AgRISTARS

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A Joint Program for Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing

June 1981

Foreign Commodity Production Forecasting

VOLUME I

PROJECT TEST REPORTS DOCUMENT

J. T. Waggoner and D. E. Phinney

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15. Supplementary Notes

16. Abstract

This document contains the technical/management documentation of the AgRISTARS - Foreign Commoidty Production Forecasting Project (FCPF) testing activities. These FCPF Procedural Evaluation Test Reports are prepared in accordance with the guidelines provided in the FCPF Project Communications/Documentation Standards Manual (JSC-17141). The Test Reports presented in this volume represent test activities conducted during 1981.

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FCPF PROJECT
TEST REPORTS DOCUMENT
VOLUME I

Job Order 70-221
Job Order 72-422

THIS DOCUMENT PROVIDES FCPF STANDARD TEST REPORTS DOCUMENTATION THROUGH JUNE 1981

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HOUSTON, TEXAS

June 1981

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1. INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this document is to provide the technical/management type documentation of the FCPF testing activities. These FCPF Test Reports are prepared in accordance with the guidelines provided in the FCPF Project Communications/Documentation Standards Manual (JSC-17141).

This FCPF Test Reports Document, Volume I contains the officially documented AgRISTARS FCPF Test Reports that have been presented to the FCPF Project Manager up through June 1981.

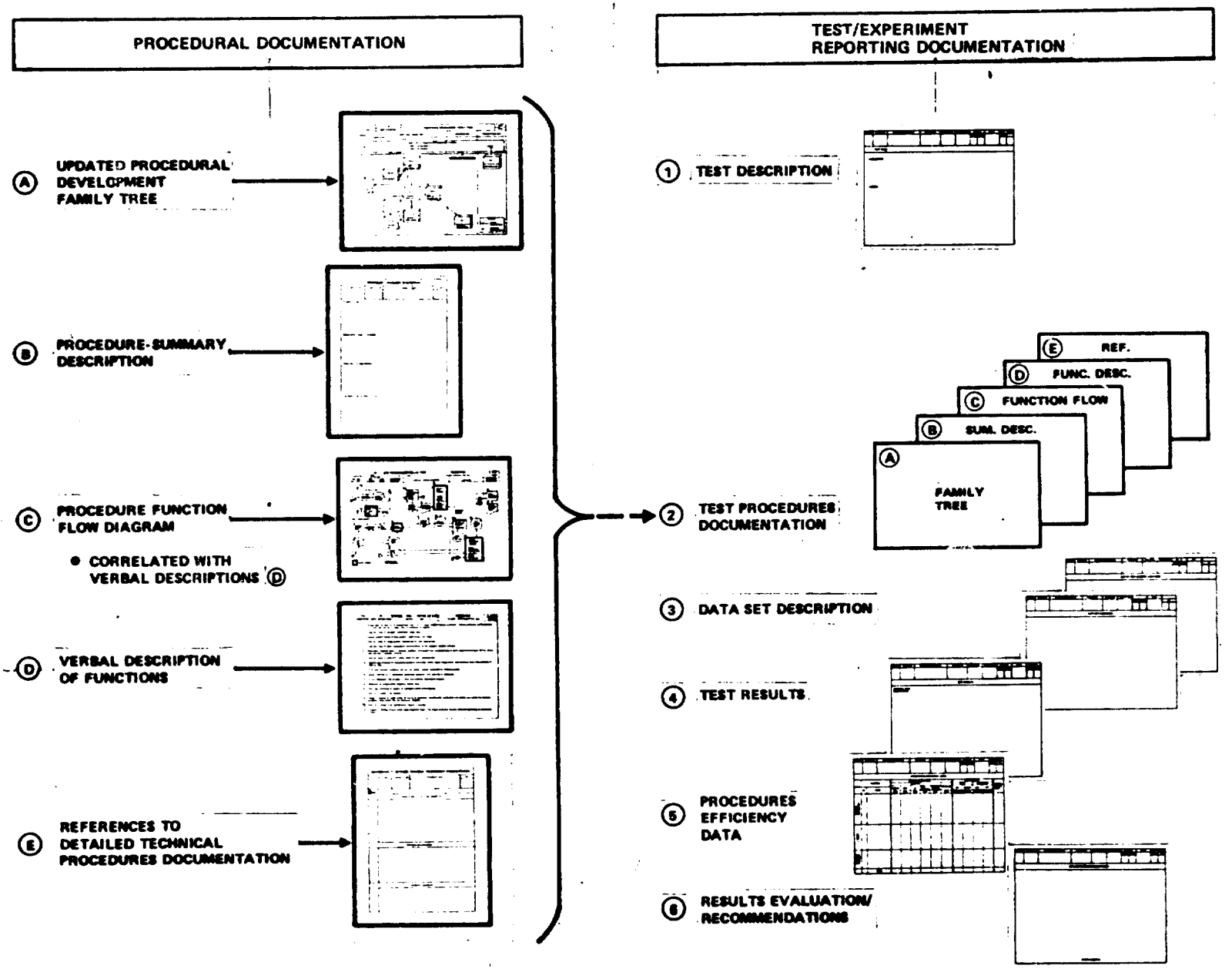
1.2 DOCUMENT DESCRIPTION

The FCPF Test Reports Documents are arranged for easy access by the user while providing a quick overview of the FCPF tests that have been completed and reported to the FCPF Project Manager during the period covered by the document. It contains:

a. Log of Test Reports.

b. Standard documentation sets in Appendix A for each Test reported in the document. Figure 1 contains a summary of the documentation elements presented in each set. These elements are described in detail in the FCPF Communications/Documentation Standards Manual.

FIGURE 1. FCPF STANDARDS BASIC DOCUMENTATION ELEMENTS SUMMARY



2. FCPF TEST/EXPERIMENTS REPORTS LOG

FCPF TEST/EXPERIMENTS LOG

CROP PROCEDURE		*TEST NO.	TEST TYPE • DEV. • EXPLOR. • PILOT	TEST LEVEL • SYSTEM • SUBSYS. • COMPONENT • SUBCOMP.	TEST DATA SET		TEST DESCRIPTION	Reported In FCPF Test Doc. Volume	TEST DATES	
CODE	NAME				REGION	NUMBER OF SEGS.			FROM	TO
SSG-3B SSG-3C	CAESAR2 CAESAR2A	1	DEV.	SUBSYSTEM	N. Dak. S. Dak. Mont. Minn.	76-5 77-6 78-14 79-4	CAESAR 2, 2A DEVELOPMENT TESTING	I	4/81	5/81
B1	BARLEY	2	DEV.	AREA EST. SUBCOMP.	N. Dak. S. Dak Mont. Minn	77-8 78-12	SPECTROMET BARLEY/OTHER SSG'S DISCRIMINANT	I	5/81	
MC1	SPATIAL/ COLOR SEQ	3	DEV.	SUBSYSTEM	Mont. Minn S. Dak.	78-1 78-3 78-2	SHAKEDOWN DEV. TEST OF MULTICROP SPATIAL/ COLOR SEQ (MC-1)	I		
*Assigned When Report is Presented to the FCPF Project Manager										

APPENDIX A

FCPF TEST REPORTS

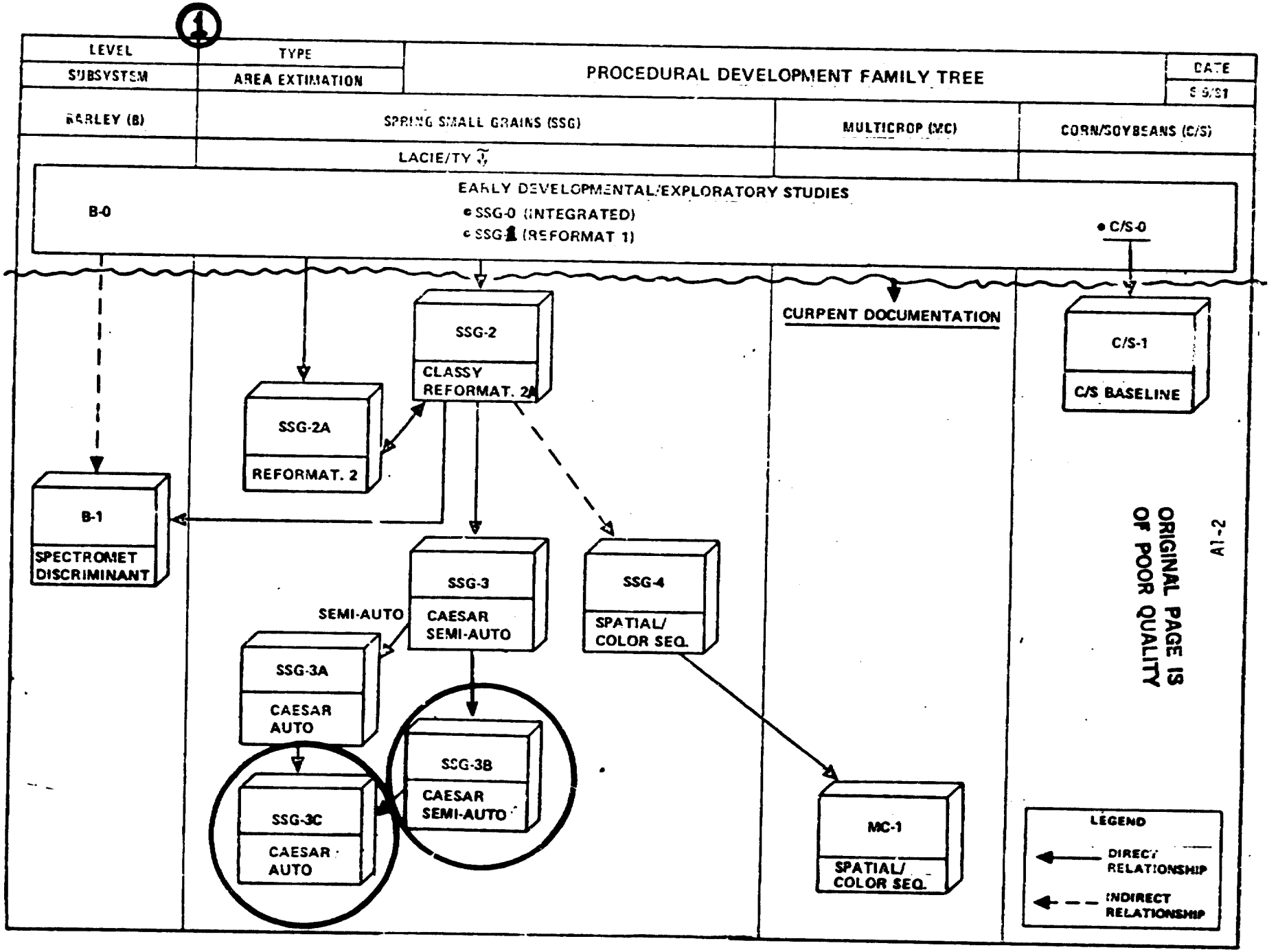
DOCUMENTATION

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TEST TITLE: TECHNIQUES DEVELOPMENT TESTING OF SSG-3B (CAESAR SEMI-AUTO)AND SSG-3C (CAESAR AUTO)

OBJECTIVE: FINAL CHECK-OUT BEFORE IMPLEMENTATION OF THE SSG-3B AND SSG-3C AREA ESTIMATION SUBSYSTEM LEVEL PROCEDURES BASED ON THE AUGMENTED DECISION LOGIC.

SCOPE: THE TEST WAS RUN USING ACQUISITIONS OVER 29 SEGMENTS DURING THE YEARS 1976-1979. THESE SEGMENTS WERE WELL DISTRIBUTED THROUGHOUT THE PRINCIPAL SPRING SMALL GRAINS PRODUCTION AREA OF THE UNITED STATES.


