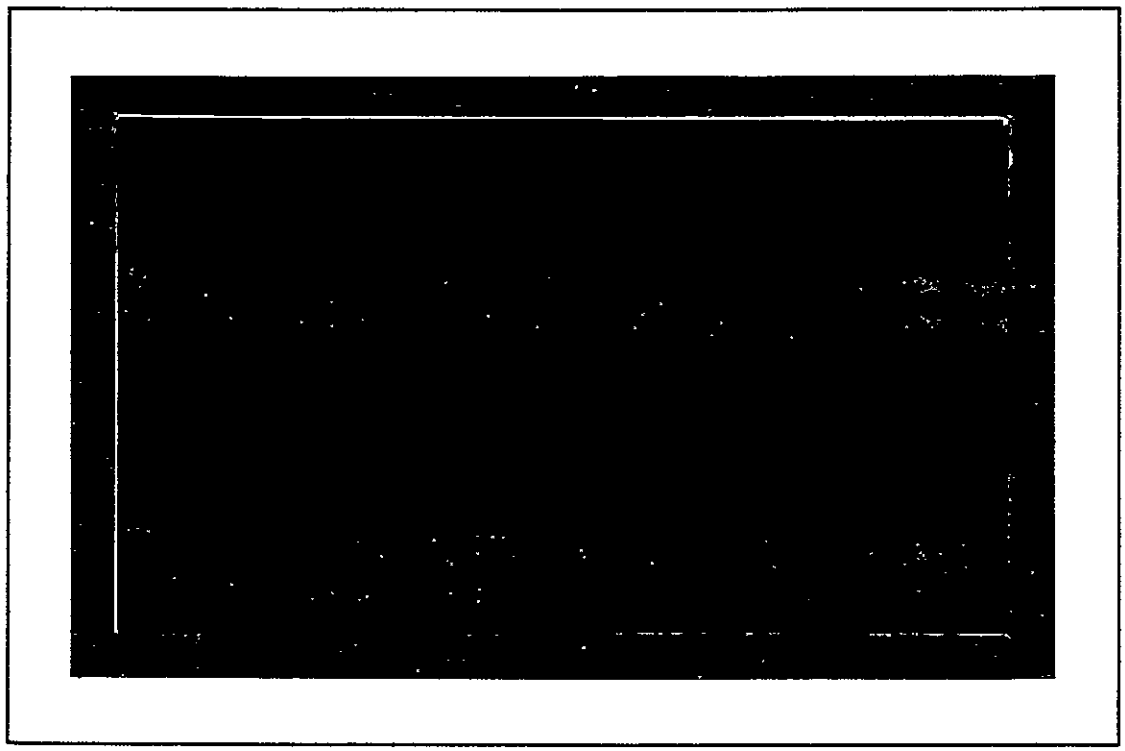

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Double-cross validation of eye scan measurements obtained during simulator landing

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Project Monitor

Double-cross validation of eye scan measurements obtained during simulator landing

Summary

A double-cross validation study was done to evaluate the usefulness of principal factor components derived from eye scan measurements. The results show that 11 of the components reported by Dick, Brown and Bailey (1976) meet validity requirements. These 11 components account for approximately 54-59% of the variance in the data. When turbulence and instrument changes are made in the flight conditions, the components can be used to classify correctly up to 60% of the cases.

Introduction

Eye scanning has been used as an index to evaluate cockpit instrument layout for a number of years. The measures applied have been mean dwell (the average time on each instrument), the standard deviations of dwell times, and transition probabilities from one instrument to another. These measures have been used as direct indices of both the pilot's behavior and the usefulness of the instruments.

In the commercial jet transport (737) there is considerable redundancy in the instrument display. Because the pilot will take advantage of these redundancies and further because any change in the instruments should produce changes in eye scanning behavior, the analysis must be able to handle these changes. Note that the eye scanning changes that occur will be relative. If an instrument is removed, the time that would have been spent on that instrument will be distributed (more or less) across the remaining instruments.

The problem in analysis is determining what goes with what - a problem of correlation. As the instrument packages change, the terms of the correlations will change. For this reason, principal components factor analysis was selected because it is both a correlational technique and a simplifying technique.

Dick et al. (1976) used principal components analysis on a number of eye scan measures. Entry of 70 variables resulted in 18 components. These 18 components were then used as new variables in discriminant analysis to "predict" membership according to conditions, pilots, or segments of approach. Percentage of correct classification varied from better than 50% for segments to about 85% for pilots. The components were useful in differentiating among various experimental variables. Because of the potential of the technique, the next step is a validity study which is the subject of this report.

Validity refers to the degree which test scores can predict some criterion measure. In the present situation, the test scores are converted to factor scores; the criteria are conditions, pilots, segments or some combination of these.

The importance of a validation study lies in assessing the stability and generalizability of the factor components. To be useful, of course, the components must show stability not only across data sets but within data sets. Furthermore, factor analysis is known to be volatile. Because the resulting components are dependent on the data matrix entered, it is especially important to determine if any of the components are unique to some hidden aspect of the data set. This report discusses additional statistical work done on the Langley

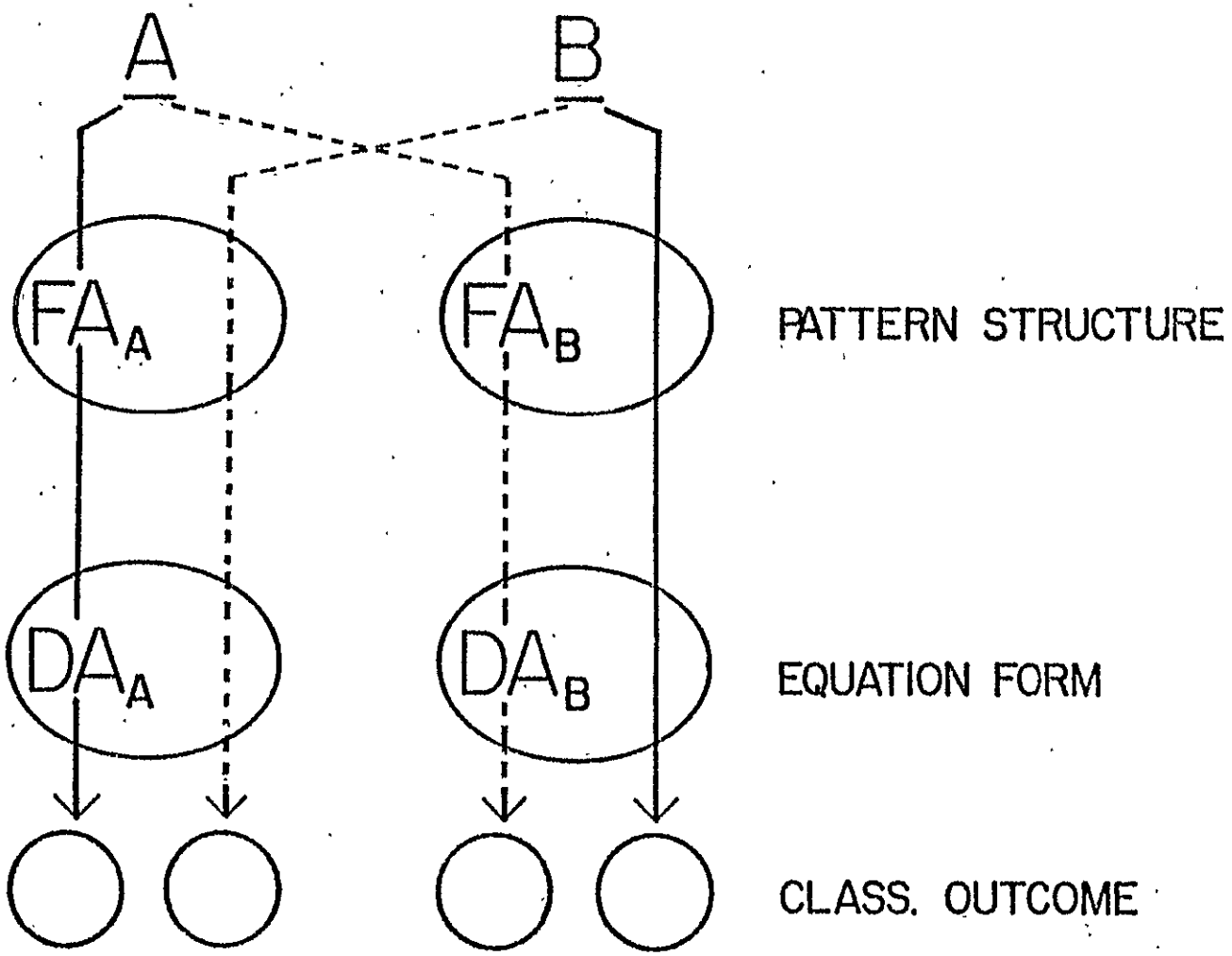
Workload Study (Spady & Waller, 1975), following the basic work reported in Dick et al. (1976).

The particular approach adopted is the double-cross validation (Guilford, 1954). Although seldom used, it is a rigorous assessment of validity. We can assess the agreement at several points in the analysis sequence, and simplify the outcome by setting aside the points of disagreement.

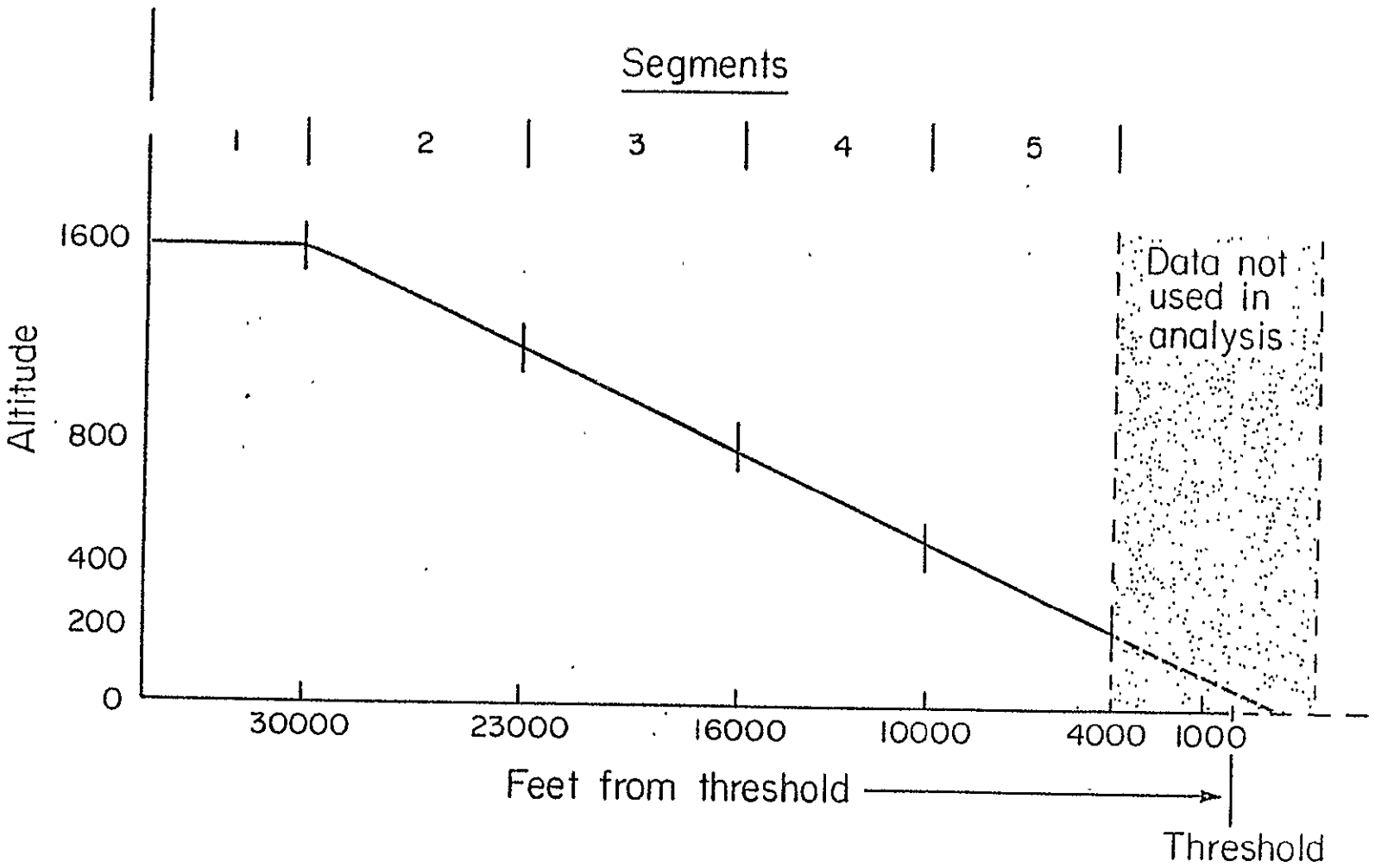
Figure 1 is a schematic representation of the double-cross validation procedure. The data from the simulator runs were randomly sorted into two equal groups, A and B. (Some runs were randomly excluded to make the groups equal.) BMD-P (Dixon, 1975) was then used to analyze the data. The two data groups were parallel with each group containing examples of each condition, pilot, and segment. A list of the variables used is provided in Appendix A.

To make the full range of comparisons illustrated in Figure 1, it is necessary to run the data through a number of steps. The following steps were carried out:

Step 1A: Factor analysis was done on Group A data. (Group B



"Figure 1: Schematic of double-cross validation. The circles represent points of comparison between the two parallel data sets, A and B."


Segments
1
2
3
4
5
1600
800
400
200
0
Altitude
Data not used in analysis
30000
23000
16000
10000
4000
1000
Feet from threshold
Threshold

was present for reasons unique to BMD-P but not used in the analysis.) Purpose: Preparation for Step 2.

Step 1B: Factor analysis was done on Group B data. Group A was present but not used in the analysis.

Step 2: The coefficients of congruity were calculated from the two rotated factor loading matrices. Purpose: Comparison of the components from the two analyses.

Step 3A: Factor scores were calculated on both A and B using the Group A factor analysis results. Purpose: Preparation for Step 4.

Step 3B: Factor scores were calculated on both A and B using the Group B factor analysis results.

Step 4A: Discriminant analysis was run on Step 3A results. This not only permits classification of Group A which was in the factor analysis, but also Group B which did not enter the factor analysis.

Step 4B: Discriminant analysis was run on Step 3B results.

