1.5 Specifying a Model with the DESIGN Subcommand

If the desired model is not the default full factorial, the model must be specified using the DESIGN subcommand. To specify a model that includes only the main effect terms, use

```
MANOVA          Y BY CAT(1,2) DRUG(1,3)/
                DESIGN  CAT,DRUG/
```

If there are three factors, (A, B, and C) with three levels each, the model containing only main effects and the A BY B and B BY C interactions is specified by

```
MANOVA          Y BY A B C (1,3)/
                DESIGN= A, B, C, A BY B, B BY C/
```

The keyword BY in the DESIGN subcommand indicates an interaction term. Thus a three-way interaction is written as A BY B BY C.

1.6 Specifying the ERROR Term

Unless otherwise requested, the within-cells mean square is used as the denominator for all the *F* values. If there is no within-cells error, the residual error is used. The residual mean square is the mean square for all terms not specified in the DESIGN subcommand. For example, if the model containing only main effects for DRUG and CAT is requested using

```
DESIGN= CAT,DRUG/
```

the residual error term is the mean square for the CAT BY DRUG interaction. For the three-factor design specification developed previously, the residual error corresponds to the sum of squares for the pooled A BY C and A BY B BY C interactions since they are not included in the DESIGN specification.

The ERROR subcommand designates the error term to be used for the analysis. See Section 1.91 for rules governing the use of the ERROR subcommand. If different error terms are to be used for the various terms in the design specification, this is indicated in the DESIGN subcommand. See Section 1.92 for further details.

1.7 An Example Using DESIGN and ERROR

The following commands request a main effects model for the data of Figure 1.2. The pooled interaction term (denoted as R for residual) and within-cells error (denoted as W) are used as the error.

```
MANOVA          Y BY CAT(1,2) DRUG(1,3)/
                ERROR=W+R/
                DESIGN=CAT,DRUG/
```

The error subcommand must precede the design specification to which it applies. The analysis of variance table from the preceding commands is given in Figure 1.7.

Figure 1.7

TESTS OF SIGNIFICANCE FOR Y USING SEQUENTIAL SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN+RESIDUAL	250.00000	14	17.85714		
CONSTANT	882.00000	1	882.00000	49.39200	0.0
CAT	18.00000	1	18.00000	1.00800	.332
DRUG	48.00000	2	24.00000	1.34400	.292

The result in Figure 1.7 can also be obtained by specifying

```
MANOVA          Y BY CAT(1,2) DRUG(1,3)/
                DESIGN = CAT VS W+R, DRUG VS W+R/
```

1.8 Partitioning the Sum of Squares

Often it is desirable to partition the sum of squares associated with the various effects into a number of components that are more relevant to the individual questions of interest. See Cochran and Cox (1957).

In procedure MANOVA partitions are controlled by the keyword PARTITION followed by the name of the factor and the degrees of freedom associated with each component.

To partition the sum of squares for factor DRUG into two components with one degree of freedom each, the following commands can be used.