LEVEL
TYPE
SUBSYSTEM
AREA EXTIMATION
PROCEDURAL DEVELOPMENT FAMILY TREE
DATE
BARLEY (B)
SPRING SMALL GRAINS (SSG)
MULTICROP (MC)
CORN/SOYBEANS (C/S)
LACIE/TY
EARLY DEVELOPMENTAL/EXPLORATORY STUDIES
B-0
• SSG-0 (INTEGRATED)
• SSG-1 (REFORMAT 1)
• C/S-0
CURPENT DOCUMENTATION
SSG-2
CLASSY
REFORMAT. 2
SSG-2A
REFORMAT. 2
C/S-1
C/S BASELINE
B-1
SPECTROMET
DISCRIMINANT
SSG-3
CAESAR
SEMI-AUTO
SEMI-AUTO
SSG-4
SPATIAL/
COLOR SEQ.
SSG-3A
CAESAR
AUTO
SSG-3B
CAESAR
SEMI-AUTO
SSG-3C
CAESAR
AUTO
MC-1
SPATIAL/
COLOR SEQ.
LEGEND
DIRECT RELATIONSHIP
INDIRECT RELATIONSHIP
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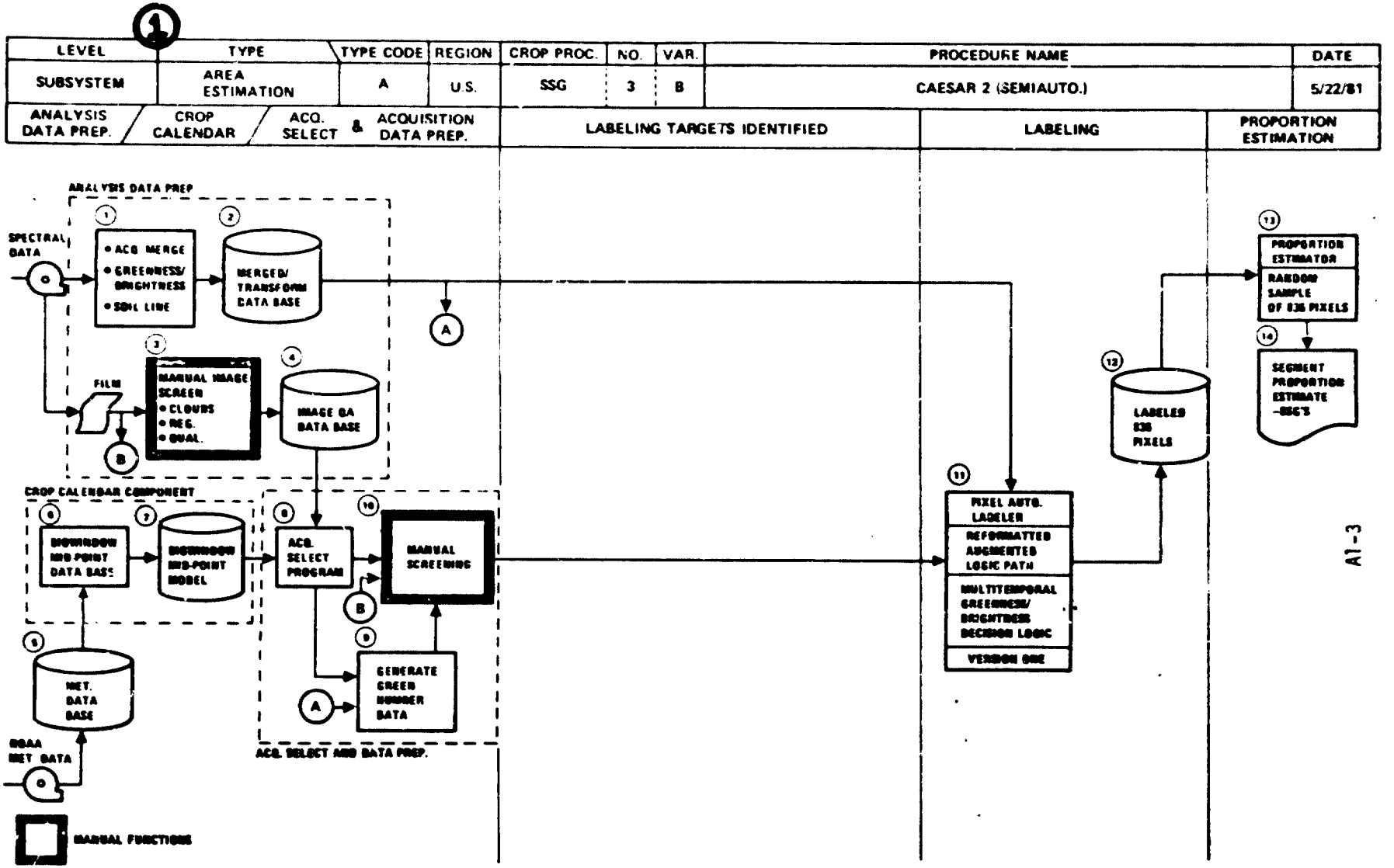
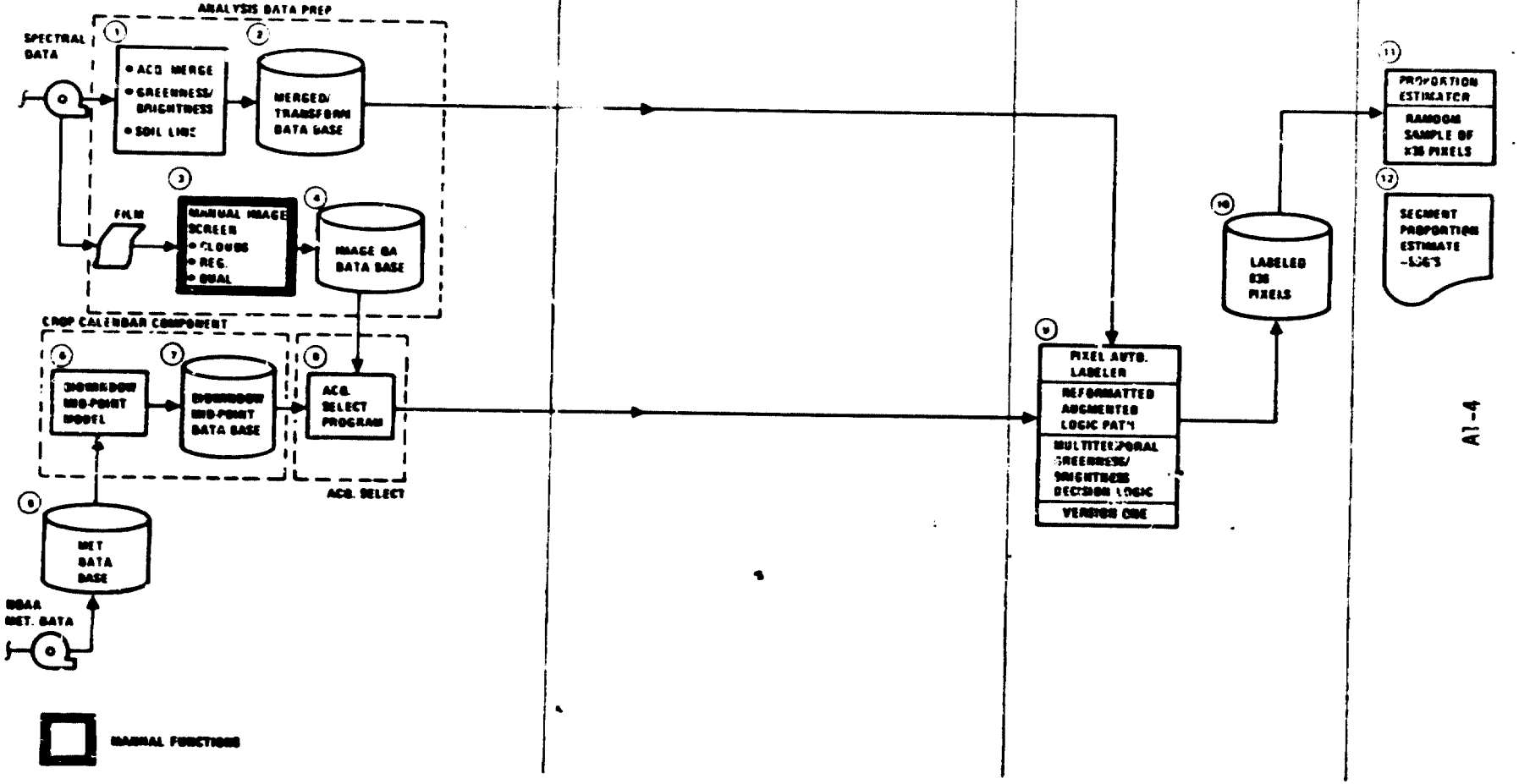

1
LEVEL
TYPE
TYPE CODE
REGION
CROP PROC.
NO.
VAR.
PROCEDURE NAME
DATE
SUBSYSTEM
AREA ESTIMATION
A
U.S.
SSG
3
B
CAESAR 2 (SEMIAUTO.)
5/22/81
ANALYSIS DATA PREP.
CROP CALENDAR
ACQ. SELECT & ACQUISITION DATA PREP.
LABELING TARGETS IDENTIFIED
LABELING
PROPORTION ESTIMATION
ANALYSIS DATA PREP
SPECTRAL DATA
ACQ MERGE
GREENNESS/ BRIGHTNESS
SOIL LINE
MERGED/ TRANSFORM DATA BASE
FILM
MANUAL IMAGE SCREEN
CLOUDS
REG.
QUAL.
IMAGE QA DATA BASE
CROP CALENDAR COMPONENT
BIOWINDOW MID POINT DATA BASE
BIOWINDOW MID-POINT MODEL
ACQ. SELECT PROGRAM
MANUAL SCREENING
GENERATE GREEN NUMBER DATA
ACQ. SELECT AND DATA PREP.
MET. DATA BASE
NOAA MET DATA
MANUAL FUNCTIONS
PIXEL AUTO. LABELER
REFORMATTED AUGMENTED LOGIC PATH
MULTITEMPORAL GREENNESS/ BRIGHTNESS DECISION LOGIC
VERSION ONE
LABELED 836 PIXELS
PROPORTION ESTIMATOR
RANDOM SAMPLE OF 836 PIXELS
SEGMENT PROPORTION ESTIMATE
A
B

LEVEL	TYPE	TYPE CODE	REGION	CROP PROC.	NO.	VAR.	PROCEDURE NAME	DATE
SUBSYSTEM	AREA ESTIMATION		U.S	SSG	3	C	CAESAR 2A (AUTO.)	5/22/81

ANALYSIS DATA PREP / CROP CALENDAR / ACQ. SELECT & ACQUISITION DATA PREP.	LABELING TARGETS IDENT.	LABELING	PROPORTION ESTIMATION



TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TECHNIQUES DEVELOPMENT TESTING OF SSG-3B ~~AND~~ SSG-3C

DESCRIPTION OF FUNCTIONS UNIQUE TO CAESAR

- ACQUISITION SELECTION - (#(8) ON CAESAR 2 AND CAESAR 2A) UP TO 8 ACQUISITIONS ARE SELECTED FOR USE IN LABELING AND PROPORTION ESTIMATION.

- PIXEL AUTO LABEL - (#(11) ON CAESAR 2 AND #(9) ON CAESAR 2A) A "TEMPORAL" LABEL IS ASSIGNED TO EACH OF 836 DOTS USING GREEN NUMBER/BRIGHTNESS DECISION LOGIC.

- PROPORTION ESTIMATOR - (#(13) ON CAESAR 2 AND #(11) ON CAESAR 2A) A PROPORTION ESTIMATE IS COMPUTED BY DIVIDING THE NUMBER OF DOTS LABELED SPRING SMALL GRAINS BY 836.

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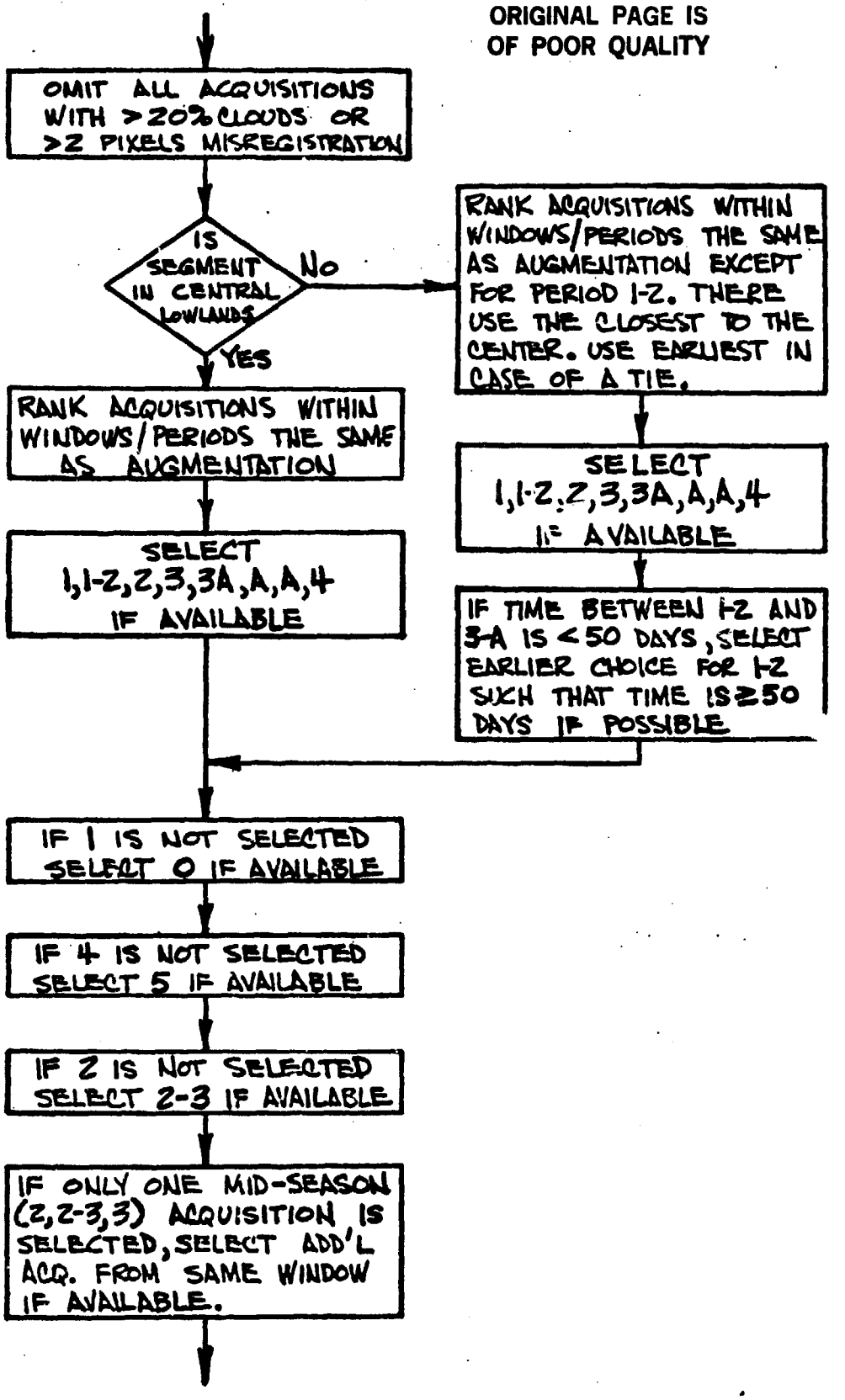
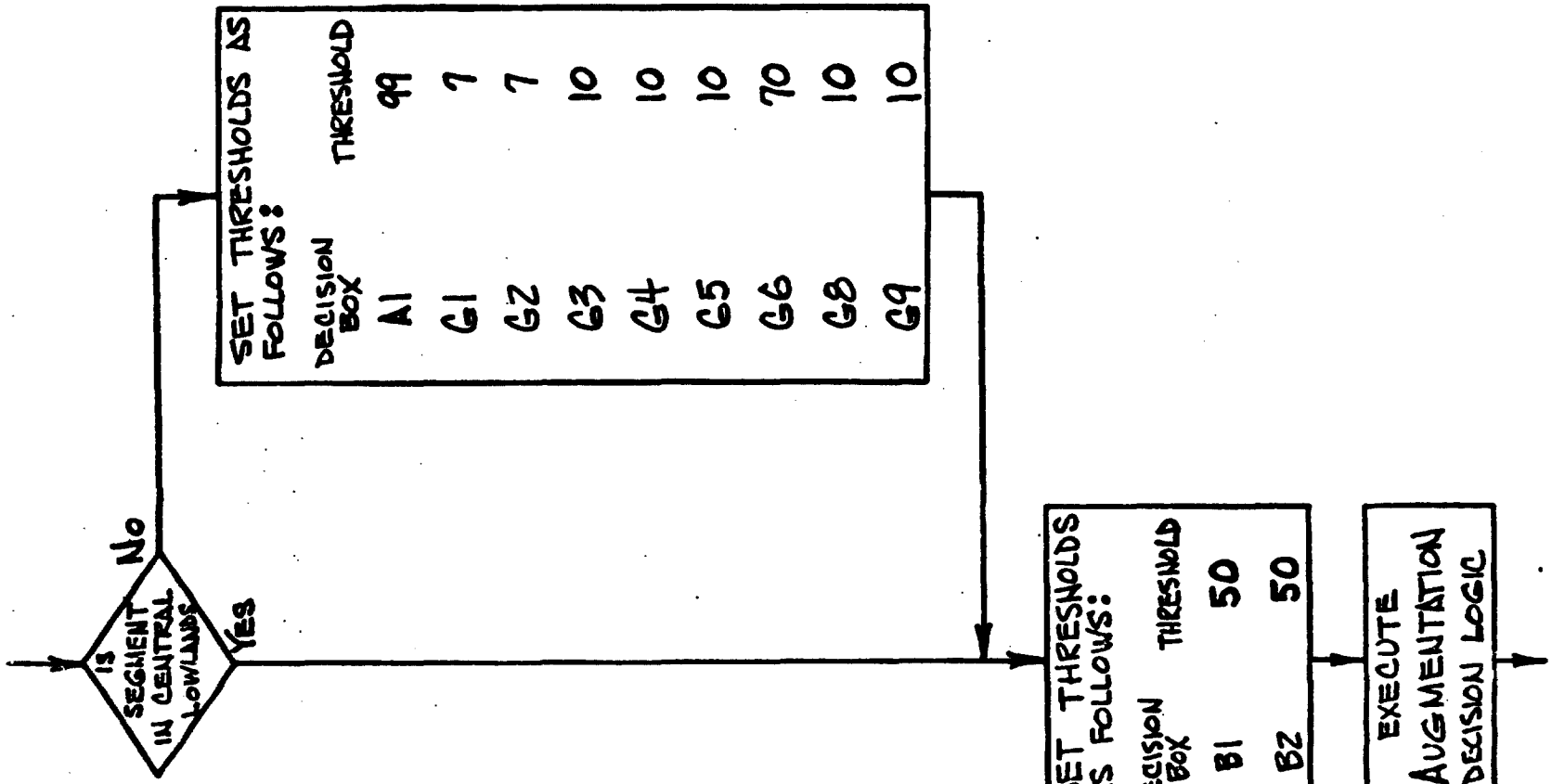