Step 5: Comparison of the results in discriminant analysis. Tabulation of "old" and "new" cases correctly classified.

Factor Analysis

The purpose of the factor analysis is two-fold. It is necessary as a first step for all subsequent analyses. It also permits comparison of the consistency of the components which is discussed in the following section. Tables 1A and 1B provide the full list of the rotated factor loadings of each variable on each component. The presentation of the tables provides the opportunity for the interested reader to examine some of the minor loadings.

Coefficient of Congruity

This analysis compares the two rotated factor loading matrices (Tables 1A and 1B). The outcome is a correlation matrix (for principle components) which therefore provides an index of the agreement of the two-factor loading sets.

Theoretical Expectations. If the two-factor analyses showed perfect agreement we would get 18 significant coefficients. The remainder would be non-significant. (More than 18 would imply

Table 1A

Rotated factor loadings for each variable in each component. Eigenvalues are provided (VP).
(There were 70 variables used in the analysis.)
Variable numbers in left column match those in Appendix A.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
06	158	058	915	-051	-080	-029	-002	-047	142	-032	-016	-022	014	005	-009	005	028	079
07	034	060	879	-048	-110	195	-036	-125	041	-059	002	024	-049	030	-004	-024	036	-058
09	-031	-096	174	028	134	-095	-055	028	017	-042	-151	-121	111	-170	-061	-041	-005	-336
10	146	024	163	035	031	014	010	004	057	061	-023	-042	030	-016	-161	-014	-050	690
11	031	046	886	-048	-089	191	-038	-115	051	-060	-013	012	-039	022	-018	-017	042	-041
12	-230	161	-070	-084	-300	096	470	142	-085	-300	-041	513	-128	018	040	-063	051	-009
13	-110	002	024	-007	-078	817	-058	-163	272	-053	029	-066	270	041	041	008	010	003
14	-063	-055	-200	119	733	316	-262	006	-128	-004	-007	041	079	-152	102	015	078	057
15	857	219	050	041	-159	000	-035	-066	048	-051	057	-037	-083	-013	006	-027	-024	051
17	-112	-015	012	-032	-068	845	-069	-153	211	-041	028	-082	253	035	025	017	015	041
18	042	109	152	055	-052	120	-031	-060	872	-005	109	022	022	-017	091	010	-013	066
19	-034	-017	-083	-013	007	-084	-133	-094	157	-011	026	698	-007	046	072	-040	-044	025
20	177	077	058	085	019	-047	-055	-064	565	-054	-065	092	005	019	017	001	064	-164
22	-110	-029	-191	104	728	351	-262	-020	-134	-004	-001	015	038	-168	096	019	063	039
23	-006	-053	-004	066	034	-066	-153	-001	066	-036	097	520	047	-077	056	-017	260	489
24	-054	-026	-085	120	882	-087	-128	104	-024	019	068	111	082	-070	017	-001	-017	-029
25	255	-167	-012	018	174	047	-080	057	-083	112	018	444	606	085	-095	010	-141	-143
27	889	199	047	059	-079	-076	-033	-036	106	-075	040	006	014	023	037	-034	-005	033
28	278	-092	-034	-099	017	000	-104	-061	485	078	-004	081	-056	044	-164	069	-060	-273
29	131	-122	039	014	067	228	-097	-022	-114	149	015	481	549	000	-137	-011	-165	-075
30	889	132	174	041	-071	-070	-019	-075	164	-048	011	053	048	001	006	-005	-044	066
31	157	035	825	-048	-045	-078	066	076	177	-063	-056	-051	033	-044	032	012	-048	039
32	-236	048	-089	-120	-253	-149	715	030	-109	-028	-041	-049	022	016	036	-032	-060	048
33	037	194	248	024	053	-004	-007	024	684	-022	-017	076	-044	-017	053	-039	-084	179
34	-128	190	007	-023	798	-170	-094	138	089	095	055	-016	-008	054	-027	-053	-069	-030
35	771	151	170	036	-027	-133	049	-044	085	-045	-054	015	021	007	016	056	-075	014
36	147	052	851	-031	-064	-054	011	-005	132	-027	-037	-039	022	-026	003	056	-029	075
37	-229	031	-050	-103	-269	-139	595	115	-073	063	-080	-128	033	021	089	-031	-188	075
38	097	129	159	011	-052	057	-055	-010	766	020	-032	-032	-005	051	097	033	008	124
39	-032	125	-091	054	838	-165	-136	031	064	063	056	-018	024	027	-062	-053	-054	-022
40	831	148	112	038	-023	-107	-014	-115	106	-006	-010	046	016	061	014	060	-046	024
41	-009	030	-060	903	075	-031	-062	018	035	-014	179	-047	-022	015	-029	009	-015	003
43	-075	-004	-074	787	090	008	-077	-040	033	-059	037	240	-021	-055	-005	003	-015	-061

46	040	003	028	048	-046	003	-033	013	052	-001	-022	-066	-004	008	-026	818	-035	060
49	-006	097	-006	-008	-010	-024	002	-054	-021	-026	-003	036	-004	-010	011	803	007	-063
52	-163	-067	-103	026	088	135	-032	855	-056	-052	-006	002	-056	002	-053	004	045	001
53	-094	-048	095	-079	012	797	-126	319	-140	-069	-032	003	-057	013	-056	-031	079	002
55	017	-068	029	009	217	046	182	109	-059	073	-072	137	-015	-345	416	030	103	015
56	-078	-014	-076	876	085	-002	-098	-050	022	-077	063	231	-011	-055	-009	005	-023	-056
57	-091	-031	112	-069	039	826	-103	293	-147	-057	-051	038	-044	-029	-044	-036	042	006
58	022	-229	127	-156	-067	007	526	038	-076	-576	016	-309	-060	-001	-099	-043	003	-045
59	142	800	123	064	072	296	-133	-034	110	-084	043	-001	016	-059	018	056	-060	070
60	-196	-249	-175	-068	200	044	-543	-261	-060	070	-045	135	314	-199	248	-050	035	181
63	169	775	068	083	068	308	-130	-046	126	-128	030	003	-111	-054	-010	038	-053	080
64	256	877	105	040	-021	-120	-078	-099	147	-046	-041	009	-037	009	-028	055	-006	038
65	-148	071	-041	-104	029	193	-089	-010	053	002	-042	-085	705	038	059	004	248	080
67	-051	-055	-058	000	052	061	024	055	-028	484	026	010	005	-334	-136	-022	436	-027
68	-124	-029	031	-086	-055	071	-063	027	-006	027	-019	-022	027	016	012	-031	703	021
70	-067	-067	-004	-072	040	004	-027	010	-078	539	007	-020	032	086	134	032	456	-029
73	-186	-250	-146	-143	242	013	-530	-241	-058	097	-046	005	317	-191	288	-024	027	182
74	049	053	-008	-055	-035	-025	-060	-014	126	075	-037	038	019	103	720	-029	-060	-106
75	-149	-220	-143	-168	026	-134	-311	-186	032	728	-052	099	058	009	230	-017	-035	052
78	498	050	067	023	061	084	-015	050	-022	-044	150	-043	517	012	129	-004	-071	-013
79	265	347	-132	-110	066	-139	-227	-187	296	-024	-166	-186	113	014	-114	-074	220	-050
80	222	-079	059	-135	-013	-029	-172	-131	125	412	033	-131	019	122	501	036	216	-014
81	259	149	-016	712	044	-060	-074	133	014	-035	099	-199	-027	003	-081	037	-079	141
82	-037	-078	-044	071	065	005	022	881	-056	-110	079	-051	081	-070	002	-037	-011	-025
83	161	-276	-030	-142	-086	-074	644	-183	-073	-182	-017	-039	-059	015	-015	006	049	029
84	194	833	012	045	025	-205	088	-055	069	-149	-045	-075	-001	038	015	018	-021	-027
85	-034	-115	-076	-049	050	-068	-055	-109	-041	845	-037	042	-010	-037	-038	-033	-001	029
86	192	126	-005	766	014	-073	-077	068	015	-051	076	-200	-005	038	-029	008	-044	066
87	-079	-066	-064	-009	068	034	038	883	-030	-091	-021	-079	-014	-086	025	-017	012	020
88	059	-306	021	-189	-159	-132	682	-129	-062	-230	-002	-085	-041	024	-039	-004	026	-009
89	156	857	019	053	063	-193	022	-024	053	-053	-037	-056	036	012	007	009	015	-032
90	-219	-090	-087	-223	072	-178	-084	-168	031	506	-050	-252	053	022	265	-065	-215	103
91	-285	020	050	191	-095	-140	-001	-187	-190	-065	361	-051	-113	-275	-198	069	027	-093
93	028	-044	-073	219	095	000	-035	032	022	-030	925	-002	030	-009	-028	-027	-014	012
94	009	-136	028	-003	-005	-013	010	-014	-096	-049	-040	035	105	776	-018	075	078	061
95	078	-033	-050	149	081	-001	-032	048	-007	-023	927	020	027	-028	-014	-020	-012	018
96	-047	-097	047	026	122	-049	-166	129	-150	-042	035	-011	069	-686	-111	086	055	052
VP	5.146		4.399		3.863		3.475		3.082		2.078		1.932		1.519		1.371	
		4.487		3.958		3.738		3.104		2.917		2.046		1.645		1.405		1.227

Table 1B

Rotated factor loadings for each variable in each component. Eigenvalues are provided (VP).
(There were 69 variables in the analysis.)
Variable numbers in left column match those in Appendix A.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
06	111	961	045	014	-043	-080	-032	063	-014	002	-026	-002	-018	003	010	-057	-017	-024
07	055	944	046	-006	-026	-115	-023	058	-009	-040	-011	-029	025	-010	-008	020	030	012
09	034	101	-021	087	058	156	183	-003	113	753	-043	-036	-073	-043	289	028	-029	040
10	088	254	147	-051	-018	020	030	022	021	-057	-040	071	067	020	040	-527	-160	-141
11	069	952	056	-010	-026	-109	-038	060	-012	-035	-014	-030	023	-017	015	-021	018	019
12	-111	024	237	614	256	-296	086	047	041	-406	-022	-280	055	-021	175	009	042	016
13	-073	024	-007	138	-031	-152	011	828	-109	-053	118	-180	218	044	210	019	041	-072
14	-050	-194	-067	-306	188	692	095	-066	151	-152	067	064	180	-055	148	085	184	025
15	865	080	221	-031	-033	-138	082	-034	-027	-082	-030	008	-026	065	043	-036	-039	012
17	-113	011	-013	-113	-011	-152	011	805	-088	-031	104	-133	236	066	232	-101	032	-079
18	064	103	169	-050	-061	-024	039	871	-020	-040	105	153	-076	-002	-054	097	-019	037
19	-043	-067	-060	-111	-035	044	-052	040	-053	037	088	740	-029	074	-026	004	024	000
20	238	132	069	-141	-121	009	031	212	-115	-072	-069	034	-080	-175	-050	487	079	004
22	-074	-187	-071	-305	188	698	091	-054	149	-175	061	047	120	-039	159	109	184	028
23	-018	-025	053	-064	-036	110	-025	028	-050	055	-051	699	-010	-128	-016	004	156	053
24	-062	-095	-043	-161	030	833	064	-068	-009	335	012	052	-021	053	049	029	015	-002
25	162	-074	-196	-297	-095	094	-080	-133	-057	738	123	166	004	007	-133	-043	-021	-046
27	882	114	231	-044	-039	-140	089	011	-033	-060	-012	-016	-031	017	026	024	-020	002
28	180	052	-078	-078	-061	-050	-021	074	-006	023	-033	634	-007	079	064	-083	-110	-110
29	088	-079	-190	-315	-120	134	-073	-109	-090	735	067	075	005	-013	-163	-007	-003	-015
30	895	148	114	-077	-072	-064	040	030	-029	181	025	043	-042	002	-009	055	-040	-022
31	129	902	012	066	031	-055	-016	082	004	025	-032	-002	-062	-061	-037	-030	-001	038
32	-193	-098	006	770	-023	-226	-038	-136	-050	-011	-023	-019	-055	038	-080	006	-035	-028
33	072	194	203	071	053	054	-025	610	074	-044	-115	282	-127	-095	-214	118	-095	173
34	-123	-079	141	-083	131	829	-087	-017	066	100	005	021	-086	021	-082	-050	-064	-050
35	802	165	106	-009	-102	066	-004	029	-060	102	-011	041	-055	037	-101	063	022	023
36	191	903	-021	016	-022	-069	-012	070	-041	012	-043	000	-040	012	015	003	028	-036
37	-173	-050	054	678	041	-237	022	-069	049	-016	-057	-004	-079	084	-130	-006	-047	-067
38	212	157	139	014	-041	069	016	693	072	-051	-043	175	-055	-003	-191	053	026	038
39	-022	-075	066	-124	043	866	-036	-030	-009	131	024	026	-041	023	-052	-040	-045	-029
40	844	108	079	-067	-099	-068	044	037	-056	125	028	062	-060	040	-048	053	-011	023
41	-018	011	064	-064	-023	034	906	-028	-102	-084	108	-022	-081	-041	-067	015	-057	005
43	-049	-076	-022	-065	-007	007	825	102	-097	291	-119	-096	104	-050	176	-105	045	-016

```
46     not used in this analysis - all observations were 0.0
49     065 -003  061 -032 -027 -035  009  034 -010 -014 -047 -045  009  031  029  028 -074  872
52    -113 -133 -038 -004  905  137 -043 -076 -039  024  056 -019 -041 -071 -037 -001 -005  000
53    -021  118 -084 -117  762 -017  006  022 -057 -029 -021 -074  356 -110  135 -040  134 -029
55    -023 -062 -021 -021  004  061 -011 -039  077 -032 -019  003  758  014 -050  008 -110  033
56    -038 -069 -015 -068 -006  015  837  103 -101  292 -112 -094  051 -058  176 -102  048  008
57    -108  107 -065 -121  745  001 -018  005 -070 -034 -054 -057  429 -086  149 -040  072 -037
58     080  163 -062  704  166 -019 -033  077 -199 -237  016 -123 -029 -011  378 -020  023  037
59     167  033  842 -138  049 -017  078  196 -124 -049 -041 -011 -026  058  020  006  052  028
60    -088 -116 -246 -340 -149  250 -031 -006  483  145 -025  284  124  000  424  081  121 -004
63     175  000  823 -138  024 -018  105  245 -136 -054 -021 -023 -033  075  002 -040  023  018
64     215  052  901 -081 -144 -010  059  073 -074 -035 -050  005 -035  021 -064  011  015 -004
65    -078  053  094 -030  076  068 -083  013  063 -032 -041  074 -048 -023  030  073  795 -080
67    -110 -008 -123 -136  162  055  031  008  396 -064  060 -027  279  026 -042  086  296  098
68    -076 -013 -091 -059  016 -056  008  169  069 -001 -050 -036  751 -076  073 -050  064 -046
70    -111  086 -059 -090  113 -050 -028 -060  628  112  012 -023  238  140 -009  156  064  095
73    -091 -091 -270 -313 -154  281 -066 -032  451  161 -051  305  113  021  431  115  126 -012
74    -004 -045  161 -101  034  088 -156  073  188 -082 -101 -049  096  020  147  471 -291 -318
75    -154 -112 -233 -381 -217  013 -185 -067  663  017 -021  089 -030 -034 -121 -046  003 -013
78     463  020  124 -093  030  059  006  043 -117 -107  060 -034  016 -027  308 -147 -163  144
79     339 -091  385 -045 -227  251 -031  192  072 -055 -117 -103  062 -119 -111 -144  193 -070
80     279  103  029  000 -070  088 -126  071  514  012  021 -151  140 -015  052  377 -059 -160
81     209 -032  201 -046  006 -021  750 -022 -119 -161  238  028 -024 -042 -115  058 -065  064
82    -032 -038 -024  096  861  143  009 -022 -019 -035  092 -011 -143  000 -054  002 -029  033
83     005  035 -253  739 -117 -078 -158 -063 -173 -068  024 -079 -013 -020 -033 -026  004  026
84     129  036  830  031 -062  056  029 -074 -045 -083  035 -049 -057 -007  033  021 -021  029
85    -035 -099 -104 -168 -096  029 -138 -039  600 -034 -059 -097 -147 -216 -086 -296 -010 -035
86     176 -001  122 -034 -012 -016  815 -065 -088 -207  149  022 -026 -049 -126  033 -060 -017
87    -020 -072 -013  065  865  097 -002 -017 -004 -064  051 -045 -131 -001 -094  004  015 -024
88     009  056 -239  780 -097 -082 -131 -046 -121 -057  010 -074 -014 -014 -064 -028  005  013
89     091  045  868  014 -030  029  041 -014 -041 -073  061 -011 -034 -039 -034  007 -014  003
90    -071 -030 -058  072 -066  115 -218  006  735 -130 -041 -092 -038 -088  075 -113 -026 -062
91    -371  056  030 -023 -104 -054  121 -209 -042 -031  314 -152 -138 -402  193  046 -249  110
93    -004 -063 -016 -022  071  052  110  108 -024  034  949  003 -038 -027  000 -019 -016 -026
94     108 -015 -107 -058 -029  029 -146 -007 -076 -092  009 -055 -056  766 -006 -117  032 -008
95     015 -061 -001 -013  083  046  078  060 -015  049  950  010 -023 -041 -004 -016 -006 -025
96     025  052 -232 -141  235  004  020 -009  018 -063  075 -069  048 -673 -030 -048  106 -068
VP  4.967     4.775     4.063     3.821     3.000     2.210     1.997     1.327     1.216
       4.916     4.188     3.839     3.399     2.566     2.099     1.457     1.223     1.076
```

