is appropri e for many research situations. For example, in the vigilance experiment, subjects assigned to the auditory display condition a_1 might find this m le of signal presentation unpleasant. As a result, two of the subjects mig t refuse to complete the experiment. In this example, unequal cell frequen es result from the nature of the experimental treatments. A least-square analysis, rather than an unweighted-means analysis, should be used. Computational formulas based on the data in Table 8.10-1 are given in Table 8.10-3.

TABLE 8.10-3 Computational Procedures for Least-Squares Solution for Type SPF-2.4 Design

$$SS_{total} = [ABS] - [X] = 235.500$$
$$SS_{between\ subj} = [AS] - [X] = 12.500$$
$$SS_A = [A] - [X] = 5.633$$
$$SS_{subj\ w.groups} = [AS] - [A] = 6.867$$
$$SS_{within\ subj} = [ABS] - [AS] = 223.000$$
$$SS_B = [B] - [X] = 194.500$$
$$SS_{AB} = [AB] - [A] - [B] + [X] = 15.634$$
$$SS_{B \times subj\ w.groups} = [ABS] - [AB] - [AS] + [A] = 12.866$$

The analysis is summarized in Table 8.10-4. In a least-squares analysis, the partitioned sum of squares add up to the total sum of squares.

Tests of simple main effects and comparisons among means have the same general form as tests based on equal cell frequencies. These procedures are illustrated in Sections 8.6 and 8.7. They generalize to the least-squares solution but require the substitution of the appropriate value for n.

TABLE 8.10-4 Analysis of Variance Table for Least-Squares Solution

	Source	SS	df	MS	*F*
1	Between subjects	12.500	$N - 1 = 7$		
2	A	5.633	$p - 1 = 1$	5.633	$[\frac{2}{3}] = 4.92$
3	Subj w.groups	6.867	$N - p = 6$	1.144	
4	Within subjects	223.000	$N(q - 1) = 24$		
5	B	194.500	$q - 1 = 3$	64.833	$[\frac{5}{7}] = 90.68$
6	AB	15.634	$(p - 1)(q - 1) = 3$	5.211	$[\frac{6}{7}] = 7.29$
7	$B \times$ subj w.groups	12.866	$(N - p)(q - 1) = 18$	.715	
8	Total	235.500	$Nq - 1 = 31$		

*$p < .01$.