Note that the model does not include A BY B BY C, which is confounded with BLOCK W REPLIC.

It is possible to test the ABC interaction if some interaction other than ABC is confounded in some of the replications. One possible layout would be that given in Table 1.26c.

Table 1.26c

In replication 1, ABC is confounded with blocks. In replication 2, the AB interaction is confounded with blocks. For replications 3 and 4, AC and BC are confounded.

For this example, A, B, and C are free of the block effects and three-fourths information for AB, AC, BC, and ABC can be obtained, since the unconfounded interactions can be estimated in three out of four of the replications. Hence we say AB, AC, BC, and ABC are *partially* confounded with blocks. The MANOVA specifications for this $2 \times 2 \times 2$ factorial with partial confounding are

```
MANOVA        Y BY REPLIC(1,4), BLOCK(1,2),A, B, C(1,2)/
              DESIGN=REPLIC,BLOCK W REPLIC, A, B, C, A BY B, A BY C,
                  B BY C, A BY B BY C/
```

More complex confounding designs can be found in Davies (1954) and Cochran and Cox (1957).

Another Example   The following example is taken from Cochran and Cox (1957, p. 205). The data are a $3 \times 3 \times 2$ factorial in blocks of six units with three blocks in each of four replications. Interactions AB and ABC are partially confounded with blocks. The SPSS commands for this analysis are given in Figure 1.26a.

Figure 1.26a

```
RUN NAME        CONFOUNDING IN MIXED SERIES.
COMMENT         CONFOUNDING IN MIXED SERIES. 3*3*2 FACTORIAL
COMMENT         FROM COCHRAN AND COX(1957)  P. 205
COMMENT         SECOND ANALYSIS GIVES AB TWO-WAY TABLE ADJUSTED FOR BLOCK
COMMENT         THIRD ANALYSIS GIVES AC TWO-WAY TABLE ADJUSTED FOR BLOCKS
COMMENT
COMMENT         FACTOR A : 8-8-6 FERTILIZER APPLIED IN THE ROW,
COMMENT                    3 LEVELS -- 0 (NONE), 1 (200 LB.), 2 (400 LB.)
COMMENT         FACTOR B : MEALS, 3 LEVELS -- 0 (NONE), 1 (TUNG MEAL),
COMMENT                                       2 (COTTONSEED MEAL).
COMMENT         FACTOR C : 8-8-6 FERTILIZER APPLIED AS SIDE-DRESSING,
COMMENT                    2 LEVELS -- 0 (NONE), 1 (200 LB.).
VARIABLE LIST   REPLICS,BLOCKS,A,B,C,DEP
INPUT MEDIUM    CARD
INPUT FORMAT    FIXED(2X,5F1.0,8X,F3.0)
N OF CASES      72
MANOVA          DEP BY REPLICS(1,4),BLOCKS(1,3),A(0,2),B(0,2),C(0,1)/
                DESIGN = REPLICS,BLOCKS WITHIN REPLICS,A,B,C,
                    A BY B,A BY C, B BY C, A BY B BY C/
                DESIGN = REPLICS,BLOCKS W REPLICS,CONSPLUS A AND B/
                DESIGN = REPLICS,BLOCKS W REPLICS,CONSPLUS A AND C/
READ INPUT DATA
     11011      82
     11020      70
     11100      80
     11121      86
     11201      74
     11210      86
     12001      67
     12010      55
     ....        .
     ....        .
     ....        .
     42210      66
     43001      90
     43010      58
     43100      81
     43121      67
     43211      68
     43220      56
FINISH
```