non-orthogonal rotations.) Less than 18 implies that some of the components are not consistently obtained in the two parallel data sets. Accordingly, one should ignore or reject components which do not show high coefficients. The ordering of the components between the two sets may change without seriously disrupting the coefficients. In the present case, for example we observe a high coefficient between component 2 and component 3 of the respective analyses.

Results. The coefficients are shown in Table 2. Because the coefficients may be treated as correlations, squaring the coefficient will index the percent of variance accounted for by the pairings. If we use as a conservative cutoff only coefficients which show 50% or more common variance ($r > .704$), we have eleven components which qualify. For comparison purposes, some analyses are reported later which use all components and some which are based on just the 11 components.

Factor Analysis - Summarized

Because the eleven components appear strongly in both factor analyses, they show reasonable validity. The remaining components, however, do not pass the requirement; the lack of consistency shows that they are not generalizable across parallel data sets and should not be used. It should be noted, however,

Table 2

Coefficients of congruity. The entries may be treated as correlation coefficients. They are the normalized covariance (cross products) of variables by components for the two analyses. Group A components across top; Group B down side. (See Tables 1A and 1B)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	975	341	264	089	-093	-115	-074	-118	327	-125	-013	-029	094	130	028	062	-109	063
2	247	119	983	-082	-226	068	072	-093	267	-137	-067	-094	-057	028	-048	026	024	086
3	346	980	144	156	-020	-042	-024	-040	322	-215	-002	-106	-119	081	004	057	-078	101
4	-103	-089	059	-194	-456	-191	928	081	-084	-425	-061	-244	-290	133	-100	-057	-086	-042
5	-196	-075	-031	013	151	419	027	899	-193	-178	057	-044	-086	-151	-073	-051	117	-018
6	-100	-003	-215	086	967	-036	-436	115	-010	142	058	055	214	-149	121	-055	021	026
7	099	172	-047	946	084	008	-108	062	037	-195	222	005	-094	-128	-170	037	-056	001
8	072	204	211	029	-086	465	-117	-138	791	-093	060	-032	117	059	131	022	063	144
9	-206	-224	-141	-260	180	-122	-360	-181	-020	833	-109	-056	137	-146	517	-064	260	119
10	080	-178	017	086	241	-062	-239	-047	-054	173	002	371	459	-059	-109	-013	-134	-266
11	035	-042	-079	229	100	044	-027	093	-061	-053	940	-018	083	-076	-121	-012	-043	-010
12	098	-069	-039	-029	166	-126	-327	-096	344	082	019	514	164	-040	060	-021	-024	280
13	-125	-129	-031	-065	106	488	-124	-010	-140	105	-096	085	085	-220	288	-008	601	047
14	090	018	-026	-113	-052	017	113	-050	007	-041	-128	021	038	779	109	031	-050	003
15	-149	-169	-051	-021	127	356	-220	-179	-202	-208	032	-044	220	-185	232	-019	117	-039
16	043	034	-026	-023	028	-030	-098	-035	230	-021	-018	020	-009	-028	531	043	160	-338
17	-148	-016	-073	-087	142	279	-197	-015	-032	031	-123	058	408	-119	-092	-061	464	110
18	018	076	031	070	-005	-067	057	-001	-016	-097	032	050	-075	-092	-191	582	038	-058

that not all 11 of these components will be relevant to any particular experimental variable such as conditions (Dick et al, 1976).

In Table 3 we have provided an abbreviated listing of the variables which load heavily on each component. As a result of the coefficient of congruity evaluations, component labels are provided for just those components which show high correlations (validity) between the two analyses.

Discriminant Analysis

Discriminant analysis was done on both Group A and Group B data in several ways. Because this was a validation study, it seemed sufficient to concentrate on one of the experimental variables analyzed by Dick et al. (1976); namely, Conditions. The data were analyzed in two ways. One way was to let all data and all components enter the equations. The other way was to use only the eleven components which showed high consistency and that half of the data originally used in the principal components analysis. The other half of the data was "passively" classified; for example, Group A data were used to generate the equation and Group B data were classified based on the Group A equation.

Table 3

Abbreviated factor loading tables for the two analyses. Only the primary loadings are listed. The percent figure indicates the amount of variance accounted for by that component in the data set. The other numbers indicate the loading (correlation) of that variable with the component. The variable list is provided in Appendix A. Factors without labels show low correlations between analyses. (Table 2)

Group A

Factor 1 "Vertical Velocity" 7.4%	
Rate of Climb - Rate of Climb	889
F. D. - Rate of Climb	889
Rate of Climb - F. D.	857
S. D./Rate of Climb	831
Mean Dwell/Rate of Climb	771

Factor 2 "Vertical Guidance" 6.4%	
G. S. - G. S.	877
S. D. - G. S.	857
Mean Dwell/Glide Slope	833
Glide Slope - Cmmd bars	800
Cmmd Bars - Glide Slope	775

Factor 3 "Airspeed I" 6.3%	
Airspeed - Airspeed	915
Airspeed - F. D.	886
F. D. - Airspeed	879
S. D.- Airspeed	851
Mean Dwell - Airspeed	825

Group B

Factor 1 "Vertical Velocity" 7.2%	
Rate of Climb - Rate of Climb	895
F. D. - Rate of Climb	882
Rate of Climb - F. D.	865
S. D./Rate of Climb	844
Mean Dwell/Rate of Climb	802

Factor 2 "Airspeed I" 7.1%	
Airspeed - Airspeed	961
Airspeed - F. D.	952
F. D.- Airspeed	944
S. D./Airspeed	903
Mean Dwell/Airspeed	902

Factor 3 "Vertical Guidance" 6.9%		
64	Glide Slope - Glide Slope	901
89	S. D./Glide Slope	868
59	Glide Slope - Cmmd bars	842
84	Mean Dwell - Glide Slope	830
63	Cmmd bars - Glide Slope	823

Factor 4 "Roll"	5.7%
Roll - Roll	903
Cmmd bars - Roll	878
Roll - Cmmd bars	876
S. D. - Roll	766
Mean Dwell - Roll	712

Factor 5 "Horizontal Situation"	5.5%
HSI - HSI	882
S. D. - HSI	838
Mean Dwell - HSI	798
HSI - F. D.	733
F. D. - HSI	728

Factor 6	5.3%
F. D. - Altimeter#	845
Speed buq - Cmmd bars*	826
Altimeter - F. D.#	817
Cmmd bars - Speed buq*	797

Factor 7 "Flight Director"	5.0%
Mean Dwell - F. D.	715
S. D. - Cmmd bars	682
Mean Dwell - Cmmd bars	644
S. D. - F. D.	595
Loc - Cmmd bars$	-543
Cmmd bars - Loc$	-530

Factor 4 "Flight Director"	6.1%
Cmmd bars - Cmmd bars	704
S. D. - Cmmd bars	780
Mean Dwell - F. D.	770
Mean Dwell - Cmmd bars	739
S. D. - F. D.	678

$(See Factor 7, Group A; Factor 15, Group B.)

Factor 5 "Airspeed II"	5.9%
Speed bug - Speed bug	905
S. D. - Speed bug	865
Mean Dwell - Speed bug	861
Cmmd bars - Speed bug*	762
Speed buq - Cmmd bars*	745

Factor 6 "Horizontal Situation"	5.6%
S. D. - HSI	866
HSI - HSI	833
Mean Dwell - HSI	829
F. D. - HSI	698
HSI - F. D.	692

Factor 7 "Roll"	5.5%
Roll - Roll	906
Roll - Cmmd bars	825
Cmmd bars - Roll	815
S. D. - Roll	815
Mean Dwell - Roll	750

Factor 8 "Airspeed II"	4.4%
S. D. - Speed bug	883
Mean Dwell - Speed bug	881
Speed bug - Speed bug	855
*(See Factor 6, Group A and Factor 5, Group B.)	

Factor 9 "Altitude"	4.4%
Altimeter - Altimeter	872
S. D. - Altimeter	766
Mean Dwell - Altimeter	684
Rate of Climb - Altimeter	565
#(See Factor 6, Group A; Factor 8, Group B.)	

Factor 10 "Localizer"	4.2%
Mean Dwell - Localizer	845
Localizer - localizer	728
Cmmd bars - Cmmd bars	576
Localizer - Cell 7	539
S. D. - Localizer	506

Factor 11 "Aircraft Parameters I"	3.0%
Localizer Error	927
Distance from Center line	925

Factor 12	2.9%
HSI - Altimeter	698
Altimeter - HSI	520
F. D. - F. D.	513

Factor 8 "Altitude"	4.9%
Altimeter - Altimeter	871
Altimeter - F. D.#	828
F. D. - Altimeter#	805
S. D. - Altimeter	693
Mean Dwell - Altimeter	610

Factor 9 "Localizer"	4.3%
S. D. - Localizer	735
Localizer - localizer	663
Localizer - Cell 7	628
Mean Dwell - Localizer	600
Localizer - Cell 9	514

Factor 10	3.7%
HSI - Airspeed	753
Rate of Climb - HSI	738
HSI - Rate of Climb	735

Factor 11 "Aircraft Parameters I"	3.2%
Localizer Error	950
Distance from Center line	949

Factor 12	3.0%
HSI - Altimeter	740
Altimeter - HSI	699
Altimeter - Rate of Climb	634

Factor 13	2.8%
Localizer - Glide Slope	705
Rate of Climb - HSI	606
HSI - Rate of Climb	549
Cmmd bars - Cell 9	517
Factor 14 "Aircraft Parameters II"	**2.4%**
Glide Slope Error	776
Aircraft Airspeed	-686
Factor 15	**2.2%**
Glide Slope - Localizer	720
Localizer - Cell 9	501
Factor 16	**2.0%**
Roll - Cell 3	818
Glide Slope - Cell 3	803
Factor 17	**2.0%**
Cmmd bars - Cell 7	703
Factor 18	**1.8%**
Rate of Climb - Airspeed	690
Percent variance accounted for	
All 18 factors	73.4%
Labeled factors	54.5%

Factor 13	2.9%
Localizer - Speed bug	758
Cmmd bars - Cell 7	751
Factor 14 "Aircraft Parameters II"	**2.1%**
Glide Slope Error	766
Aircraft Airspeed	-673
Altitude	-402
Factor 15	**1.9%**
Cmmd bars - Localizer	431
Cmmd bars - Cell 9	308
Localizer - Cmmd bars$	424
Factor 16	**1.8%**
Rate of Climb - Airspeed	-527
Glide Slope - localizer	471
Rate of Climb - Altimeter	487
Factor 17	**1.8%**
Localizer - Glide Slope	795
Factor 18	**1.6%**
Glide Slope - Cell 3	872
	70.3%
	58.5%

Active and Passive Classification

Discriminant analysis may be opportunistic in as much as equations are developed on a set of cases and then those equations are used to classify the very cases used to develop the equations. A pseudo-jackknife technique was developed to reduce these difficulties by leaving one case out of the equation. A second, much more powerful technique is to use a portion (e.g. half) of the cases to develop the equations and then use those equations to classify all of the cases. The latter technique was used; the BMD-P program (BMDP7M) automatically gives the pseudo-jackknife results in addition.