FUNCTION DESCRIPTION OF THE "ACQUISITION SELECTION FUNCTION" # (8) IN BOTH SSG-3B AND SSG-3C PROCEDURES

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKO S. DAKO MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

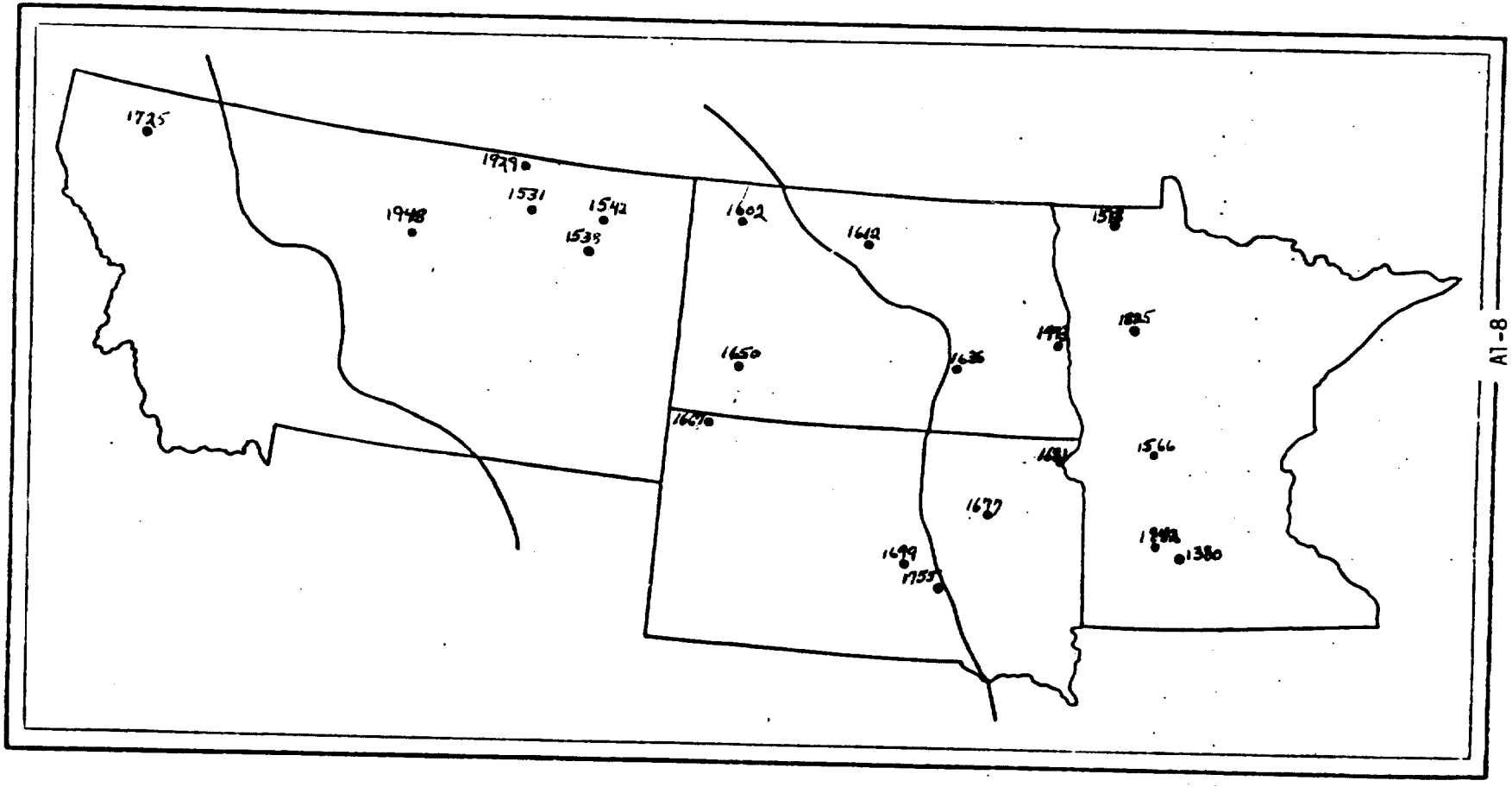
TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

FUNCTION DESCRIPTION OF THE "PIXEL AUTO LABELER FUNCTION" (# (11) IN SSG-3B PROCEDURE AND # (9) IN SSG-3C PROCEDURE



TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

MAP OF TEST SEGMENT LOCATIONS



TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
1	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

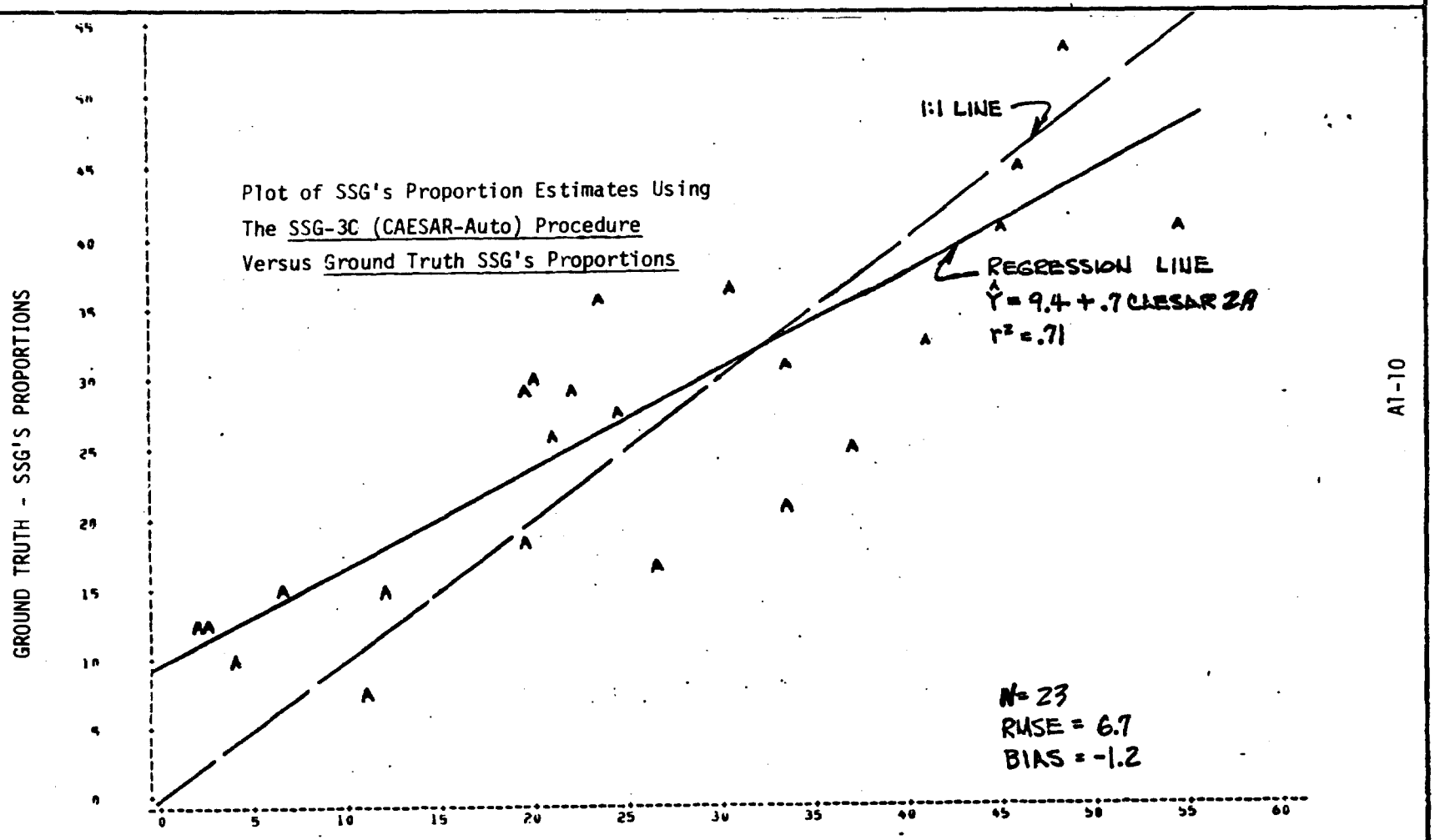
TEST RESULTS

GENERAL TEST DESCRIPTION: TECHNIQUES DEVELOPMENT TESTING OF SSG-3B (CAESAR SEMI-AUTO) & SSG-3C (CAESAR-AUTO)

