Chapter 1

MANOVA: Multivariate Analysis of Variance

SPSS MANOVA is a generalized multivariate analysis of variance and covariance program which will perform univariate and multivariate linear estimation and tests of hypotheses for any crossed and/or nested design with or without covariates. The user has complete control of the model specification. For example, several effects can be lumped together into a single term. Also, interaction between factors and covariates is allowed.

The sections beginning with 1.2 present univariate analysis of variance models, which include balanced incomplete block designs, confounding designs, nested designs, and split-plot designs. Special features such as collapsing error terms, specifying multiple error terms, partitioning degrees of freedom, contrasts, orthogonal polynomials and analysis of covariance are also discussed.

Tests of significance for a multivariate analysis of variance model include hypotheses and error matrices, four multivariate test criteria, dimension reduction analysis, univariate *F* tests, and step-down analysis. In addition, principal components analysis and discriminant analysis can be requested. They are documented beginning in Section 1.31.

The sections beginning with 1.38 present multivariate multiple linear regression analysis, which can be considered a special case of multivariate analysis of covariance in which all the independent variables are covariates. Canonical correlation analysis is also discussed.

MANOVA enables the user to analyze a large class of repeated measures designs. The observation can be either single-valued or vector-valued. Covariates, varying or constant across the repeated measures, can also appear in the model. These facilities are described beginning in Section 1.43.

Section 1.51 describes the graphics features available in MANOVA.

MANOVA may require an additional scratch file for which provision must be made in the job setup. See Appendix L for information for the IBM/OS version.

1.1 OVERVIEW

MANOVA specifications are entered via the MANOVA command itself and a number of optional subcommands that fall into the three categories outlined below. For more detail on these, see Section 1.52.

The MANOVA command has the following general format:

```
MANOVA          <dependent variable list> BY <factor list> WITH
                <covariate list>/
```

The MANOVA command, with no subcommands, is the only required specification. A dependent variable list of one variable activates univariate analysis; more than one dependent variable activates multivariate analysis of variance.

Subcommands in the first category specify the factor and data structures of the design. WSFACTOR provides the within-subjects factors for a repeated measures design.

```
WSFACTOR = <factor list>/
```