A second feature of the BMD-P program is the step-wise analysis. Results are printed after each variable is entered. This permits us to evaluate the contribution of each variable in terms of differentiating the cases. For economy of presentation, we will discuss the major features of the results; the tables supporting the discussion appear in Appendix B.

Step by step. The first component to be entered is "Airspeed I." It has the effect of discriminating Condition I from the remaining Conditions. (Condition I is the one in which the Speed Bug in the Flight Director is disabled.) Other

components are useful in defining Cond I but it is so well defined by Airspeed I that further improvement is negligible.

The second component to enter is "Horizontal Situation." This one serves to discriminate Conditions III and V from II, IV, and VI; specifically the conditions in which the Command Bars are inactive from those where they are active. It may be noted that within the groupings, e.g. III and V and II, IV-VI, there is very poor separation. The horizontal situation indicator can be used as a substitute for command bars.

The third component is "Flight Director." This is largely monitoring of command bars. Because the command bars are absent in Conditions III and V, this component in part serves the same function as the second component. In addition, because turbulence increases across Conditions II, IV and VI, there are changes in the need for the pilot to use/monitor command bar information. Accordingly, the component "Flight Director" serves to separate partially these Conditions.

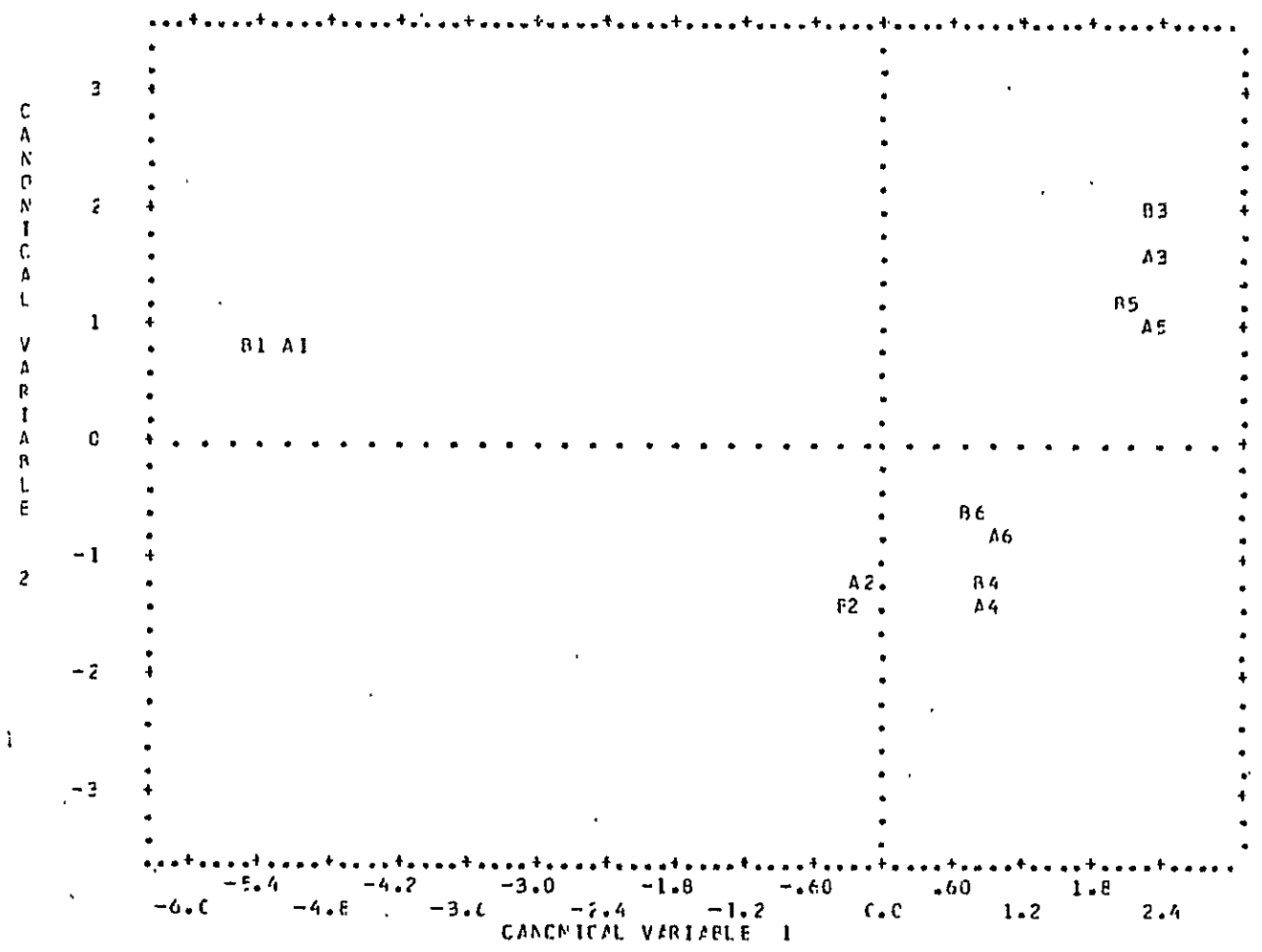
The fourth component is "Airspeed II" or use of the Speed Bug. The pilot cannot use it in Condition I and uses it relatively little in Conditions II and III. Accordingly, Condition II can be separated from IV and VI and Condition III from V. Conditions IV, V, and VI have turbulence and possibly

the pilot is using this instrument as an aid to thrust management.

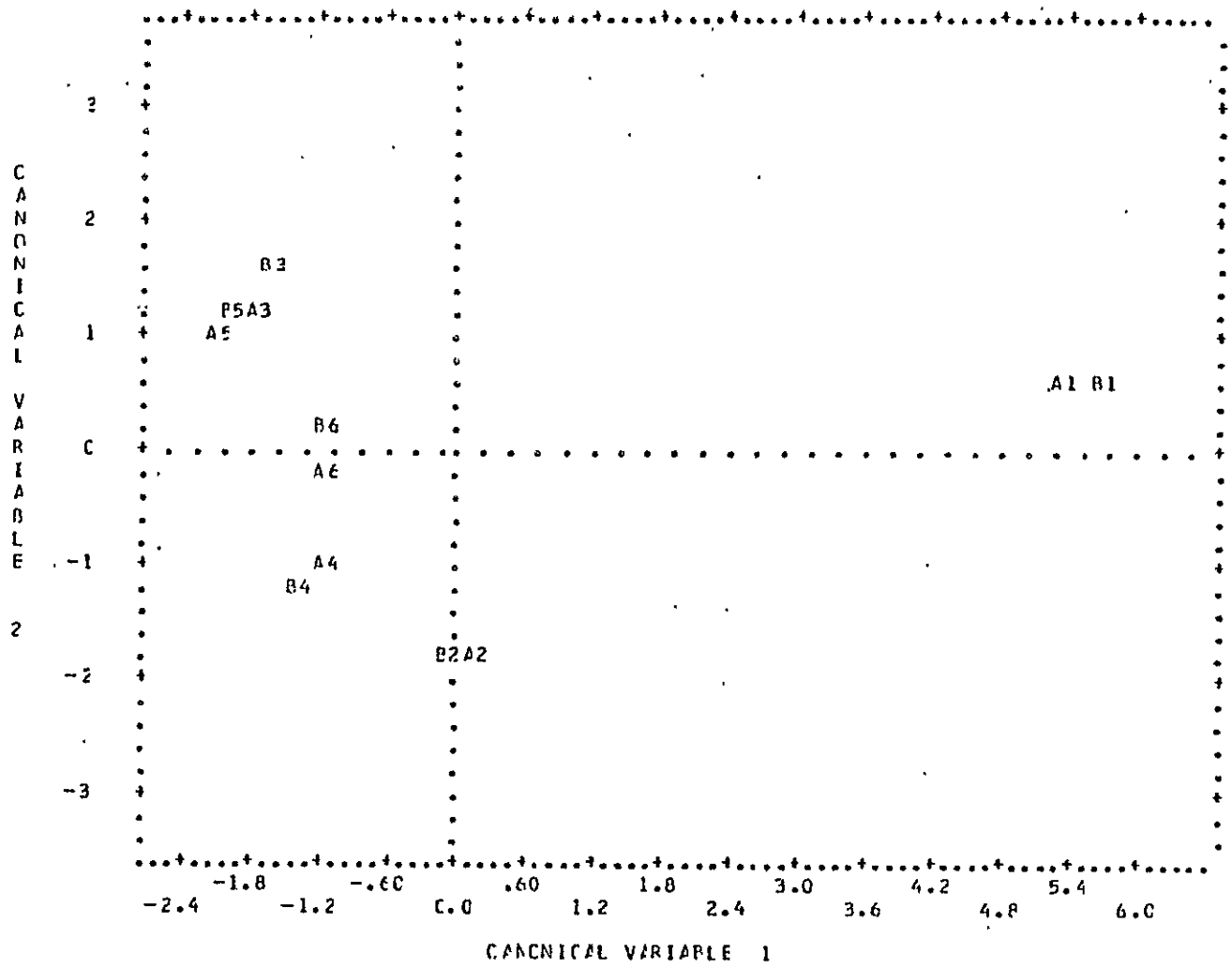
The fifth component to enter is "Vertical Guidance." It is not strong relative to the previous components and serves only to differentiate Condition VI from the other Conditions. This component is much more strongly related to pilot differences (Dick et al. , 1976).

The remaining components are not significantly related to differentiating conditions. This does not mean they are not useful; some are useful in separating pilot strategies and some in differentiating segments. Note, for example, that the sixth component to enter differs for the two analyses.

We may wish to note one further characteristic of these data. Figures 2a and 2b show a plot of the first two canonical variables. We may note that the six conditions fall into three main clusters, I, III-V, and II-IV-VI, all three of which correspond to instrument manipulations. There is, of course, some small amount of differentiation within the Condition clusters and additional discrimination is provided by the third canonical variable. To differentiate fully among the conditions, five canonical functions may be necessary; only three functions of these are viable in each of the two analyses by the criterion



"Figure 2A: Plot of first two canonical variables. The letters indicate the data set A or B; the numbers indicate Conditions."



"Figure 2B: Plot of first two canonical variables. The letters indicate the data set A or B; the numbers indicate Conditions."

of accounting for 10% of the overall variance. (Each function is independent of the others; therefore, the variance accounted for can exceed 100%.) See Appendix C.

Classification. No formal statistics are reported, however, it is apparent from the classification matrices that a given half of the data is just about as good at classifying an "external" data set as an "internal" one. Specifically, cases can be classified about equally well independently of whether or not they enter the equation. This particular point is important because it shows that equations are not dependent upon unique characteristics of a particular data set.

Overall Discriminant Analysis

One other pair of analyses was done using Group A and Group B factor analysis as the basis of factor score generation. In these analyses, both Group A and Group B scores were allowed to enter the equations differentiating Conditions. The tables summarizing the analyses are presented in Appendix D. On the whole there is exceptionally good agreement between the classification functions for the analyses.

Conclusions

The purpose of this study was to evaluate the validity of the factor components as they relate to the various experimental variables. The present effort focused on the instrument and turbulence changes. The results show that instrument changes can be detected by measuring eye scanning. Turbulence is not so easily assessed; it does not appear to be related to eye movements across the instruments. Dick et al. (1976) suggested that turbulence is related to control inputs.

The results of the present study show that all of the statistical requirements can be met. Some informal discussion suggests that some pilots think the components are at least reasonable approximations to the way they use the instruments. More work needs to be done, of course. We do know, however, that asking the pilot to rate the instruments in terms of use is not the way to approach the problem (Dick & Bailey, 1976).

The present approach has produced results sufficiently encouraging to warrant further application of the technique. At the same time, we should be prepared for some factors to change. If turbulence is the only variable manipulated, we should not expect much difference in scanning functions. A different approach will be required to evaluate the effects of turbulence.

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Guilford, J. P. Psychometric methods. New York: McGraw-Hill, 1954.

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Appendix A

The complete list of variables available. Those eliminated are marked. The variable label, X(n), corresponds to labels in the computer output in Tables 1A and 1B.

Transition Probabilities

From	To	Variable Label	
Airspeed	Clock	X(1)	not used
Flight Director	Clock	X(2)	not used
Altimeter	Clock	X(3)	not used
Hor. Sit. Ind.	Clock	X(4)	not used
Rate of Climb	Clock	X(5)	not used
Airspeed	Airspeed	X(6)	
Flight Director	Airspeed	X(7)	
Altimeter	Airspeed	X(8)	not used
Hor. Sit. Ind.	Airspeed	X(9)	
Rate of Climb	Airspeed	X(10)	
Airspeed	Flight Director	X(11)	
Flight Director	Flight Director	X(12)	
Altimeter	Flight Director	X(13)	
Hor. Sit. Ind.	Flight Director	X(14)	
Rate of Climb	Flight Director	X(15)	
Airspeed	Altimeter	X(16)	not used
Flight Director	Altimeter	X(17)	
Altimeter	Altimeter	X(18)	

Hor. Sit. Ind.	Altimeter	X(19)	
Rate of Climb	Altimeter	X(20)	
Airspeed	Hor. Sit. Ind.	X(21)	not used
Flight Director	Hor. Sit. Ind.	X(22)	
Altimeter	Hor. Sit. Ind.	X(23)	
Hor. Sit. Ind.	Hor. Sit. Ind.	X(24)	
Rate of Climb	Hor. Sit. Ind.	X(25)	
Airspeed	Rate of Climb	X(26)	not used
Flight Director	Rate of Climb	X(27)	
Altimeter	Rate of Climb	X(28)	
Hor. Sit. Ind.	Rate of Climb	X(29)	
Rate of Climb	Rate of Climb	X(30)	
Airspeed	Mean Dwell	X(31)	
Flight Director	Mean Dwell	X(32)	
Altimeter	Mean Dwell	X(33)	
Hor. Sit. Ind.	Mean Dwell	X(34)	
Rate of Climb	Mean Dwell	X(35)	
Standard Dev. Dwell	Airspeed	X(36)	
Standard Dev. Dwell	Flight Director	X(37)	
Standard Dev. Dwell	Altimeter	X(38)	
Standard Dev. Dwell	Hor. Sit. Ind.	X(39)	
Standard Dev. Dwell	Rate of Climb	X(40)	
Transitions within the Flight Director			
Roll Ind.	Roll Ind.	X(41)	
Speed Bug	Roll Ind.	X(42)	not used
Cmmd. Bars	Roll Ind.	X(43)	