						SSG-3C AUTO	SSG-3B SEMI-AUTO				SSG-3C AUTO	SSG-3B SEMI-AUTO			
CRS	SEGMENT	YEAR	STRATA	STATE	OT_SSG	CAESAR	CAESAR	PROC_ONE	INT_PROC	IP_P1	ERR_CSR	ERR_CSR	ERR_P1	ERR_IP	ERR_IPP1
1	1473	78	20	ND	53.6	48.7	51.4	53.0	54.1	54.1	-4.9	-2.2	-0.6	0.5	0.5
2	1602	78	21	ND	30.2	19.9	19.9	22.2	33.0	33.0	-10.3	-10.3	-8.0	2.8	2.8
3	1612	78	19	ND	16.7	26.6	16.1	7.0	13.4	13.4	9.9	-0.6	-9.7	-3.3	-3.3
4	1636	78	19	ND	45.4	44.1	46.1	31.0	42.8	42.8	0.7	0.7	-14.4	-2.6	-2.6
5	1650	78	21	ND	27.4	24.4	24.4	9.6	24.4	24.4	-3.0	-3.0	-17.8	-3.0	-3.0
6	1647	76	21	SD	14.9	.	15.4	1.9	.	1.9	.	0.5	-13.0	.	-13.0
7	1677	76	19	SD	29.4	22.0	30.1	43.7	.	43.7	-7.4	0.7	14.3	.	14.3
8	1677	77	19	SD	34.1	.	41.5	23.3	.	23.3	.	7.4	-10.8	.	-10.8
9	1681	76	19	SD	31.2	33.7	31.7	44.4	.	44.4	2.5	0.5	13.2	.	13.2
10	1681	77	19	SD	41.1	54.5	43.5	25.0	.	25.0	13.4	2.4	-16.1	.	-16.1
11	1699	77	16	SD	20.6	33.6	21.4	16.0	.	16.0	13.0	0.8	-4.6	.	-4.6
12	1755	78	16	SD	12.8	2.4	5.4	9.0	8.1	8.1	-10.4	-7.4	-3.8	-4.7	-4.7
13	1755	79	16	SD	12.2	1.8	13.3	.	10.1	10.1	-10.4	1.1	.	-2.1	-2.1
14	1818	78	20	MN	36.6	30.7	30.9	23.0	24.1	24.1	-5.9	-5.7	-13.6	-12.5	-12.5
15	1818	79	20	MN	21.6	.	30.7	.	13.7	13.7	.	9.1	.	-7.9	-7.9
16	1820	78	15	MN	9.8	4.1	7.2	15.0	7.7	7.7	-5.7	-2.6	5.2	-2.1	-2.1
17	1866	78	19	MN	29.3	19.7	31.0	26.0	35.4	35.4	-9.6	1.7	-3.3	6.1	6.1
18	1825	77	20	MN	32.9	41.0	39.0	24.0	.	24.0	8.1	6.1	-8.9	.	-8.9
19	1825	78	20	MN	36.1	23.4	30.1	23.0	37.4	37.4	-12.7	-6.0	-13.1	1.3	1.3
20	1825	79	20	MN	26.2	21.1	21.1	.	23.6	23.6	-5.1	-5.1	.	-2.6	-2.6
21	1842	78	19	MN	14.8	12.2	12.2	22.0	13.4	13.4	-2.6	-2.6	7.2	-1.4	-1.4
22	1542	78	21	MT	25.1	37.0	19.0	18.0	24.5	24.5	11.9	-6.1	-7.1	-0.6	-0.6
23	1531	76	23	MT	8.1	.	13.2	24.0	.	24.0	.	5.1	15.9	.	15.9
24	1531	77	23	MT	14.6	6.5	11.5	10.0	.	10.0	-8.1	-3.1	-4.6	.	-4.6
25	1539	76	22	MT	18.4	19.3	18.9	23.7	.	23.7	0.9	0.5	5.3	.	5.3
26	1725	78	104	MT	16.6	.	11.4	.	.	.	.	-5.2	.	.	.
27	1948	78	23	MT	5.9	.	12.1	6.0	.	6.0	.	6.2	0.1	.	0.1
28	1948	79	23	MT	7.5	10.9	10.8	.	8.0	8.0	3.4	3.3	.	0.5	0.5
29	1929	77	23	MT	41.1	44.9	44.9	45.6	.	45.6	3.8	3.8	4.5	.	4.5

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
①	DEVELOPMENT	SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TEST RESULTS



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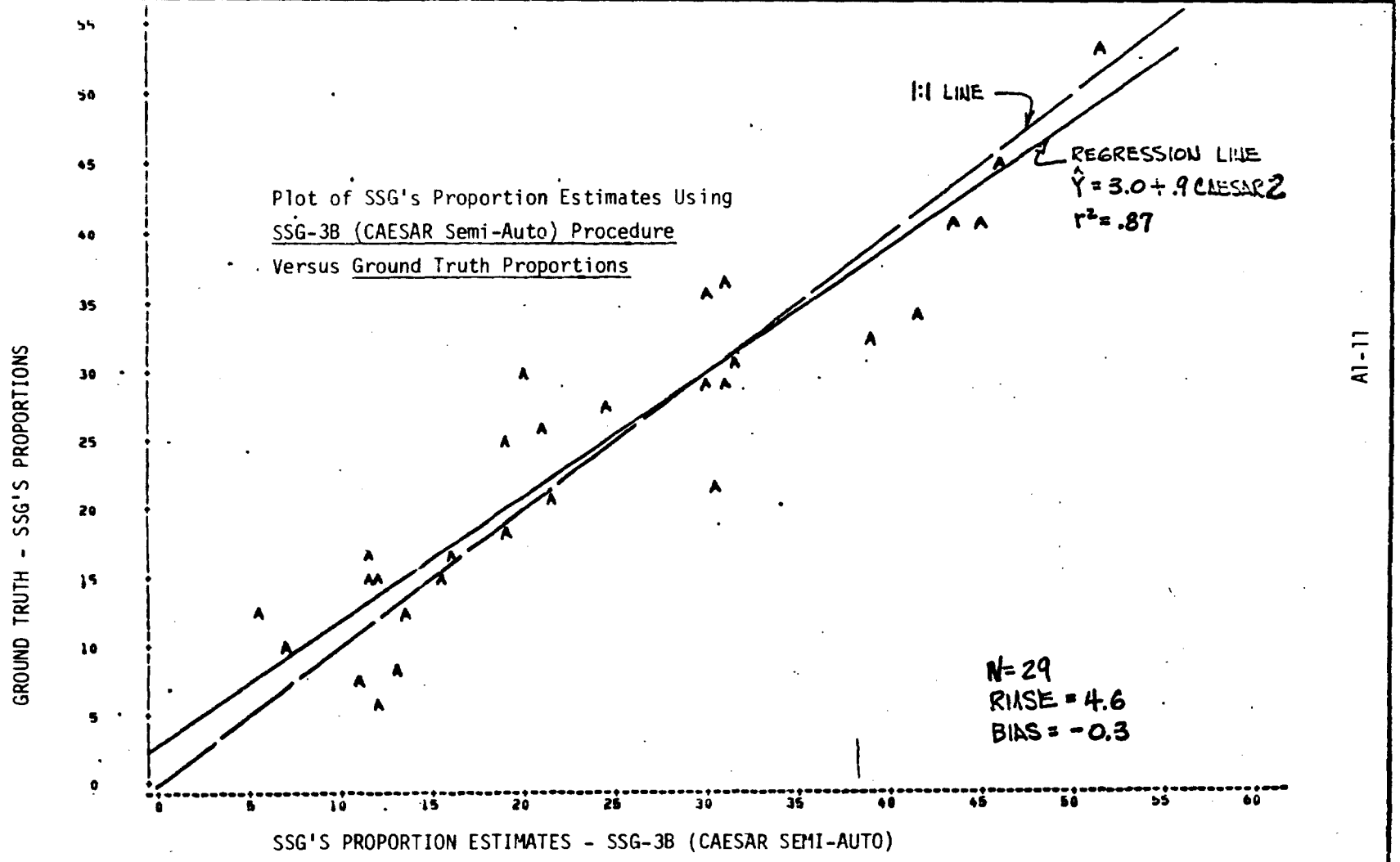
TEST NO.	TEST T 'PE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
①	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TEST RESULTS



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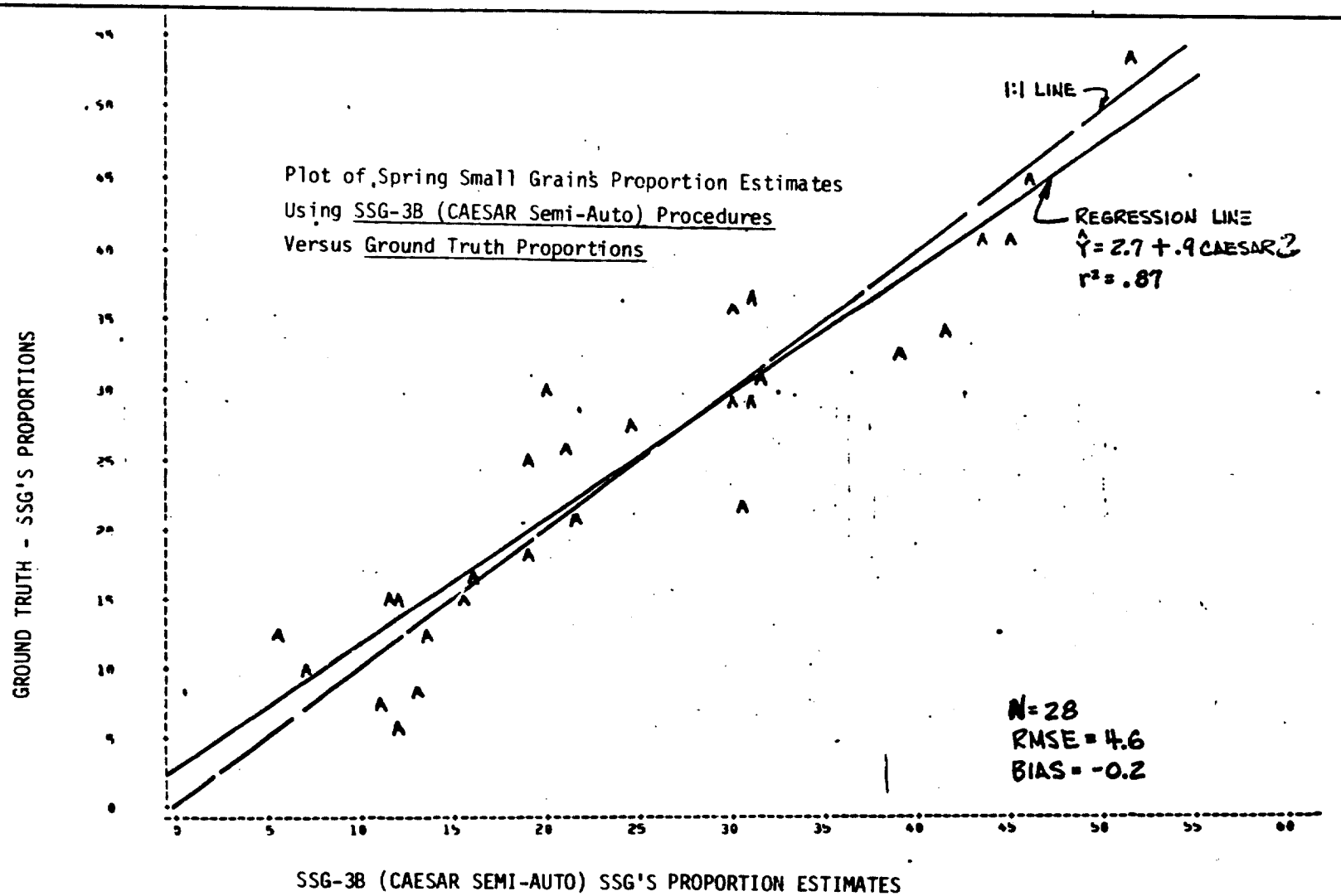
						SEGS.	ACQS.		FROM	TO
①	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TEST RESULTS



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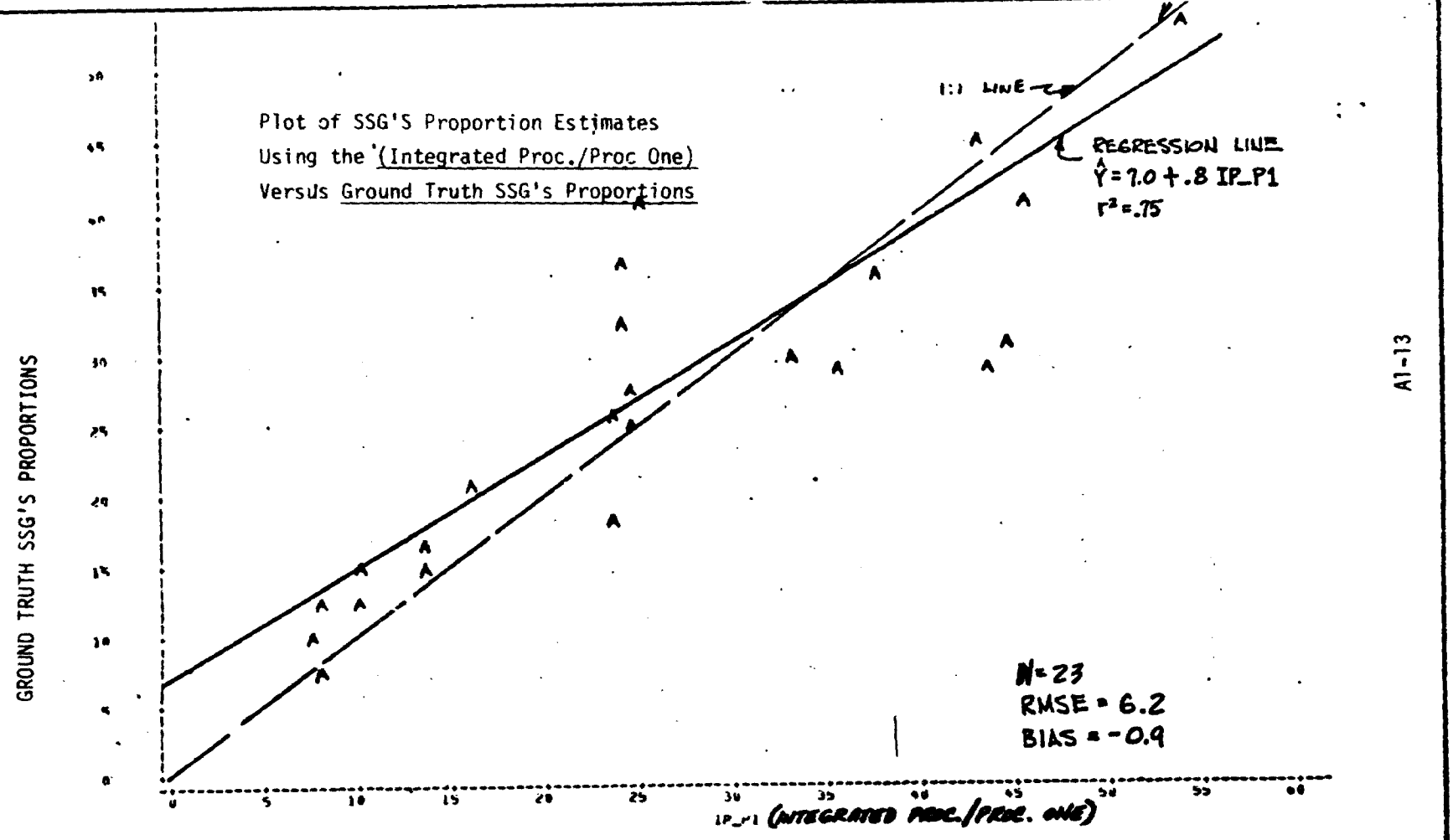
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TEST RESULTS

