA a1;
   INFILE file1  FIRSTOBS=2 EXPANDTABS;
   INPUT method $ batch sample residue;
   IF method="a" THEN batch2=batch;    *NB: recode BATCH2 as NOT nested within method;
   IF method="b" THEN batch2=batch-3;
   RUN;
-------------------------------------------------------------------------------
*Version 3: Nested Terms specified EXPLICITLY in the MODEL statement;

 Title1 "VER.3(batch2): SS(error)=SS('Sampling'), SS(batch2(method))=SS('Error')" ;
 Title2 "VER.3(batch2): E(MS) Type I or Type III ***batch2***";
 PROC GLM DATA=a1;
   CLASS  method batch2 sample;
   MODEL  residue = method batch2(method) / E1;
   RANDOM batch2(method) / TEST;
   TEST H=method E=batch2(method) / HTYPE=1 ETYPE=1;
   RUN;
   QUIT;
-------------------------------------------------------------------------------

VER.3(batch2): SS(error)=SS('Sampling'), SS(batch2(method))=SS('Error')
VER.3(batch2): E(MS) Type I or Type III  ***batch2***

Class         Levels    Values
method             2    a b
batch2             3    1 2 3

Dependent Variable: residue
                                    Sum of
Source                     DF       Squares    Mean Square   F Value   Pr > F
Model                       5    8310.416667    1662.083333     30.17   0.0004
Error                       6     330.500000      55.083333
Corrected Total            11    8640.916667


Source                     DF      Type I SS    Mean Square   F Value   Pr > F
method                      1    7550.083333    7550.083333    137.07   <.0001 **INCORRECT*
*
batch2(method)              4     760.333333     190.083333      3.45   0.0860


Source                  Type I Expected Mean Square
method                  Var(Error) + 2 Var(batch2(method)) + Q(method)
batch2(method)          Var(Error) + 2 Var(batch2(method))


Tests of Hypotheses for Mixed Model Analysis of Variance

Source                     DF      Type I SS    Mean Square   F Value   Pr > F
method                      1    7550.083333    7550.083333     39.72   0.0032
Error                       4     760.333333     190.083333
Error: MS(batch2(method))


Source                     DF      Type I SS    Mean Square   F Value   Pr > F
batch2(method)              4     760.333333     190.083333      3.45   0.0860
Error: MS(Error)            6     330.500000      55.083333


 Tests of Hypotheses Using the Type I MS for batch2(method) as an Error Term

Source                     DF      Type I SS    Mean Square   F Value   Pr > F
method                      1    7550.083333    7550.083333     39.72   0.0032
```

```
*Version 1 (batch2): Nesting is NO LONGER implicit based on the data coding for batch2;

 Title1 "VER.1(batch2): SS(error)=SS('Sampling'), SS(batch2)=SS('Error')" ;
 Title2 "VER.1(batch2): E(MS) Type I only ***batch2***";
 PROC GLM DATA=a1;
   CLASS  method batch2 sample;
   MODEL  residue = method batch2 / E1;
   RANDOM batch2 / TEST;
   TEST H=method E=batch2 / HTYPE=1 ETYPE=1;
   RUN;
   QUIT;
--------------------------------------------------------------------------------
VER.1(batch2): SS(error)=SS('Sampling'), SS(batch2)=SS('Error')
VER.1(batch2): E(MS) Type I only ***batch2***

Class         Levels    Values
method             2    a b
batch2             3    1 2 3

Dependent Variable: residue
                                     Sum of
Source                       DF       Squares    Mean Square   F Value   Pr > F
Model                         3    7725.250000    2575.083333     22.50   0.0003
Error                         8     915.666667     114.458333
Corrected Total              11    8640.916667


Source                       DF      Type I SS    Mean Square   F Value   Pr > F
method                        1    7550.083333    7550.083333     65.96   <.0001 **INCORRECT*
*
batch2                        2     175.166667      87.583333      0.77   0.4965 **INCORRECT*
*


Source                   Type I Expected Mean Square
method                   Var(Error) + Q(method)
batch2                   Var(Error) + 4 Var(batch2)


Tests of Hypotheses for Mixed Model Analysis of Variance

Source                       DF      Type I SS    Mean Square   F Value   Pr > F
method                        1    7550.083333    7550.083333     65.96   <.0001 **INCORRECT*
*
batch2                        2     175.166667      87.583333      0.77   0.4965 **INCORRECT*
*
Error: MS(Error)              8     915.666667     114.458333


     Tests of Hypotheses Using the Type I MS for batch2 as an Error Term

Source                       DF      Type I SS    Mean Square   F Value   Pr > F

method                        1    7550.083333    7550.083333     86.20   0.0114 **INCORRECT*
*


--------------------------------------------------------------------------------
*Version 1: Nesting is only implicit based on the data coding *AND* VARIABLE ORDER;

 Title1 "VER.1(batch): SS(error)=SS('Sampling'), SS(batch)=SS('Error')" ;
 Title2 "VER.1(batch): E(MS) Type I only";
 PROC GLM DATA=a1;
   CLASS  method batch sample;
   MODEL  residue = batch  method / E1; **ORDERING IS     CORRECT FOR IMPLICIT NESTING**;
  *MODEL  residue = method batch  / E1; **ORDERING IS NOT CORRECT FOR IMPLICIT NESTING**:
   RANDOM batch / TEST;
   TEST H=method E=batch / HTYPE=1 ETYPE=1;
   RUN;
   QUIT;
```