Glide Slope	Roll Ind.	X(44)	not used
Localizer	Roll Ind.	X(45)	not used
Roll Ind.	Cell 3	X(46)	
Speed Bug	Cell 3	X(47)	not used
Cmmd. Bars	Cell 3	X(48)	not used
Glide Slope	Cell 3	X(49)	
Localizer	Cell 3	X(50)	not used
Roll Ind.	Speed Bug	X(51)	not used
Speed Bug	Speed Bug	X(52)	
Cmmd. Bars	Speed Bug	X(53)	
Glide Slope	Speed Bug	X(54)	not used
Localizer	Speed Bug	X(55)	
Roll Ind.	Cmmd. Bars	X(56)	
Speed Bug	Cmmd. Bars	X(57)	
Cmmd. Bars	Cmmd. Bars	X(58)	
Glide Slope	Cmmd. Bars	X(59)	
Localizer	Cmmd. Bars	X(60)	
Roll Ind.	Glide Slope	X(61)	not used
Speed Bug	Glide Slope	X(62)	not used
Cmmd. Bars	Glide Slope	X(63)	
Glide Slope	Glide Slope	X(64)	
Localizer	Glide Slope	X(65)	
Roll Ind.	Cell 7	X(66)	not used
Speed Bug	Cell 7	X(67)	
Cmmd. Bars	Cell 7	X(68)	
Glide Slope	Cell 7	X(69)	not used
Localizer	Cell 7	X(70)	

Roll Ind.	Localizer	X(71)	not used
Speed Bug	Localizer	X(72)	not used
Cmmd. Bars	Localizer	X(73)	
Glide Slope	Localizer	X(74)	
Localizer	Localizer	X(75)	
Roll Ind.	Cell 9	X(76)	not used
Speed Bug	Cell 9	X(77)	not used
Cmmd. Bars	Cell 9	X(78)	
Glide Slope	Cell 9	X(79)	
Localizer	Cell 9	X(80)	
Mean Dwell	Roll Ind.	X(81)	
Mean Dwell	Speed Bug	X(82)	
Mean Dwell	Cmmd. Bars	X(83)	
Mean Dwell	Glide Slope	X(84)	
Mean Dwell	Localizer	X(85)	
S.D. Dwell	Roll Ind.	X(86)	
S.D. Dwell	Speed Bug	X(87)	
S.D. Dwell	Cmmd. Bars	X(88)	
S.D. Dwell	Glide Slope	X(89)	
S.D. Dwell	Localizer	X(90)	
Altitude		X(91)	
Distance from Threshold		X(92)	not used
Distance from Centerline		X(93)	
Glide Slope Error		X(94)	
Localizer Error		X(95)	
Airspeed		X(96)	

Appendix B

Step-wise results of discriminant analysis. The first set of tables is from Group A analysis; the second from Group B. The tables permit tracking of variables in terms of which variables can differentiate which conditions.

STEP NUMBER 0

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
	DF= 5 455		*		DF= 5 454		
			*	115 FACTOR1	2.817	1	1.000000
			*	116 FACTOR2	12.097	1	1.000000
			*	117 FACTOR3	160.311	1	1.000000
			*	118 FACTOR4	3.903	1	1.000000
			*	119 FACTOR5	51.261	1	1.000000
			*	121 FACTOR7	19.497	1	1.000000
			*	122 FACTOR8	11.779	1	1.000000
			*	123 FACTOR9	3.888	1	1.000000
			*	124 FACTOR10	5.078	1	1.000000
			*	125 FACTOR11	5.990	1	1.000000
			*	128 FACTOR14	7.741	1	1.000000

SUMMARY TABLE

STEP NUMBER	VAR ENTERED		F VALUE TO ENTER OR REMOVE	NUMBER OF VARIABLES INCLUDED	U-STATISTIC	APPROXIMATE F-STATISTIC
1	117	FACTOR3	160.3113	1	0.3616	160.311
2	119	FACTOR5	62.2646	2	0.2143	105.108
3	121	FACTOR7	26.3365	3	0.1660	76.279
4	122	FACTOR8	18.0595	4	0.1383	61.055
5	116	FACTOR2	15.9167	5	0.1175	52.182
6	123	FACTOR9	12.1956	6	0.1034	45.746

STEP NUMBER 1

VARIABLE ENTERED 117 FACTOR3 - AIRSPEED I

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF= 5 454			*	DF= 5 453			
117 FACTOR3	160.311	1	*	115 FACTOR1	6.750	1	0.959534
			*	116 FACTOR2	12.961	1	0.991394
			*	118 FACTOR4	3.937	1	0.999557
			*	119 FACTOR5	62.265	1	0.927277
			*	121 FACTOR7	20.153	1	0.993683
			*	122 FACTOR8	16.855	1	0.952524
			*	123 FACTOR9	8.189	1	0.956380
			*	124 FACTOR10	5.311	1	0.997457
			*	125 FACTOR11	5.998	1	0.999778
			*	128 FACTOR14	7.870	1	0.998517

U-STATISTIC OR WILKS' LAMBDA 0.3615925 DEGREES OF FREEDOM 1 5 454
APPROXIMATE F-STATISTIC 160.311 DEGREES OF FREEDOM 5.00 454.00

F - MATRIX DEGREES OF FREEDOM = 1 454

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	473.16										
CONDA3	446.15	0.71									
CONDA4	501.48	0.96	0.01								
CONDA5	477.65	0.19	0.18	0.29							
CONDA6	458.79	0.53	0.02	0.05	0.09						
CONDB1	1.39	526.63	494.53	555.64	530.54	508.85					
CONDB2	457.18	0.14	1.42	1.82	0.64	1.17	509.76				
CONDB3	438.67	0.44	0.03	0.07	0.06	0.00	486.66	1.02			
CONDB4	534.38	2.93	0.59	0.52	1.59	0.83	590.25	4.34	0.89		
CONDB5	420.83	0.86	2.88	3.53	1.80	2.56	470.56	0.31	2.31	6.77	
CONDB6	413.22	0.15	1.35	1.71	0.62	1.12	460.80	0.00	0.98	4.02	0.26

CLASSIFICATION FUNCTIONS

GROUP = VARIABLE	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
117 FACTOR3	4.75455	-0.84954	-1.07904	-1.10155	-0.96071	-1.04335
CONSTANT	-5.92379	-1.92368	-2.00458	-2.01356	-1.96046	-1.99074

STEP NUMBER 1
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	86.2	69	10	0	1	0	0
CONDA2	27.1	7	23	0	53	0	2
CONDA3	1.5	4	14	1	41	2	3
CONDA4	71.2	3	13	1	57	3	3
CONDA5	2.5	3	27	1	40	2	7
CONDA6	2.9	1	16	5	44	2	2
CONDB1	0.0	77	0	1	2	0	0
CONDB2	0.0	10	16	0	58	1	0
CONDB3	0.0	2	20	2	34	4	3
CONDB4	0.0	1	13	0	58	4	4
CONDB5	0.0	6	27	0	41	4	2
CONDB6	0.0	1	30	0	34	4	1
TOTAL	33.5	184	209	11	463	26	27

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	86.2	69	10	0	1	0	0
CONDA2	27.1	7	23	0	53	0	2
CONDA3	1.5	4	14	1	41	2	3
CONDA4	67.5	3	13	4	54	3	3
CONDA5	2.5	3	27	1	40	2	7
CONDA6	2.9	1	16	5	44	2	2
CONDB1	0.0	77	0	1	2	0	0
CONDB2	0.0	10	16	0	58	1	0
CONDB3	0.0	2	20	2	34	4	3
CONDB4	0.0	1	13	0	58	4	4
CONDB5	0.0	6	27	0	41	4	2
CONDB6	0.0	1	30	0	34	4	1
TOTAL	32.8	184	209	14	460	26	27

STEP NUMBER 2

VARIABLE ENTERED 119 FACTOR5 - HORIZONTAL SITUATION

VARIABLE	F TO REMOVE	FORCE LEVEL
DF=	5 453	
117 FACTOR3	179.609	1
119 FACTOR5	62.265	1

VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 452		
115 FACTOR1	8.133	1	0.945921
116 FACTOR2	15.906	1	0.963666
118 FACTOR4	5.068	1	0.987617
121 FACTOR7	26.337	1	0.940672
122 FACTOR8	17.092	1	0.950090
123 FACTOR9	9.382	1	0.944765
124 FACTOR10	5.336	1	0.997076
125 FACTOR11	6.205	1	0.997497
128 FACTOR14	8.970	1	0.987286

U-STATISTIC OR WILKS' LAMBDA 0.2143090 DEGREES OF FREEDOM 2 5 454
APPROXIMATE F-STATISTIC 105.108 DEGREES OF FREEDOM 10.00 906.00

F - MATRIX DEGREES OF FREEDOM = 2 453

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	249.50										
CONDA3	352.45	65.69									
CONDA4	263.63	0.48	62.79								
CONDA5	357.78	55.28	1.19	52.91							
CONDA6	247.91	1.04	47.67	0.69	38.47						
CONDB1	0.77	278.36	382.74	292.80	390.41	275.34					
CONDB2	241.61	0.07	65.88	0.91	55.34	1.35	270.03				
CONDB3	369.43	80.68	0.71	77.46	3.72	60.10	399.99	80.78			
CONDB4	284.16	1.81	55.48	0.53	46.23	0.51	314.47	2.50	69.39		
CONDB5	343.37	65.36	1.65	63.92	1.28	47.49	374.77	64.91	2.93	57.56	
CONDB6	222.68	0.41	52.29	1.13	42.49	0.64	248.71	0.33	65.02	2.01	50.45

CLASSIFICATION FUNCTIONS

GROUP =	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
VARIABLE						
117 FACTOR3	5.33452	-0.64407	-1.74693	-0.90175	-1.51406	-0.93143
119 FACTOR5	-1.61761	-0.57307	1.86283	-0.55729	1.54338	-0.31216
CONSTANT	-6.70776	-2.02207	-3.04425	-2.10661	-2.67413	-2.01993

STEP NUMBER 2
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	85.0	68	10	0	1	1	0
CONDA2	18.8	7	16	2	40	8	12
CONDA3	53.8	1	1	35	5	14	9
CONDA4	42.5	3	14	4	34	9	16
CONDA5	25.0	1	3	37	7	20	12
CONDA6	25.7	1	13	2	27	9	18
CONDB1	0.0	76	0	0	3	1	0
CONDB2	0.0	8	11	2	39	6	19
CONDB3	0.0	0	2	34	6	11	12
CONDB4	0.0	1	10	5	39	12	13
CONDB5	0.0	3	7	34	5	10	21
CONDB6	0.0	1	27	2	17	8	15
TOTAL	41.5	170	114	157	223	109	147

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	85.0	68	10	0	1	1	0
CONDA2	18.8	7	16	2	40	8	12
CONDA3	52.3	1	1	34	5	15	9
CONDA4	38.7	3	17	4	31	9	16
CONDA5	23.7	1	3	38	7	19	12
CONDA6	24.3	1	13	2	28	9	17
CONDB1	0.0	76	0	0	3	1	0
CONDB2	0.0	8	11	2	39	6	19
CONDB3	0.0	0	2	34	6	11	12
CONDB4	0.0	1	10	5	39	12	13
CONDB5	0.0	3	7	34	5	10	21
CONDB6	0.0	1	27	2	17	8	15
TOTAL	40.2	170	117	157	221	109	146

STEP NUMBER 3

VARIABLE ENTERED 121 FACTOR7 - FLIGHT DIRECTOR

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 452		*	DF=	5 451		
117 FACTOR3	184.720	1	*	115 FACTOR1	8.720	1	0.940136
119 FACTOR5	70.723	1	*	116 FACTOR2	15.874	1	0.963638
121 FACTOR7	26.337	1	*	118 FACTOR4	6.199	1	0.975923
			*	122 FACTOR8	18.059	1	0.941270
			*	123 FACTOR9	10.578	1	0.933363
			*	124 FACTOR10	5.387	1	0.996421
			*	125 FACTOR11	6.399	1	0.995354
			*	128 FACTOR14	9.649	1	0.980379

U-STATISTIC OR WILKS' LAMBDA 0.1659594 DEGREES OF FREEDOM 3 5 454
APPROXIMATE F-STATISTIC 76.279 DEGREES OF FREEDOM 15.00 1248.17

F - MATRIX DEGREES OF FREEDOM = 3 452

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	167.30										
CONDA3	254.98	75.98									
CONDA4	179.66	10.92	48.38								
CONDA5	265.24	78.40	0.96	45.11							
CONDA6	179.18	25.14	32.35	3.62	27.19						
CONDB1	0.51	186.53	274.99	198.99	286.78	197.31					
CONDB2	164.59	0.73	85.45	17.17	89.62	33.73	183.56				
CONDB3	280.04	103.03	2.06	66.70	3.31	44.34	300.19	114.51			
CONDB4	189.59	4.88	51.48	2.09	50.71	9.65	209.73	9.12	72.62		
CONDB5	253.11	81.90	1.13	50.92	0.92	32.64	273.84	92.36	3.28	56.07	
CONDB6	163.28	25.88	35.27	4.33	29.59	0.44	180.47	34.39	47.17	11.35	34.38

CLASSIFICATION FUNCTIONS

GROUP =	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
VARIABLE						
117 FACTOR3	5.49148	-0.41057	-1.91241	-0.88434	-1.70884	-1.03799
119 FACTOR5	-1.81369	-0.86477	2.06955	-0.57904	1.78670	-0.17905
121 FACTOR7	0.72260	1.07499	-0.76181	0.08014	-0.89671	-0.49055
CONSTANT	-6.91216	-2.47444	-3.27144	-2.10912	-2.98889	-2.11414

STEP NUMBER 3
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	85.0	68	9	0	1	0	2
CONDA2	48.2	7	41	2	26	3	6
CONDA3	50.8	1	2	33	7	15	7
CONDA4	27.5	3	22	6	22	7	20
CONDA5	26.2	1	0	36	5	21	17
CONDA6	45.7	1	12	3	15	7	32
CONDB1	0.0	75	4	0	1	0	0
CONDB2	0.0	8	41	3	26	2	5
CONDB3	0.0	0	2	34	2	16	11
CONDB4	0.0	1	26	4	29	6	14
CONDB5	0.0	2	1	34	5	12	26
CONDB6	0.0	1	7	3	16	8	35
TOTAL	47.2	168	167	158	155	97	175