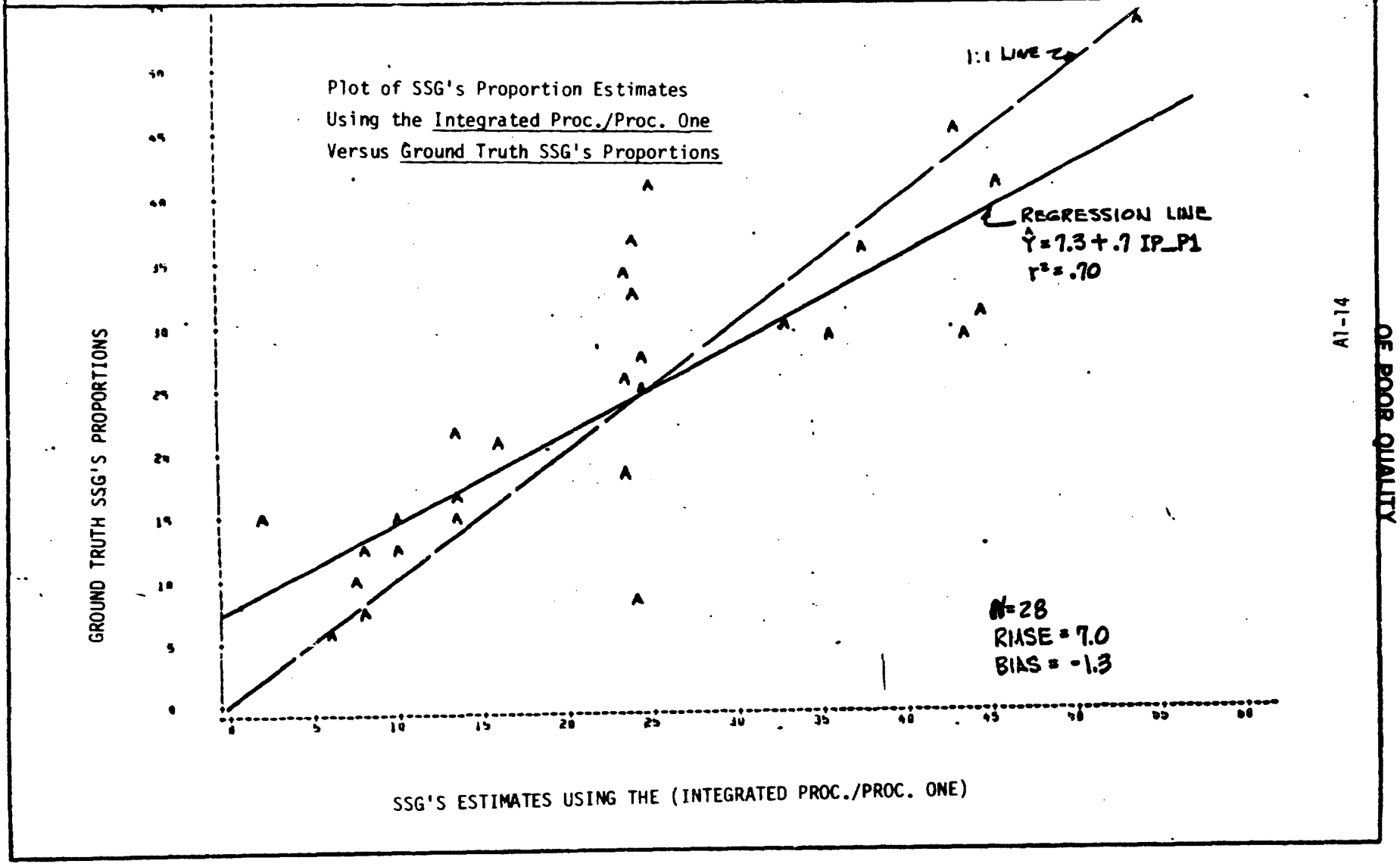


A1-13

SSG'S PROPORTION ESTIMATES USING THE
(INTEGRATED PROC./PROC. ONE)

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
①	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

TEST RESULTS



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TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET SEGS.	DATA SET ACQS.	DATE	TEST PERIOD FROM	TEST PERIOD TO
1	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

PROCEDURES EFFICIENCY DATA

GROUP	FUNCTION NO.	FUNCTION NAME	MANUAL OPERATIONS: ANALYST CONTACT (MIN)	ANALYST CLER. (MIN)	ANALYST QA (MIN)	ANALYST DATA HANDLING (MIN)	ANALYST STATUS & TRACKING (MIN)	TECHNICIAN (MIN)	COMPUTER OPS. BATCH CPU (MIN: SEC)	BATCH CONNECT (MIN:SEC)	INTERACTIVE CPU (MIN: SEC)	INTERACTIVE OPR. (MIN: SEC)	THROUGHPUT TIME (DAYS)
DATA PREP. FOR ANALYSIS		① MERGE AND TRANSFORM			10.		5.		12.	60.	12.	5.	
		② DIRECTORY							.01		.01	2.30	
		③ SOIL LINE			5.		5.		2.30	15.	2.30	5.	
		④ IMAGE SCREENING AND DATA BASE						180.	.01		.01	5.	④
		⑤ CANDIDATE SEGMENT LIST			5.	5.			.01		.01	15.	2 A1-15
LABELING		- ACQUISITION SELECTION - GREEN NUMBER GENERATION							1.	1.-2.	1.	10.-15.	
		- ACQUISITION VERIFICATION - PIXEL LABELING	30.	15.	5.	5.	1.	2.				15.	
PROPORTION ESTIMATION		PROPORTION ESTIMATES							.01		.01		
		TOTAL	30.	15.	25.	10.	11.	182.	15'34"	76.	15'34	59'30"	3

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

PROCEDURES EFFICIENCY DATA

GROUP	FUNCTION NO.	FUNCTION NAME	MANUAL OPERATIONS: ANALYST CONTACT MIN	ANALYST CLER. MIN	ANALYST QA MIN	ANALYST DATA HANDLING MIN	ANALYST STATUS & TRACKING MIN	MANUAL OPERATIONS: TECHNICIAN MIN	COMPUTER OPS. BATCH CPU MIN: SEC	BATCH CONNECT MIN:SEC	INTERACTIVE CPU MIN: SEC	INTERACTIVE OPR. MIN: SEC	THROUGH PUT TIME (DAYS)
DATA PREP. FOR ANALYSIS	1	MERGE & TRANSFORM			10.		5.		12.	60.	12.	5.	
	2	DIRECTORY							.01		.01	.30	
	3	SOIL LINE			5.		5.		2.30	15.	2.30	5.	
	4	IMAGE SCREENING & DATA BASE						180.	.01		.01	5.	2
	5	CANDIDATE SEGMENT LIST			5.	5			.01		.01	15.	
LABELING		· AUTOMATIC LABELING · ACQUISITION SELECTION · PIXEL LABELING · GROUP NUMBER GENERATION							1.	1.-2.	1.	10.-15.	
PROPORTION ESTIMATION		· PROPORTION ESTIMATE							.01		.01		
		TOTAL			20'	5'	10'	180'	15'34"	76'	15'34"	42'30"	3

(6)

A1-16

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TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
①	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

EVALUATION OF RESULTS

TECHNIQUES DEVELOPMENT TESTING OF CAESAR SSG-3B, SSG-3C

- A COMPLETELY AUTOMATIC PROPORTION ESTIMATION PROCEDURE HAS BEEN DEVELOPED WHICH APPEARS TO PRODUCE RESULTS COMPARABLE TO MANUAL PROCEDURES REQUIRING A GREAT DEAL OF ANALYST TIME.

- MANUAL QA OF ACQUISITION DESIGNATION/SELECTION IMPROVES PERFORMANCE IN TERMS OF ACCURACY AND PROCESSIBILITY.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(1)	DEVELOPMENT	SSG-3B (CAESAR-SEMI-AUTO) SSG-3C (CAESAR-AUTO)	AREA ESTIMATION	SUBSYSTEM	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	76-5 77-6 78-14 79-4		5/20/81	4/81	5/81

RECOMMENDATIONS

GENERAL TEST DESCRIPTION TECHNIQUES DEVELOPMENT TESTING OF CAESAR SSG-3B, SSG-3C

- o CONDUCT A LARGER SCALE TEST TO EVALUATE THE PROCEDURE.
- o EXPAND CAESAR TO PRODUCE PROPORTION ESTIMATES FOR OTHER CROP TYPES.
- o ADAPT CAESAR FOR USE IN FOREIGN COUNTRIES OF INTERFST.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST TITLE: SPECTROMET BARLEY DISCRIMINANT DEVELOPMENT

OSBJECTIVE: SUBCOMPONENT LEVEL TEST OF THE AUTOMATIC SPECTROMET BARLEY/OTHER SPRING SMALL GRAINS DISCRIMINANT WHICH SUPPORTS RECOMMENDATION ON
(1) ADDITIONAL DEVELOPMENT ACTIVITIES.
(2) SUITABILITY FOR USE IN AN OPERATIONAL MODE.

SCOPE:
- o FOCUS OF STUDY WAS ON TESTING A METHODOLOGY FOR PARAMETERIZING VARIATION IN ACQUISITION HISTORY USING ACCUMULATED DEGREE DAYS.

TEST NO	TEST TYPE	CROP PROCEDURE/MAJE	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

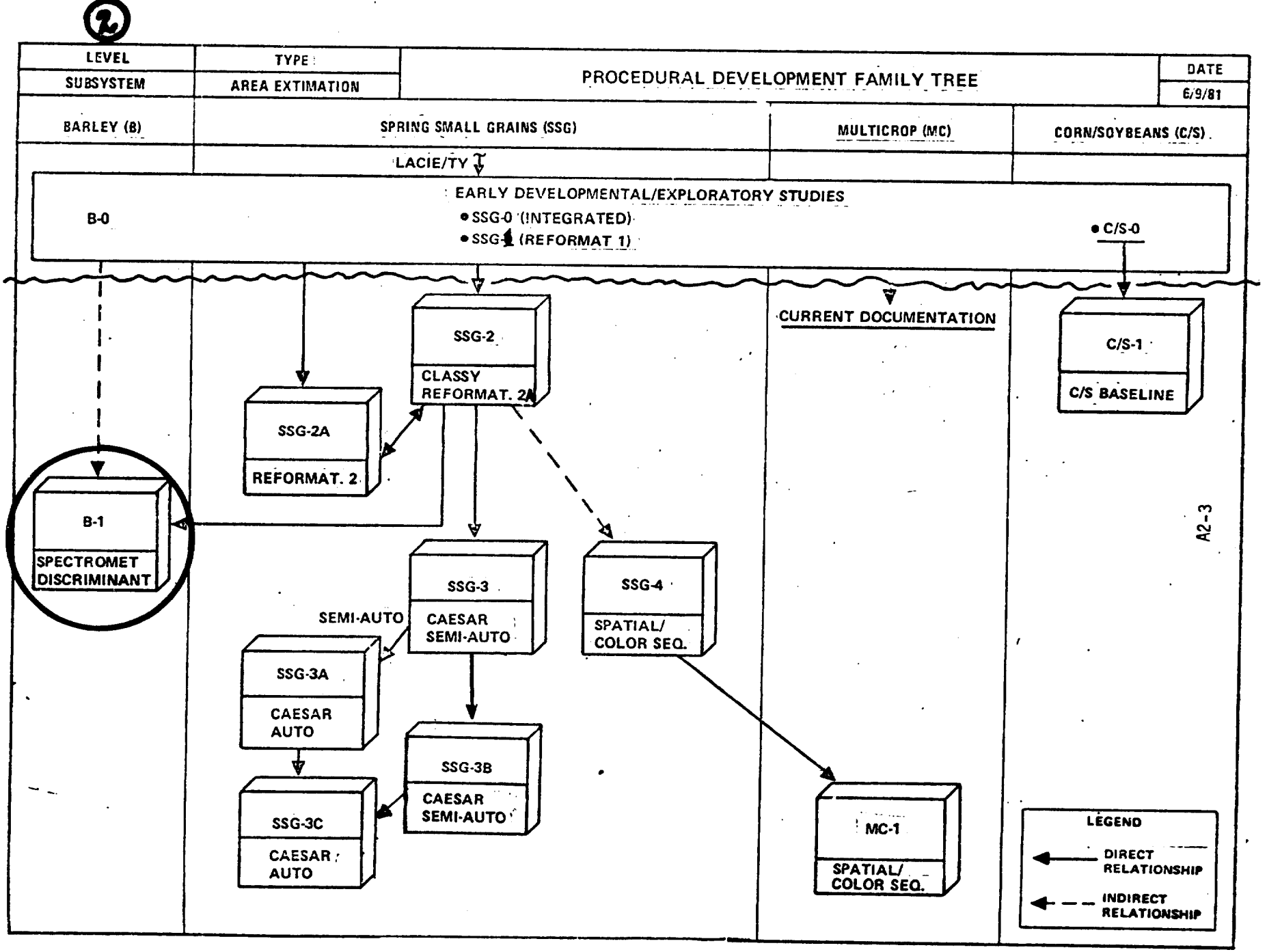
TEST TITLE: SPECTROMET BARLEY DISCRIMINANT DEVELOPMENT

BACKGROUND:

- o SPECTRAL SEPARATION OF BARLEY FROM OTHER SPRING SMALL GRAINS HAS BEEN OBSERVED NEAR THE SOFT DOUGH TAGE OF SPRING WHEAT.