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	85.0	68	9	0	1	0	2
CONDA2	47.1	7	40	3	26	3	6
CONDA3	47.7	1	2	31	7	17	7
CONDA4	25.0	3	23	6	20	7	21
CONDA5	25.0	1	0	37	5	20	17
CONDA6	45.7	1	12	3	15	7	32
CONDB1	0.0	75	4	0	1	0	0
CONDB2	0.0	8	41	3	26	2	5
CONDB3	0.0	0	2	34	2	16	11
CONDB4	0.0	1	26	4	29	6	14
CONDB5	0.0	2	1	34	5	12	26
CONDB6	0.0	1	7	3	16	8	35
TOTAL	45.9	168	167	158	153	98	176

STEP NUMBER 4

VARIABLE ENTERED 122 FACTOR8 - AIRSPEED II

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 451		*	DF=	5 450		
117 FACTOR3	200.303	1	*	115 FACTOR1	9.257	1	0.934867
119 FACTOR5	71.396	1	*	116 FACTOR2	15.917	1	0.962927
121 FACTOR7	27.370	1	*	118 FACTOR4	6.549	1	0.972239
122 FACTOR8	18.060	1	*	123 FACTOR9	12.184	1	0.918481
			*	124 FACTOR10	5.376	1	0.996408
			*	125 FACTOR11	6.683	1	0.992280
			*	128 FACTOR14	10.523	1	0.971642

U-STATISTIC OR WILKS' LAMBDA 0.1382744 DEGREES OF FREEDOM 4 5 454

APPROXIMATE F-STATISTIC 61.055 DEGREES OF FREEDOM 20.00 1496.75

F - MATRIX DEGREES OF FREEDOM = 4 451

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	134.13										
CONDA3	198.00	56.87									
CONDA4	161.30	13.33	41.15								
CONDA5	233.00	67.51	9.02	34.24							
CONDA6	154.04	21.51	26.91	3.00	21.81						
CONDB1	0.54	151.07	215.11	179.99	253.89	171.13					
CONDB2	133.86	0.63	64.09	16.81	74.31	27.13	150.82				
CONDB3	216.43	77.13	1.55	55.15	11.14	36.08	233.59	85.89			
CONDB4	166.22	7.72	42.49	1.63	38.83	7.31	185.32	9.85	58.56		
CONDB5	218.77	67.59	6.84	38.16	0.89	25.01	238.69	74.08	8.76	42.20	
CONDB6	141.64	21.88	28.92	3.59	23.74	0.33	157.99	27.47	38.03	8.62	26.41

CLASSIFICATION FUNCTIONS

GROUP =	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
VARIABLE						
117 FACTOR3	5.96591	-0.32747	-1.81426	-1.09845	-2.01493	-1.17773
119 FACTOR5	-1.92175	-0.88370	2.04720	-0.53027	1.85642	-0.14722
121 FACTOR7	0.84655	1.09670	-0.73617	0.02420	-0.97667	-0.52706
122 FACTOR8	-1.23443	-0.21622	-0.25536	0.55709	0.79642	0.36359
CONSTANT	-7.55396	-2.49413	-3.29890	-2.23983	-3.25604	-2.16981

STEP NUMBER 4
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	85.0	68	10	0	0	0	2
CONDA2	51.8	6	44	3	15	4	13
CONDA3	64.6	1	5	42	3	10	4
CONDA4	47.5	3	14	10	38	4	11
CONDA5	55.0	0	1	15	6	44	14
CONDA6	41.4	0	10	5	19	7	29
CONDB1	0.0	76	4	0	0	0	0
CONDB2	0.0	6	49	1	16	5	8
CONDB3	0.0	0	3	36	0	15	11
CONDB4	0.0	1	25	7	34	4	9
CONDB5	0.0	3	2	18	4	30	23
CONDB6	0.0	1	10	5	15	7	32
TOTAL	57.6	165	177	142	150	130	156

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	85.0	68	10	0	0	0	2
CONDA2	49.4	6	42	4	16	4	13
CONDA3	61.5	1	6	40	3	10	5
CONDA4	46.2	3	14	10	37	4	12
CONDA5	53.7	0	1	16	6	43	14
CONDA6	40.0	1	10	5	19	7	28
CONDB1	0.0	76	4	0	0	0	0
CONDB2	0.0	6	49	1	16	5	8
CONDB3	0.0	0	3	36	0	15	11
CONDB4	0.0	1	25	7	34	4	9
CONDB5	0.0	3	2	18	4	30	23
CONDB6	0.0	1	10	5	15	7	32
TOTAL	56.1	166	176	142	150	129	157

STEP NUMBER 5

VARIABLE ENTERED 116 FACTOR2 - VERTICAL GUIDANCE

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 450		*	DF=	5 449		
116 FACTOR2	15.917	1	*	115 FACTOR1	9.569	1	0.931731
117 FACTOR3	204.353	1	*	118 FACTOR4	6.535	1	0.972236
119 FACTOR5	75.442	1	*	123 FACTOR9	12.196	1	0.918130
121 FACTOR7	27.317	1	*	124 FACTOR10	5.485	1	0.995142
122 FACTOR8	18.099	1	*	125 FACTOR11	7.636	1	0.982427
			*	128 FACTOR14	10.500	1	0.971639

U-STATISTIC OR WILKS' LAMBDA 0.1174950 DEGREES OF FREEDOM 5 5 454
APPROXIMATE F-STATISTIC 52.182 DEGREES OF FREEDOM 25.00 1673.18

F - MATRIX DEGREES OF FREEDOM = 5 450

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	112.34										
CONDA3	174.46	49.14									
CONDA4	131.70	10.94	38.74								
CONDA5	191.88	53.92	10.27	27.84							
CONDA6	123.00	23.04	38.47	5.86	23.90						
CONDB1	0.60	127.92	191.39	148.18	210.69	136.64					
CONDB2	111.25	0.54	55.66	13.54	59.45	26.63	126.69				
CONDB3	180.71	62.04	2.61	45.45	9.17	37.37	196.73	69.32			
CONDB4	136.82	6.22	38.43	1.40	31.15	10.54	153.88	7.86	47.54		
CONDB5	179.67	53.95	9.17	30.74	0.75	25.60	197.56	59.17	7.47	33.73	
CONDB6	113.07	22.72	39.07	5.87	24.80	0.28	126.22	26.33	38.22	11.04	26.12

CLASSIFICATION FUNCTIONS

GROUP =	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
VARIABLE						
116 FACTOR2	-0.65554	0.21130	0.98374	0.00198	0.27413	-0.73642
117 FACTOR3	6.10095	-0.37100	-2.01690	-1.09886	-2.07140	-1.02603
119 FACTOR5	-2.05235	-0.84160	2.24320	-0.52988	1.91104	-0.29395
121 FACTOR7	0.84101	1.09848	-0.72786	0.02422	-0.97436	-0.53328
122 FACTOR8	-1.21644	-0.22202	-0.28235	0.55703	0.78890	0.38379
CONSTANT	-7.73855	-2.51331	-3.71459	-2.23983	-3.28832	-2.40276

STEP NUMBER 5
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	87.5	70	7	0	0	0	3
CONDA2	55.3	4	47	5	15	5	9
CONDA3	66.2	1	4	43	2	11	4
CONDA4	40.0	3	17	10	32	5	13
CONDA5	62.5	0	1	13	8	50	8
CONDA6	60.0	0	11	1	11	5	42
CONDB1	0.0	75	4	0	0	0	1
CONDB2	0.0	6	49	3	18	6	3
CONDB3	0.0	0	3	31	3	14	14
CONDB4	0.0	1	24	4	33	5	13
CONDB5	0.0	3	2	17	16	33	9
CONDB6	0.0	1	5	1	16	6	41
TOTAL	61.7	164	174	128	154	140	160

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	87.5	70	7	0	0	0	3
CONDA2	55.3	4	47	5	15	5	9
CONDA3	66.2	1	4	43	2	11	4
CONDA4	38.7	3	17	10	31	5	14
CONDA5	61.2	0	1	14	8	49	8
CONDA6	58.6	0	11	1	11	6	41
CONDB1	0.0	75	4	0	0	0	1
CONDB2	0.0	6	49	3	18	6	3
CONDB3	0.0	0	3	31	3	14	14
CONDB4	0.0	1	24	4	33	5	13
CONDB5	0.0	3	2	17	16	33	9
CONDB6	0.0	1	5	1	16	6	41
TOTAL	61.1	164	174	129	153	140	160

STEP NUMBER 6

VARIABLE ENTERED 123 FACTOR9 - ALTITUDE

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 449		*	DF=	5 448		
116 FACTOR2	15.922	1	*	115 FACTOR1	10.720	1	0.920847
117 FACTOR3	226.380	1	*	118 FACTOR4	6.870	1	0.968713
119 FACTOR5	78.756	1	*	124 FACTOR10	5.505	1	0.994810
121 FACTOR7	29.028	1	*	125 FACTOR11	7.715	1	0.981461
122 FACTOR8	19.792	1	*	128 FACTOR14	10.900	1	0.967544
123 FACTOR9	12.196	1	*				

U-STATISTIC OR WILKS' LAMBDA 0.1034460 DEGREES OF FREEDOM 6 5 454
APPROXIMATE F-STATISTIC 45.746 DEGREES OF FREEDOM 30.00 1798.00

F - MATRIX DEGREES OF FREEDOM = 6 449

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	101.34										
CONDA3	162.53	43.34									
CONDA4	128.27	11.60	32.21								
CONDA5	185.28	50.28	8.93	23.69							
CONDA6	120.49	21.76	31.98	4.88	20.28						
CONDB1	0.72	111.83	173.07	138.11	196.36	128.15					
CONDB2	102.00	0.52	48.03	12.99	53.71	23.98	112.12				
CONDB3	165.13	53.14	2.26	37.85	8.52	31.18	175.20	58.63			
CONDB4	128.14	6.24	32.30	1.46	27.54	9.13	138.98	7.12	39.60		
CONDB5	169.93	48.04	7.63	25.60	0.91	21.30	180.76	51.50	6.40	28.59	
CONDB6	112.12	21.44	32.49	4.89	21.04	0.23	119.39	23.69	31.87	9.53	21.73

CLASSIFICATION FUNCTIONS

GROUP =	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
VARIABLE						
116 FACTOR2	-0.68382	0.20580	0.99171	0.00927	0.28750	-0.72843
117 FACTOR3	6.76844	-0.24109	-2.20487	-1.27082	-2.38703	-1.21483
119 FACTOR5	-2.31503	-0.89272	2.31717	-0.46221	2.03524	-0.21965
121 FACTOR7	1.02840	1.13495	-0.78063	-0.02406	-1.06297	-0.58628
122 FACTOR8	-1.40174	-0.25808	-0.23017	0.60477	0.87652	0.43621
123 FACTOR9	1.42178	0.27670	-0.40037	-0.36628	-0.67231	-0.40215
CONSTANT	-8.63822	-2.54739	-3.78594	-2.29954	-3.48949	-2.47474

STEP NUMBER 6
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	87.5	70	7	0	0	0	3
CONDA2	58.8	5	50	3	19	3	5
CONDA3	64.6	1	4	42	3	11	4
CONDA4	43.8	3	14	10	35	3	15
CONDA5	63.7	0	1	11	9	51	8
CONDA6	57.1	0	10	1	13	6	40
CONDB1	0.0	76	2	1	0	0	1
CONDB2	0.0	6	51	3	16	6	3
CONDB3	0.0	0	4	29	3	15	14
CONDB4	0.0	1	29	3	30	6	11
CONDB5	0.0	3	4	15	14	35	9
CONDB6	0.0	1	7	1	15	7	39
TOTAL	62.6	166	183	119	157	143	152

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6
CONDA1	87.5	70	7	0	0	0	3
CONDA2	56.5	5	48	3	20	3	6
CONDA3	64.6	1	4	42	3	11	4
CONDA4	38.7	3	16	10	31	4	16
CONDA5	57.5	1	1	13	10	46	9
CONDA6	57.1	0	10	1	13	6	40
CONDB1	0.0	76	2	1	0	0	1
CONDB2	0.0	6	51	3	16	6	3
CONDB3	0.0	0	4	29	3	15	14
CONDB4	0.0	1	29	3	30	6	11
CONDB5	0.0	3	4	15	14	35	9
CONDB6	0.0	1	7	1	15	7	39
TOTAL	60.2	167	183	121	155	139	155

STEP NUMBER 0

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
	DF= 5 455		*		DF= 5 454		
			*	115 FACTOR1	2.218	2	1.000000
			*	116 FACTOR2	206.153	2	1.000000
			*	117 FACTOR3	8.726	2	1.000000
			*	118 FACTOR4	36.701	2	1.000000
			*	119 FACTOR5	15.015	2	1.000000
			*	120 FACTOR6	41.837	2	1.000000
			*	121 FACTOR7	5.977	2	1.000000
			*	122 FACTOR8	0.959	2	1.000000
			*	123 FACTOR9	4.220	2	1.000000
			*	125 FACTOR11	4.188	2	1.000000
			*	128 FACTOR14	2.874	2	1.000000

SUMMARY TABLE

STEP NUMBER	VAR ENTERED	F VALUE TO ENTER OR REMOVE	NUMBER OF VARIABLES INCLUDED	U-STATISTIC	APPROXIMATE F-STATISTIC
1	116 FACTOR2	206.1527	1	0.3058	206.153
2	120 FACTOR6	48.0092	2	0.1999	112.057
3	118 FACTOR4	46.5549	3	0.1319	90.106
4	119 FACTOR5	22.9864	4	0.1051	72.759
5	117 FACTOR3	10.1042	5	0.0945	59.366
6	115 FACTOR1	7.7941	6	0.0870	50.430

STEP NUMBER 1

VARIABLE ENTERED 116 FACTOR2 - AIRSPEED - I

VARIABLE	F TO REMOVE	FORCE LEVEL
DF=	5 454	
116 FACTOR2	206.153	2

VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 453		
115 FACTOR1	6.232	2	0.958497
117 FACTOR3	8.809	2	0.998974
118 FACTOR4	37.506	2	0.993088
119 FACTOR5	22.607	2	0.932641
120 FACTOR6	48.009	2	0.954805
121 FACTOR7	6.184	2	0.997726
122 FACTOR8	1.226	2	0.997068
123 FACTOR9	4.240	2	0.999688
125 FACTOR11	4.826	2	0.993218
128 FACTOR14	3.384	2	0.994511

U-STATISTIC OR WILKS' LAMBDA 0.3057724 DEGREES OF FREEDOM 1 5 454
APPROXIMATE F-STATISTIC 206.153 DEGREES OF FREEDOM 5.00 454.00

F - MATRIX DEGREES OF FREEDOM = 1 454

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	551.99										
CONDA3	517.15	0.70									
CONDA4	581.04	0.95	0.01								
CONDA5	582.39	1.00	0.01	0.00							
CONDA6	579.40	3.00	0.68	0.61	0.57						
CONDB1	1.00	600.69	561.08	630.21	631.62	626.81					
CONDB2	545.36	0.02	0.94	1.24	1.31	3.50	593.77				
CONDB3	514.64	0.61	0.00	0.02	0.03	0.77	558.46	0.83			
CONDB4	648.15	5.51	1.86	1.83	1.76	0.28	700.04	6.19	2.02		
CONDB5	534.95	0.00	0.71	0.95	1.01	2.98	582.18	0.02	0.62	5.43	
CONDB6	535.08	0.61	0.00	0.02	0.03	0.83	580.68	0.84	0.00	2.14	0.62

CLASSIFICATION FUNCTIONS

GROUP =	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
VARIABLE						
116 FACTOR2	5.84563	-0.98122	-1.25183	-1.67844	-1.01590	-1.24759
CONSTANT	-7.07363	-1.94058	-2.03398	-2.22721	-1.95128	-2.03234

STEP NUMBER 1
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	1	0	1
CONDA2	0.0	6	25	2	52	0	0
CONDA3	0.0	2	13	4	38	5	3
CONDA4	0.0	3	10	6	51	5	5
CONDA5	0.0	2	16	5	44	6	7
CONDA6	0.0	1	10	9	46	1	3
CONDB1	93.8	75	2	0	2	1	0
CONDB2	16.5	8	14	2	59	1	1
CONDB3	27.7	1	13	18	26	4	3
CONDB4	68.8	1	9	8	55	1	6
CONDB5	6.3	3	24	4	38	5	6
CONDB6	1.4	1	15	11	42	0	1
TOTAL	36.5	173	159	69	454	29	36

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	1	0	1
CONDA2	0.0	6	25	2	52	0	0
CONDA3	0.0	2	13	4	38	5	3
CONDA4	0.0	3	10	6	51	5	5
CONDA5	0.0	2	16	5	44	6	7
CONDA6	0.0	1	10	9	46	1	3
CONDB1	93.8	75	2	0	2	1	0
CONDB2	12.9	8	11	2	59	4	1
CONDB3	27.7	1	13	18	26	4	3
CONDB4	68.8	1	9	8	55	1	6
CONDB5	5.0	3	25	4	38	4	6
CONDB6	1.4	1	15	11	42	0	1
TOTAL	35.7	173	157	69	454	31	36

STEP NUMBER 2

VARIABLE ENTERED 120 FACTOR6 - HORIZONTAL SITUATION

VARIABLE	F TO REMOVE DF= 5 453	FORCE LEVEL	*	VARIABLE	F TO ENTER DF= 5 452	FORCE LEVEL	TOLERANCE
116 FACTOR2	219.724	2	*	115 FACTOR1	6.866	2	0.952109
120 FACTOR6	48.009	2	*	117 FACTOR3	9.401	2	0.992854
			*	118 FACTOR4	46.555	2	0.926872
			*	119 FACTOR5	22.594	2	0.932339
			*	121 FACTOR7	6.285	2	0.996542
			*	122 FACTOR8	1.224	2	0.997060
			*	123 FACTOR9	5.209	2	0.989455
			*	125 FACTOR11	4.888	2	0.992456
			*	128 FACTOR14	3.377	2	0.994507

U-STATISTIC OR WILKS' LAMBDA 0.1998639 DEGREES OF FREEDOM 2 5 454
APPROXIMATE F-STATISTIC 112.057 DEGREES OF FREEDOM 10.00 906.00

F - MATRIX DEGREES OF FREEDOM = 2 453

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	282.49										
CONDA3	337.59	42.88									
CONDA4	295.39	0.55	44.87								
CONDA5	364.06	36.95	0.65	38.76							
CONDA6	298.25	1.75	33.60	0.89	27.86						
CONDB1	0.59	308.56	364.83	321.47	394.03	323.81					
CONDB2	279.79	0.02	41.64	0.77	35.78	1.90	305.78				
CONDB3	355.01	56.95	0.89	59.14	3.23	45.66	382.77	55.49			
CONDB4	332.12	2.86	38.38	1.29	32.41	0.17	359.93	3.14	51.57		
CONDB5	343.11	38.40	0.78	41.22	0.53	30.67	372.18	37.05	3.02	36.02	
CONDB6	275.47	0.45	34.52	0.44	28.79	0.42	300.06	0.50	46.73	1.07	30.73

CLASSIFICATION FUNCTIONS

GROUP =	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
VARIABLE						
116 FACTOR2	6.26022	-0.83330	-1.78136	-1.55013	-1.39319	-1.12476
120 FACTOR6	-1.30335	-0.46500	1.66468	-0.40336	1.18609	-0.38612
CONSTANT	-7.63492	-2.01202	-2.94962	-2.28097	-2.41612	-2.08160

STEP NUMBER 2
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	1	1	0
CONDA2	0.0	6	21	2	47	8	1
CONDA3	0.0	1	0	32	17	14	1
CONDA4	0.0	3	19	5	40	11	2
CONDA5	0.0	0	4	35	17	19	5
CONDA6	0.0	1	13	4	40	6	6
CONDB1	93.8	75	2	0	2	1	0
CONDB2	15.3	7	13	2	57	6	0
CONDB3	55.4	0	2	36	11	9	7
CONDB4	61.2	1	12	4	49	13	1
CONDB5	15.0	3	9	32	20	12	4
CONDB6	10.0	1	15	4	35	8	7
TOTAL	41.7	168	118	156	336	108	34

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	1	1	0
CONDA2	0.0	6	21	2	47	8	1
CONDA3	0.0	1	0	32	17	14	1
CONDA4	0.0	3	19	5	40	11	2
CONDA5	0.0	0	4	35	17	19	5
CONDA6	0.0	1	13	4	40	6	6
CONDB1	93.8	75	2	0	2	1	0
CONDB2	15.3	7	13	2	57	6	0
CONDB3	53.8	0	2	35	11	10	7
CONDB4	58.7	1	12	4	47	13	3
CONDB5	15.0	3	9	32	20	12	4
CONDB6	10.0	1	15	4	35	8	7
TOTAL	41.1	168	118	155	334	109	36

STEP NUMBER 3

VARIABLE ENTERED 118 FACTOR4 - FLIGHT DIRECTOR

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 452		*	DF=	5 451		
116 FACTOR2	225.413	2	*	115 FACTOR1	7.271	2	0.948012
118 FACTOR4	46.555	2	*	117 FACTOR3	10.113	2	0.985602
120 FACTOR6	57.784	2	*	119 FACTOR5	22.986	2	0.928694
			*	121 FACTOR7	6.766	2	0.991450
			*	122 FACTOR8	1.272	2	0.996503
			*	123 FACTOR9	5.408	2	0.987275
			*	125 FACTOR11	6.174	2	0.979109
			*	128 FACTOR14	3.968	2	0.988185

U-STATISTIC OR WILKS' LAMBDA 0.1319243 DEGREES OF FREEDOM 3 5 454
APPROXIMATE F-STATISTIC 90.106 DEGREES OF FREEDOM 15.00 1248.17

F - MATRIX DEGREES OF FREEDOM = 3 452

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	190.31										
CONDA3	247.36	68.24									
CONDA4	201.65	15.22	36.73								
CONDA5	275.23	79.10	0.88	37.88							
CONDA6	213.53	30.75	23.22	3.47	21.30						
CONDB1	0.44	207.05	267.36	219.97	297.55	232.11					
CONDB2	190.81	0.41	75.14	20.53	87.86	37.71	207.25				
CONDB3	262.52	82.33	0.71	48.24	2.25	32.01	283.01	89.52			
CONDB4	222.61	10.11	38.10	1.81	41.37	7.06	241.68	14.23	49.56		
CONDB5	258.55	76.48	0.71	37.88	0.41	22.44	280.17	84.81	2.01	41.67	
CONDB6	205.42	39.61	22.99	6.61	19.87	0.91	223.67	47.50	31.34	12.66	20.82

CLASSIFICATION FUNCTIONS

GROUP =	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
VARIABLE						
116 FACTOR2	6.43608	-0.51964	-2.00690	-1.48139	-1.62465	-1.31121
118 FACTOR4	0.82829	1.47727	-1.06230	0.32376	-1.09015	-0.87814
120 FACTOR6	-1.52583	-0.86179	1.95001	-0.49032	1.47890	-0.15025
CONSTANT	-7.86383	-2.74020	-3.32616	-2.31594	-2.81266	-2.33891

STEP NUMBER 3
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	7	0	1	0	2
CONDA2	0.0	6	36	1	38	2	2
CONDA3	0.0	1	2	32	9	15	6
CONDA4	0.0	3	18	5	30	5	19
CONDA5	0.0	0	0	35	3	21	21
CONDA6	0.0	1	7	4	29	3	26
CONDB1	93.8	75	3	0	1	0	1
CONDB2	47.1	6	40	1	33	4	1
CONDB3	55.4	0	0	36	5	9	15
CONDB4	53.7	1	16	4	43	7	9
CONDB5	16.2	3	0	32	5	13	27
CONDB6	40.0	1	7	4	24	6	28
TOTAL	51.1	167	136	154	221	85	157

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	7	0	1	0	2
CONDA2	0.0	6	36	1	38	2	2
CONDA3	0.0	1	2	32	9	15	6
CONDA4	0.0	3	18	5	30	5	19
CONDA5	0.0	0	0	35	3	21	21
CONDA6	0.0	1	7	4	29	3	26
CONDB1	93.8	75	3	0	1	0	1
CONDB2	47.1	6	40	1	33	4	1
CONDB3	53.8	0	0	35	5	10	15
CONDB4	52.5	1	17	4	42	7	9
CONDB5	16.2	3	0	32	6	13	26
CONDB6	40.0	1	7	4	24	6	28
TOTAL	50.7	167	137	153	221	86	156

STEP NUMBER 4

VARIABLE ENTERED 119 FACTOR5 - AIRSPEED - II

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 451		*	DF=	5 450		
116 FACTOR2	248.422	2	*	115 FACTOR1	7.792	2	0.942802
118 FACTOR4	46.988	2	*	117 FACTOR3	10.104	2	0.985469
119 FACTOR5	22.986	2	*	121 FACTOR7	7.227	2	0.986603
120 FACTOR6	57.823	2	*	122 FACTOR8	1.305	2	0.996119
			*	123 FACTOR9	5.887	2	0.982221
			*	125 FACTOR11	6.539	2	0.975267
			*	128 FACTOR14	4.437	2	0.983187

U-STATISTIC OR WILKS' LAMBDA 0.1051325 DEGREES OF FREEDOM 4 5 454
APPROXIMATE F-STATISTIC 72.759 DEGREES OF FREEDOM 20.00 1496.75

F - MATRIX DEGREES OF FREEDON = 4 451

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	154.55										
CONDA3	195.47	51.07									
CONDA4	195.05	22.02	36.92								
CONDA5	251.39	70.47	10.66	28.35							
CONDA6	182.46	25.16	19.35	5.34	19.00						
CONDB1	0.51	170.25	213.17	214.55	273.97	200.41					
CONDB2	156.33	0.35	56.28	24.75	75.74	29.85	171.97				
CONDB3	201.78	62.52	1.28	51.97	18.28	29.18	219.12	68.29			
CONDB4	198.89	12.79	33.19	2.27	32.08	5.82	218.15	15.02	46.54		
CONDB5	232.43	65.36	7.77	28.51	0.56	18.41	254.07	70.51	14.48	31.50	
CONDB6	174.03	31.10	18.55	8.61	18.89	0.74	191.53	36.58	27.63	10.44	17.90

CLASSIFICATION FUNCTIONS

GROUP =	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
VARIABLE						
116 FACTOR2	7.10410	-0.50364	-1.79957	-1.79704	-2.03005	-1.46255
118 FACTOR4	0.92919	1.47969	-1.03098	0.27608	-1.15138	-0.90100
119 FACTOR5	-1.46581	-0.03511	-0.45494	0.69263	0.88955	0.33208
120 FACTOR6	-1.58212	-0.86314	1.93253	-0.46373	1.51306	-0.13750
CONSTANT	-8.72939	-2.74069	-3.40954	-2.50920	-3.13143	-2.38333

STEP NUMBER 4
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	0	0	2
CONDA2	0.0	6	44	2	25	3	5
CONDA3	0.0	0	0	40	4	12	9
CONDA4	0.0	3	14	9	42	2	10
CONDA5	0.0	0	0	11	5	50	14
CONDA6	0.0	0	10	5	26	3	26
CONDB1	95.0	76	3	0	0	0	1
CONDB2	57.6	6	49	1	21	4	4
CONDB3	60.0	0	2	39	1	12	11
CONDB4	45.0	1	22	6	36	6	9
CONDB5	43.8	2	1	15	6	35	21
CONDB6	42.9	1	6	5	25	3	30
TOTAL	57.6	165	159	133	191	130	142

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	0	0	2
CONDA2	0.0	6	44	2	25	3	5
CONDA3	0.0	0	0	40	4	12	9
CONDA4	0.0	3	14	9	42	2	10
CONDA5	0.0	0	0	11	5	50	14
CONDA6	0.0	0	10	5	26	3	26
CONDB1	95.0	76	3	0	0	0	1
CONDB2	56.5	6	48	1	22	4	4
CONDB3	56.9	0	2	37	1	12	13
CONDB4	45.0	1	22	6	36	6	9
CONDB5	43.8	2	1	15	6	35	21
CONDB6	41.4	1	6	6	25	3	29
TOTAL	56.7	165	158	132	192	130	143