- o SEGMENT TO SEGMENT VARIATION IN THE POSITION IN FEATURE SPACE OF THE BARLEY/OTHER SSG DISCRIMINANT LINE WAS HYPOTHESIZED TO BE THE RESULT OF

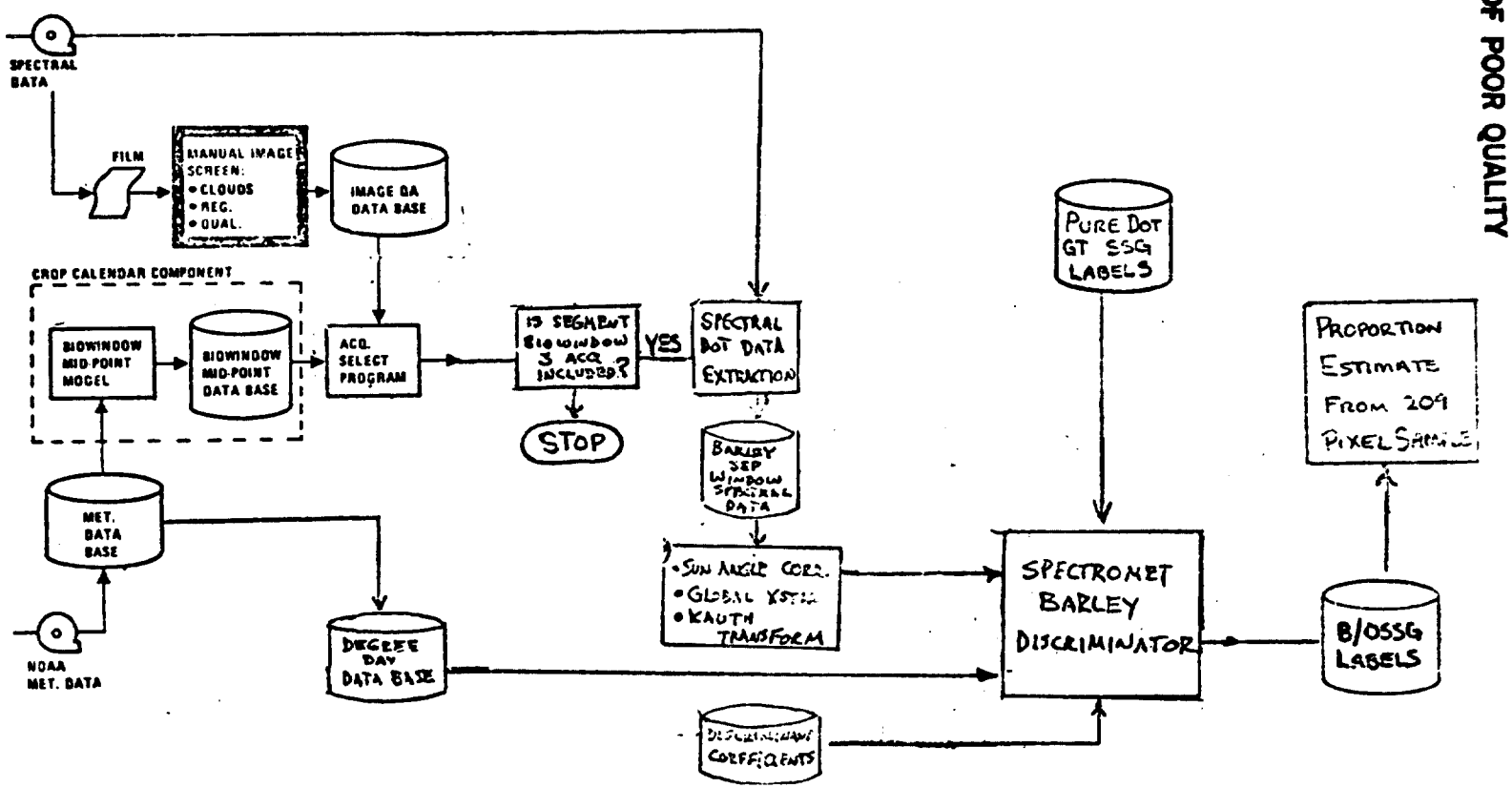
  --ACQUISITION HISTORY
  --METEOROLOGICAL STRESS
  --PLANTING DATE DISTRIBUTION


LEVEL
SUBSYSTEM
TYPE
AREA EXTIMATION
PROCEDURAL DEVELOPMENT FAMILY TREE
DATE
6/9/81
BARLEY (B)
SPRING SMALL GRAINS (SSG)
MULTICROP (MC)
CORN/SOYBEANS (C/S)
LACIE/TY
EARLY DEVELOPMENTAL/EXPLORATORY STUDIES
B-0
• SSG-0 (INTEGRATED)
• SSG-1 (REFORMAT 1)
• C/S-0
CURRENT DOCUMENTATION
SSG-2
CLASSY
REFORMAT. 2A
C/S-1
C/S BASELINE
SSG-2A
REFORMAT. 2
B-1
SPECTROMET
DISCRIMINANT
SSG-3
CAESAR
SEMI-AUTO
SEMI-AUTO
SSG-4
SPATIAL/
COLOR SEQ.
SSG-3A
CAESAR
AUTO
SSG-3B
CAESAR
SEMI-AUTO
SSG-3C
CAESAR
AUTO
MC-1
SPATIAL/
COLOR SEQ.
LEGEND
DIRECT
RELATIONSHIP
INDIRECT
RELATIONSHIP
A2-3

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST TITLE: SPECTROMET BARLEY DISCRIMINANT DEVELOPMENT

SUBCOMPONENT FUNCTIONAL FLOW



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TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST TITLE: SPECTROMET BARLEY DISCRIMINANT DEVELOPMENT

MULTIVARIATE NORMAL BAYES LINEAR DISCRIMINANT FUNCTION

$$G_i(X) = -1/2\,(X-\mu_i)^t\,\Sigma^{-1}\,(X-\mu_i) + \text{Log}\,P(\omega_i)$$

$G_i(X)$ = DISCRIMINANT FUNCTION FOR ith GROUP

X = FEATURE SPACE VECTOR

- PIXEL VALUE OF GREENNESS/BRIGHTNESS
- ACCUMULATED DEGREE DAY FOR DATE OF ACQUISITION

Σ = POOLED COVARIANCE MATRIX

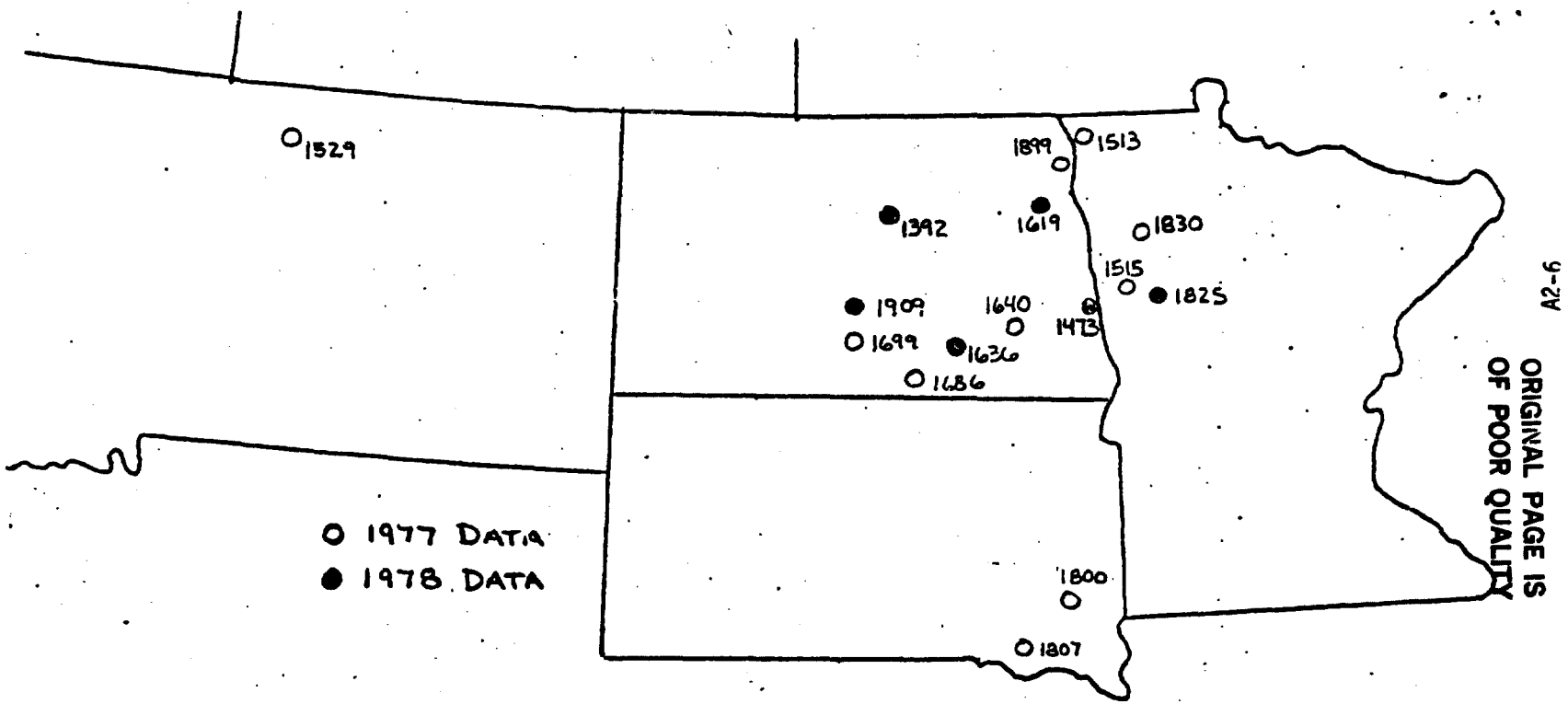
μ_i = MEAN VECTOR FOR THE ith GROUP

$P(\omega_i)$ = A PRIORI PROBABILITY FOR THE ith GROUP

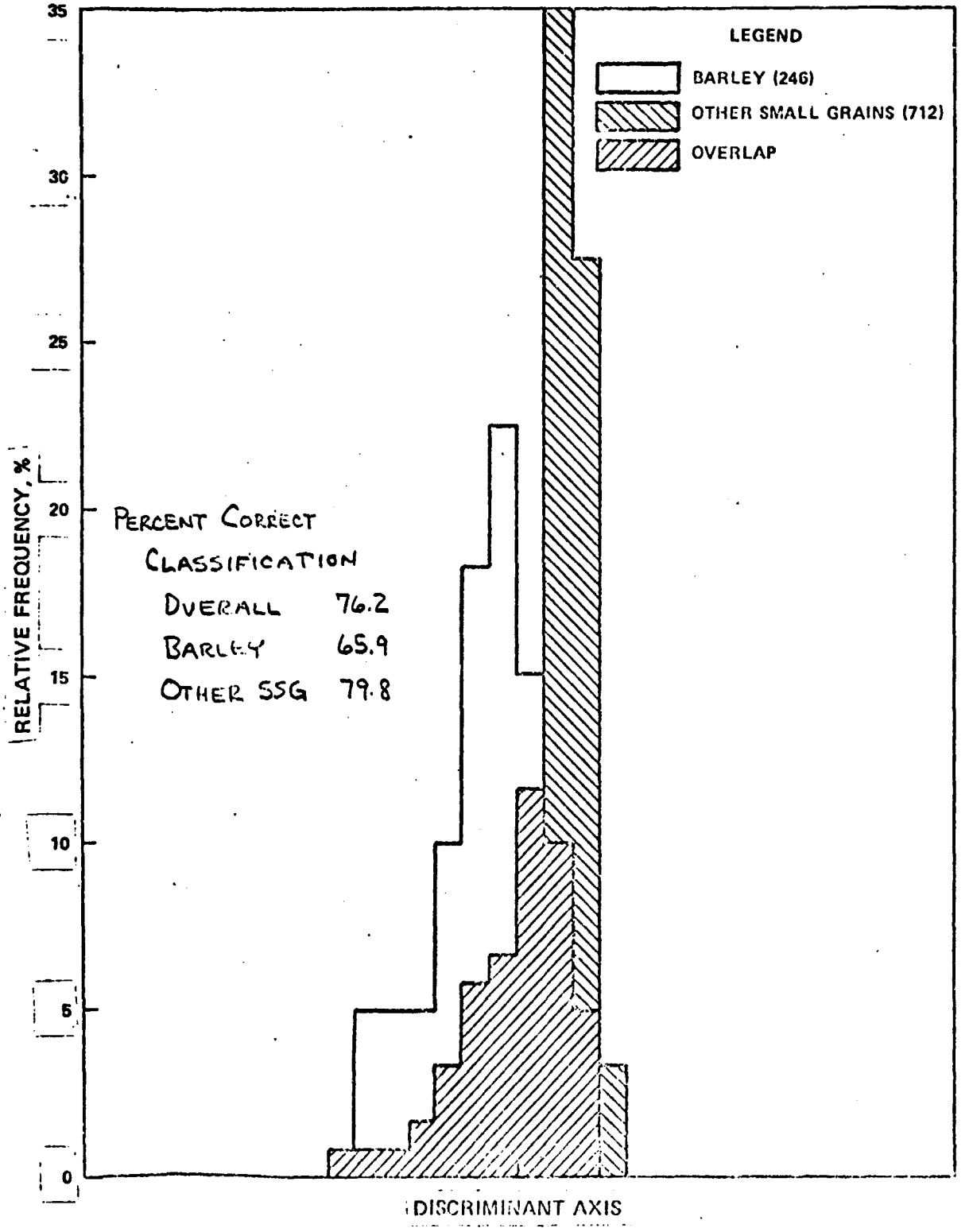
TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST TITLE: SPECTROMET BARLEY DISCRIMINANT DEVELOPMENT