STEP NUMBER 5

VARIABLE ENTERED 117 FACTOR3 - VERTICAL GUIDANCE

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 450		*	DF=	5 449		
116 FACTOR2	248.206	2	*	115 FACTOR1	7.794	2	0.942613
117 FACTOR3	10.104	2	*	121 FACTOR7	7.218	2	0.986532
118 FACTOR4	47.905	2	*	122 FACTOR8	1.353	2	0.995554
119 FACTOR5	22.951	2	*	123 FACTOR9	5.948	2	0.981468
120 FACTOR6	58.118	2	*	125 FACTOR11	6.923	2	0.971245
			*	128 FACTOR14	4.677	2	0.980589

U-STATISTIC OR WILKS' LAMBDA 0.0945206 DEGREES OF FREEDOM 5 5 454
APPROXIMATE F-STATISTIC 59.366 DEGREES OF FREEDOM 25.00 1673.18

F - MATRIX DEGREES OF FREEDOM = 5 450

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	125.17										
CONDA3	160.24	41.41									
CONDA4	155.74	18.83	32.85								
CONDA5	200.88	57.01	11.10	22.69							
CONDA6	148.74	29.58	28.84	8.17	20.05						
CONDB1	0.49	138.61	175.60	171.53	219.27	162.14					
CONDB2	125.91	0.36	46.09	20.45	60.80	31.69	139.12				
CONDB3	162.05	49.98	2.04	42.09	14.89	30.24	176.53	54.51			
CONDB4	159.16	10.70	28.60	1.98	25.63	10.28	175.00	12.16	37.30		
CONDB5	185.67	53.12	9.11	22.77	0.45	19.16	203.25	56.75	11.97	25.21	
CONDB6	142.57	35.30	29.29	11.41	20.66	0.61	155.52	37.95	29.78	14.72	19.43

CLASSIFICATION FUNCTIONS

GROUP =	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
VARIABLE						
116 FACTOR2	7.11400	-0.52259	-1.81868	-1.80724	-2.03447	-1.41641
117 FACTOR3	-0.17122	0.32742	0.33033	0.17635	0.07647	-0.79757
118 FACTOR4	0.91191	1.51274	-0.99763	0.29388	-1.14366	-0.98153
119 FACTOR5	-1.46370	-0.03915	-0.45902	0.69046	0.88861	0.34192
120 FACTOR6	-1.59326	-0.84184	1.95403	-0.45225	1.51804	-0.18939
CONSTANT	-8.74271	-2.78942	-3.45913	-2.52334	-3.13409	-2.67244

STEP NUMBER 5
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	0	0	2
CONDA2	0.0	4	50	3	19	4	5
CONDA3	0.0	0	3	41	4	11	6
CONDA4	0.0	3	16	9	38	2	12
CONDA5	0.0	0	0	12	9	52	7
CONDA6	0.0	0	8	2	19	3	38
CONDB1	96.2	77	3	0	0	0	0
CONDB2	58.8	6	50	1	22	4	2
CONDB3	50.8	0	2	33	3	10	17
CONDB4	42.5	1	22	4	34	6	13
CONDB5	47.5	2	0	17	16	38	7
CONDB6	48.6	1	5	4	22	4	34
TOTAL	57.8	164	167	126	186	134	143

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	0	0	2
CONDA2	0.0	4	50	3	19	4	5
CONDA3	0.0	0	3	41	4	11	6
CONDA4	0.0	3	16	9	38	2	12
CONDA5	0.0	0	0	12	9	52	7
CONDA6	0.0	0	8	2	19	3	38
CONDB1	95.0	76	3	0	0	0	1
CONDB2	58.8	6	50	1	22	4	2
CONDB3	49.2	0	2	32	3	11	17
CONDB4	41.2	1	22	4	33	7	13
CONDB5	46.2	2	0	18	16	37	7
CONDB6	48.6	1	5	4	22	4	34
TOTAL	57.0	163	167	126	185	135	144

STEP NUMBER 6

VARIABLE ENTERED 115 FACTOR1 - VERTICAL VELOCITY

VARIABLE	F TO REMOVE	FORCE LEVEL	*	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	5 449		*	DF=	5 448		
115 FACTOR1	7.794	2	*	121 FACTOR7	7.206	2	0.986482
116 FACTOR2	267.315	2	*	122 FACTOR8	1.371	2	0.995328
117 FACTOR3	10.102	2	*	123 FACTOR9	5.940	2	0.981410
118 FACTOR4	48.453	2	*	125 FACTOR11	7.020	2	0.970117
119 FACTOR5	23.520	2	*	128 FACTOR14	4.740	2	0.979817
120 FACTOR6	59.455	2	*				

U-STATISTIC OR WILKS' LAMBDA 0.0869719 DEGREES OF FREEDOM 6 5 454
APPROXIMATE F-STATISTIC 50.430 DEGREES OF FREEDOM 30.00 1798.00

F - MATRIX DEGREES OF FREEDOM = 6 449

	CONDA1	CONDA2	CONDA3	CONDA4	CONDA5	CONDA6	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5
CONDA2	112.12										
CONDA3	151.84	37.29									
CONDA4	147.00	17.64	27.44								
CONDA5	185.29	49.66	9.30	18.88							
CONDA6	138.72	26.03	24.23	6.82	16.74						
CONDB1	0.55	121.25	161.63	157.08	197.47	147.14					
CONDB2	116.21	0.62	39.67	17.73	51.44	26.78	124.72				
CONDB3	154.66	44.95	1.72	35.25	12.56	25.55	163.61	47.05			
CONDB4	151.81	11.59	23.80	1.70	21.33	8.69	161.75	11.28	31.10		
CONDB5	172.49	46.36	7.65	18.94	0.38	15.99	184.00	48.05	10.14	20.99	
CONDB6	133.68	30.81	24.59	9.51	17.23	0.51	141.72	32.01	25.16	12.37	16.20

CLASSIFICATION FUNCTIONS

GROUP =	CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
VARIABLE						
115 FACTOR1	1.24739	0.05104	-0.50205	-0.38005	-0.31678	-0.22499
116 FACTOR2	7.67387	-0.49968	-2.04402	-1.97782	-2.17666	-1.51739
117 FACTOR3	-0.18911	0.32669	0.33753	0.18180	0.08101	-0.79434
118 FACTOR4	1.01405	1.51692	-1.03874	0.26276	-1.16960	-0.99995
119 FACTOR5	-1.56313	-0.04322	-0.41900	0.72075	0.91386	0.35985
120 FACTOR6	-1.74616	-0.84810	2.01556	-0.40567	1.55687	-0.16181
CONSTANT	-9.46645	-2.79063	-3.57637	-2.59052	-3.18077	-2.69598

STEP NUMBER 6
CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	0	0	2
CONDA2	0.0	4	51	2	20	4	4
CONDA3	0.0	0	4	40	4	11	6
CONDA4	0.0	3	15	10	41	2	9
CONDA5	0.0	0	1	12	7	54	6
CONDA6	0.0	0	6	2	21	3	38
CONDB1	95.0	76	3	0	1	0	0
CONDB2	67.1	6	57	1	16	4	1
CONDB3	53.8	0	2	35	3	10	15
CONDB4	48.7	1	18	4	39	6	12
CONDB5	47.5	3	2	16	17	38	4
CONDB6	51.4	1	4	2	21	6	36
TOTAL	61.1	164	171	124	190	138	133

JACKKNIFED CLASSIFICATION

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -					
		CONDB1	CONDB2	CONDB3	CONDB4	CONDB5	CONDB6
CONDA1	0.0	70	8	0	0	0	2
CONDA2	0.0	4	51	2	20	4	4
CONDA3	0.0	0	4	40	4	11	6
CONDA4	0.0	3	15	10	41	2	9
CONDA5	0.0	0	1	12	7	54	6
CONDA6	0.0	0	6	2	21	3	38
CONDB1	95.0	76	3	0	1	0	0
CONDB2	62.4	6	53	1	19	4	2
CONDB3	52.3	0	2	34	3	10	16
CONDB4	43.8	1	22	4	35	6	12
CONDB5	46.2	3	2	17	17	37	4
CONDB6	48.6	1	4	2	23	6	34
TOTAL	58.5	164	171	124	191	137	133

Appendix C

Canonical correlations and percent variance accounted for by each canonical variable. (As a rule of thumb, correlations of less than .316 are not considered significant because they account for less than 10% of the variance.

	Group A		Group B	
	Canonical Correlation	Percent Variance	Canonical Correlation	Percent Variance
1	.874	76	.880	77
2	.622	39	.662	44
3	.487	24	.481	23
4	.210	4	.307	9
5	.127	2	.110	1

Appendix D

Summary tables of overall discriminant analysis using all variables. The first two tables are on Group A; the second two on Group B.

Classification functions based on Group A data.
(920 cases in the equation)

Group =	Cond I	Cond II	Cond III	Cond IV	Cond V	Cond VI	F to Remove DF= 5,897
Factor 1	1.43333	0.13126	-0.76337	-0.35585	-0.57011	-0.26648	18.667
Factor 2	-0.42817	0.16403	0.67777	0.02373	0.14433	-0.81772	21.296
Factor 3	7.83763	0.02674	-2.24899	-1.47138	-2.74647	-1.56590	515.075
Factor 4	-0.53902	-0.59082	0.00569	-0.06490	0.87426	0.26012	18.375
Factor 5	-2.44242	-1.04560	2.12559	-0.31888	2.16540	-0.03656	167.172
Factor 6	-0.73360	-0.49685	-0.09721	0.40802	0.46608	-0.16288	10.214
Factor 7	1.33314	1.46021	-1.07783	0.19313	-1.41056	-0.67176	85.365
Factor 8	-1.76180	-0.24760	-0.40130	0.68508	1.00000	0.61618	45.756
Factor 9	1.30349	0.30128	-0.21191	-0.31157	-0.64340	-0.49332	16.831
Factor 10	-0.30221	0.01129	0.06368	-0.37834	-0.04828	0.54816	9.142
Factor 11	-0.33617	-0.31129	-0.23668	-0.10557	0.32996	0.76198	13.993
Factor 12	-0.54558	-0.22648	0.02887	0.08203	0.40291	0.66520	12.717
Factor 13	-0.47155	-0.07296	0.34868	-0.17800	0.58281	0.12789	5.847
Factor 14	0.91209	0.37371	-0.02795	-0.10945	-0.88727	-0.24336	18.260
Factor 15	0.30583	0.15236	0.05722	-0.17786	-0.09680	-0.31210	3.715
Factor 16	0.34764	-0.23717	0.00398	-0.22865	-0.08818	-0.11239	1.489
Factor 17	-0.05131	-0.26340	-0.00171	0.01494	0.38887	0.18944	4.433
Factor 18	0.34472	-0.02062	-0.03885	-0.07850	0.01953	-0.05169	1.693
Constant	-10.17334	-2.93577	-3.92762	-2.50086	-4.18887	-3.06541	

Classification matrix based on Group A data

Group	Percent Correct	Number of cases classified into condition by equation					
		Cond I	Cond II	Cond III	Cond IV	Cond V	Cond VI
Cond I	90.6	145	13	0	1	0	1
Cond II	68.8	10	117	6	330	1	3
Cond III	60.8	0	4	79	10	20	17
Cond IV	61.2	3	32	15	98	5	7
Cond V	63.1	1	0	22	23	101	13
Cond VI	47.9	1	16	3	41	12	67
Total	66.0	160	182	125	206	139	108

F - Matrix Degrees of Freedom= 18,897

	Cond I	Cond II	Cond III	Cond IV	Cond V
Cond II	78.37				
Cond III	121.78	34.74			
Cond IV	105.45	11.72	24.06		
Cond V	151.85	51.37	12.97	23.35	
Cond VI	105.25	25.94	24.53	11.83	18.84

Classification functions based on Group B analysis.
(920 cases in the equations)

Group =	Cond I	Cond II	Cond III	Cond IV	Cond V	Cond VI	F to Remove DF= 5,897
Factor 1	1.47116	0.14763	-0.49940	-0.30114	-0.39635	-0.27790	20.444
Factor 3	-0.30625	0.40081	0.72395	0.18119	0.19486	-0.87532	29.417
Factor 4	1.42578	1.52823	-1.01034	0.14392	-1.41900	-1.16770	89.091
Factor 5	-1.63297	-0.12235	-0.08061	0.72558	1.22203	0.40752	46.712
Factor 6	-2.30397	-1.06249	2.38275	-0.55542	2.21715	-0.26888	142.211
Factor 7	-0.09517	-0.33514	-0.03871	-0.02312	0.75602	-0.00052	12.553
Factor 8	0.75002	0.21583	-0.16290	0.02131	-0.42764	-0.45751	8.697
Factor 9	-0.02522	0.03845	0.38917	-0.36257	0.30598	0.00936	7.871
Factor 10	-0.60923	-0.11887	-0.00877	-0.23384	0.35837	0.18424	4.113
Factor 11	-0.54876	-0.30712	-0.18089	-0.04509	0.34876	0.73358	16.376
Factor 12	-0.33640	-0.21461	0.18554	-0.18281	0.24564	0.19702	2.850
Factor 13	-0.42889	-0.20283	-0.05080	0.17110	0.31207	0.05838	2.865
Factor 14	0.53121	0.21759	0.09787	-0.09865	-0.60062	-0.43461	8.695
Factor 15	-0.02627	-0.00904	0.53845	0.04622	0.44624	-0.52908	12.755
Factor 16	-0.24566	0.12880	-0.08519	-0.08708	0.33289	-0.08438	3.750
Factor 17	-0.36663	-0.21854	0.37797	-0.18974	0.60972	-0.02076	10.338
Factor 18	0.07958	0.02921	0.04033	-0.05011	0.02814	-0.04986	0.705
Constant	-9.90668	-2.91505	-3.89747	-2.68114	-4.32131	-3.20585	

Classification matrices based on Group B data.

Group	Percent Correct	Number of cases classified into group by equation					
		Cond I	Cond II	Cond III	Cond IV	Cond V	Cond VI
Cond I	91.2	146	11	0	2	0	1
Cond II	70.6	10	120	5	32	2	1
Cond III	66.9	0	4	87	9	20	10
Cond IV	63.7	4	27	18	102	2	7
Cond V	65.6	1	0	24	23	105	7
Cond VI	47.9	1	12	4	42	14	67
Total	68.2	162	174	138	210	143	93

F - Matrix Degrees of Freedom = 18,877

	Cond I	Cond II	Cond III	Cond IV	Cond V
Cond II	79.57				
Cond III	118.68	34.60			
Cond IV	106.25	11.33	24.85		
Cond V	150.46	49.45	11.46	25.43	
Cond VI	107.93	28.18	26.32	12.73	21.36