COEFFICIENT DEVELOPMENT DATA SET

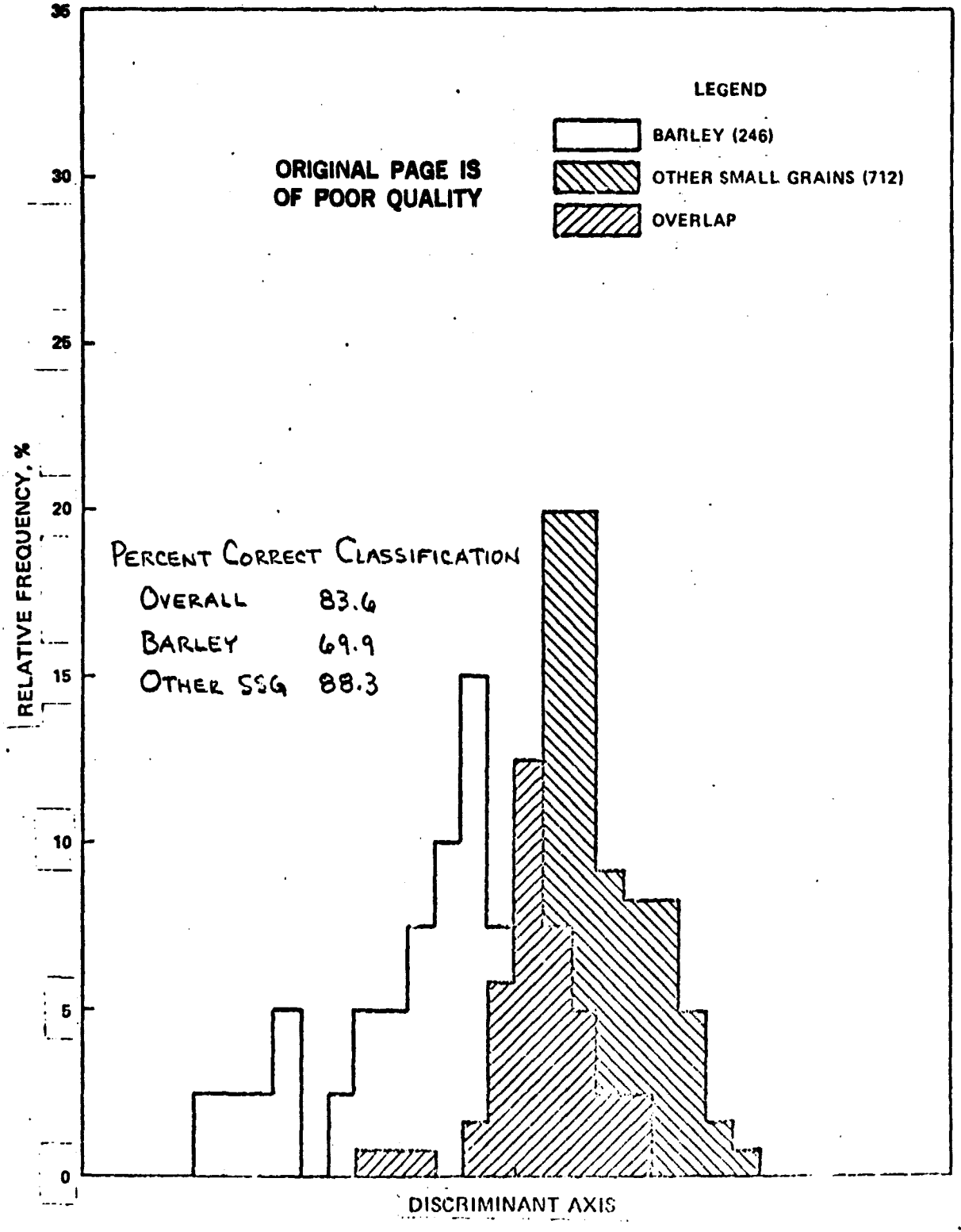


(2) OVERLAP OF BARLEY AND OTHER SPRING SMALL GRAINS USING LANDSAT DATA ALONE (NORMALIZED)



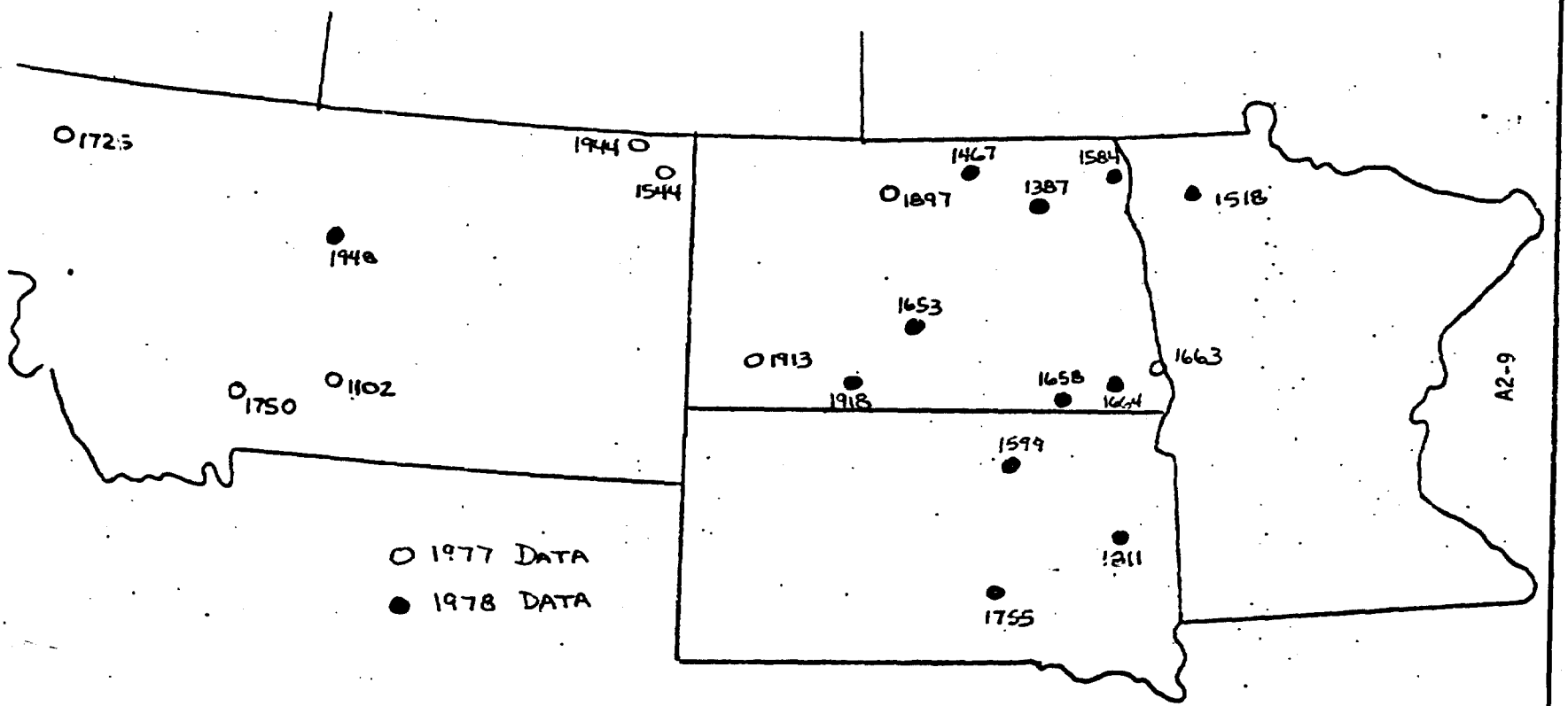
OVERLAP OF BARLEY AND OTHER SPRING SMALL GRAINS USING LANDSAT AND METEROLOGICAL DATA (NORMALIZED)

(2)



TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTRONET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

MAP OF TEST SEGMENT LOCATIONS



A2-9

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TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST RESULTS

GROUPING OF TEST SEGMENTS

GT % BARLEY

GT % SSG	0-2.5	2.5-10.0	>10.0
0-20.0	1544 77 1913 77 1653 77 1918 78 1599 78	1948 78 1755 78	1725 77 1750 77 (1102 77)
20.0-40.0		1518 78 1944 77 1897 77 1664 78 1811 78	
>40.0			1663 77 1467 78 1658 78 (1387 78) (1584 78)

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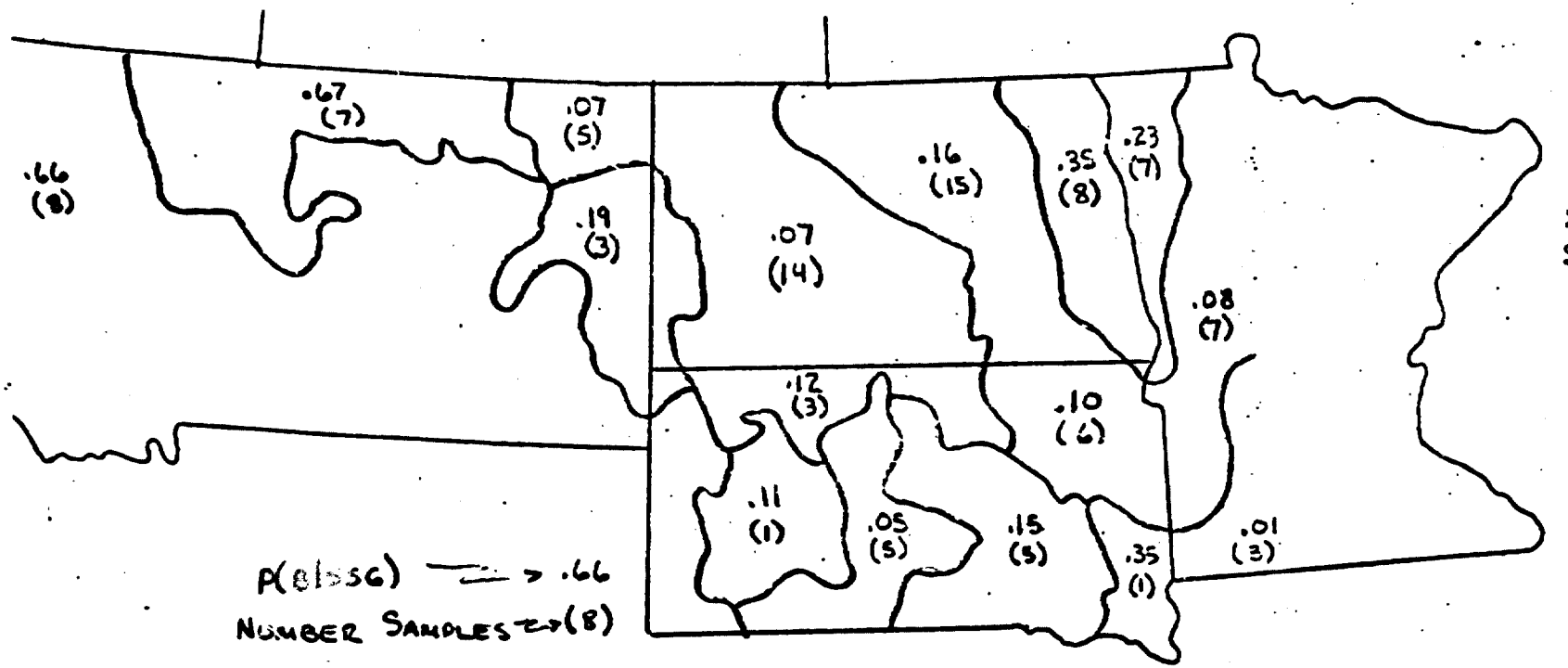
TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

SPECTROMET BARLEY DISCRIMINANT DEVELOPMENT

STRATA LEVEL A PRIORI PROBABILITY OF BARLEY GIVEN SSG



A2-11

TEST NO.	TEST TYPE	CROP PROCEDURE/LAVE	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST RESULTS

SUMMARY OF ERRORS - BARLEY PROPORTION

GT % BARLEY

GT % SSG	0 - 2.5	2.5 - 10.0	>10.0
0 - 20.0	0.0 $\bar{X}$ 1.17 S_x 5 N	.7 $\bar{X}$ 1.02 S_x 2 N	.2 $\bar{X}$ .34 S_x 2 N
20.0 - 40.0		-.4 $\bar{X}$ 1.04 S_x 5 N	
>40.0			-5.9 $\bar{X}$ .73 S_x 3 N

OVERALL

MEAN ERROR = 1.04

STANDARD DEV = 2.499

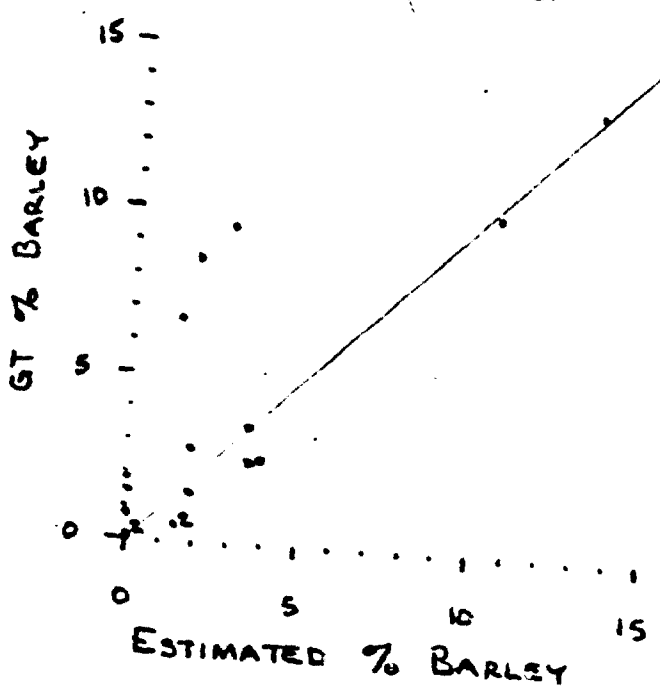
N = 17

TEST NO.	TEST TYPE	CROP PROCEDURE NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTRAL BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST RESULTS

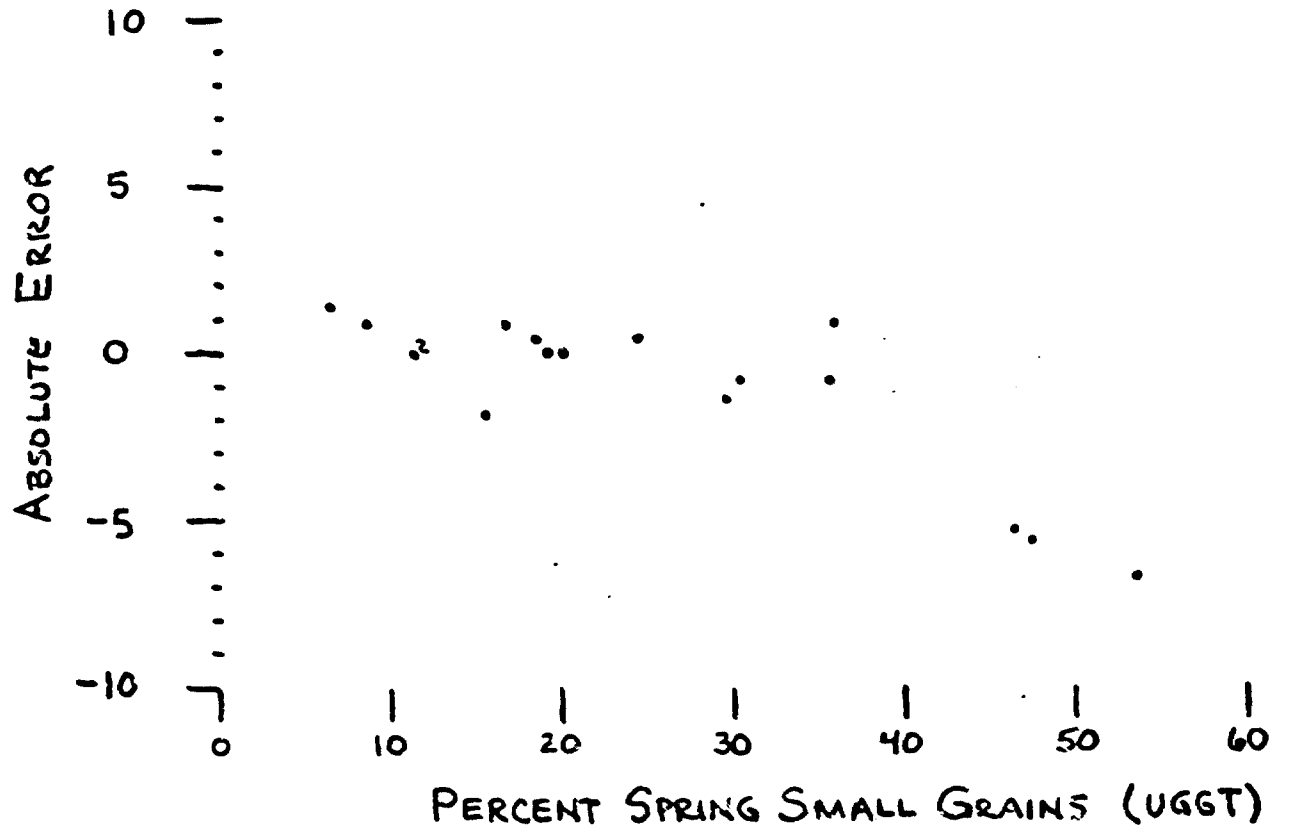
PREDICTED VS. ACTUAL PERCENT

BARLEY - PURE DOT



TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

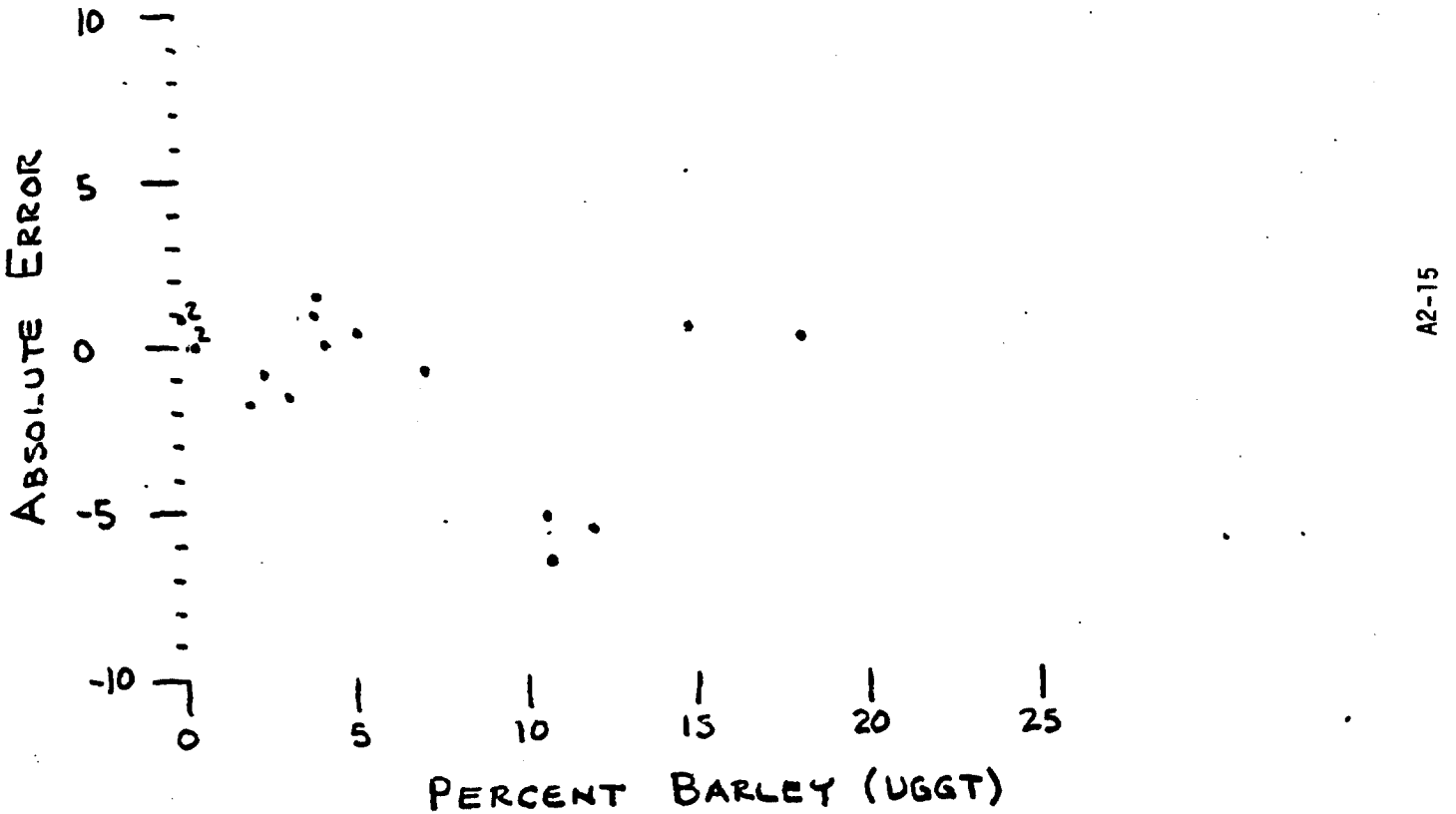
TEST RESULTS



TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

TEST RESULTS

SPECTROMET BARLEY PROPORTION ESTIMATES



A2-15

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(2)	DEVELOPMENT	SPECTROMET BARLEY/OTHER SSG DISCRIMINANT	AREA ESTIMATION	SUB-COMPONENT	N. DAKOTA S. DAKOTA MONTANA MINNESOTA	'77-8 78-12		5/20/81		

EVALUATION/RECOMMENDATIONS

CONCLUSIONS

- o WE ARE NOT THERE YET
  - --AUTOMATION ACHIEVED
  - --PERFORMANCE REMAINS MARGINAL
- o USE OF PROFILE FIT TECHNOLOGY FOR ADDITIONAL FEATURE SPACE VARIABLES RECOMMENDED IN NEXT STAGE OF DEVELOPMENT.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(3)	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

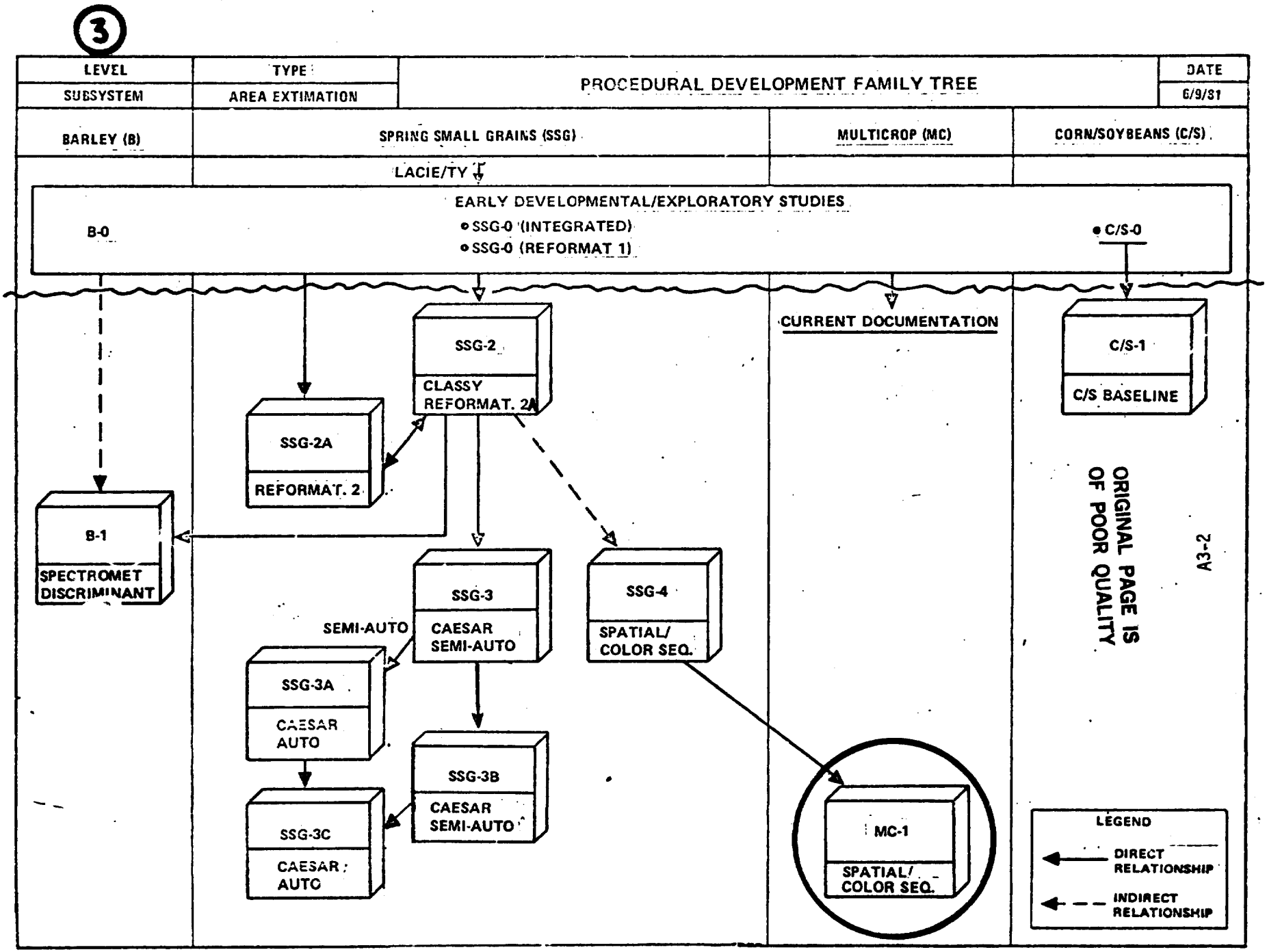
TEST TITLE: SHAKEDOWN TEST - (MC-1)

OBJECTIVE: VERIFY MULTICROP SOFTWARE PRIOR TO INTENSIVE TESTING

SCOPE: --SIX SSG'S SEGMENTS DISTRIBUTED OVER 3 STATES (MINNESOTA, MONTANA, SOUTH DAKOTA) WITH VARYING AMOUNTS OF SMALL GRAINS CORN AND SOYBEANS.

--THIS PROCEDURE WAS DEVELOPED FROM TY SPECIAL FIELDS DATA AND LACIE ITS FIELDS DATA.

--THIS TEST OVER THE 6 SSG'S SEGMENTS CONSTITUTES AN INDEPENDENT TEST FOR CORN AND SOYBEANS.


3
LEVEL
SUBSYSTEM
TYPE
AREA EXTIMATION
PROCEDURAL DEVELOPMENT FAMILY TREE
DATE
6/9/81
BARLEY (B)
SPRING SMALL GRAINS (SSG)
MULTICROP (MC)
CORN/SOYBEANS (C/S)
LACIE/TY
EARLY DEVELOPMENTAL/EXPLORATORY STUDIES
B-0
SSG-0 (INTEGRATED)
SSG-0 (REFORMAT 1)
C/S-0
CURRENT DOCUMENTATION
SSG-2
CLASSY REFORMAT. 2A
C/S-1
C/S BASELINE
SSG-2A
REFORMAT. 2
B-1
SPECTROMET DISCRIMINANT
SSG-3
CAESAR SEMI-AUTO
SSG-4
SPATIAL/ COLOR SEQ.
SEMI-AUTO
SSG-3A
CAESAR AUTO
SSG-3B
CAESAR SEMI-AUTO
SSG-3C
CAESAR AUTO
MC-1
SPATIAL/ COLOR SEQ.
LEGEND
DIRECT RELATIONSHIP
INDIRECT RELATIONSHIP
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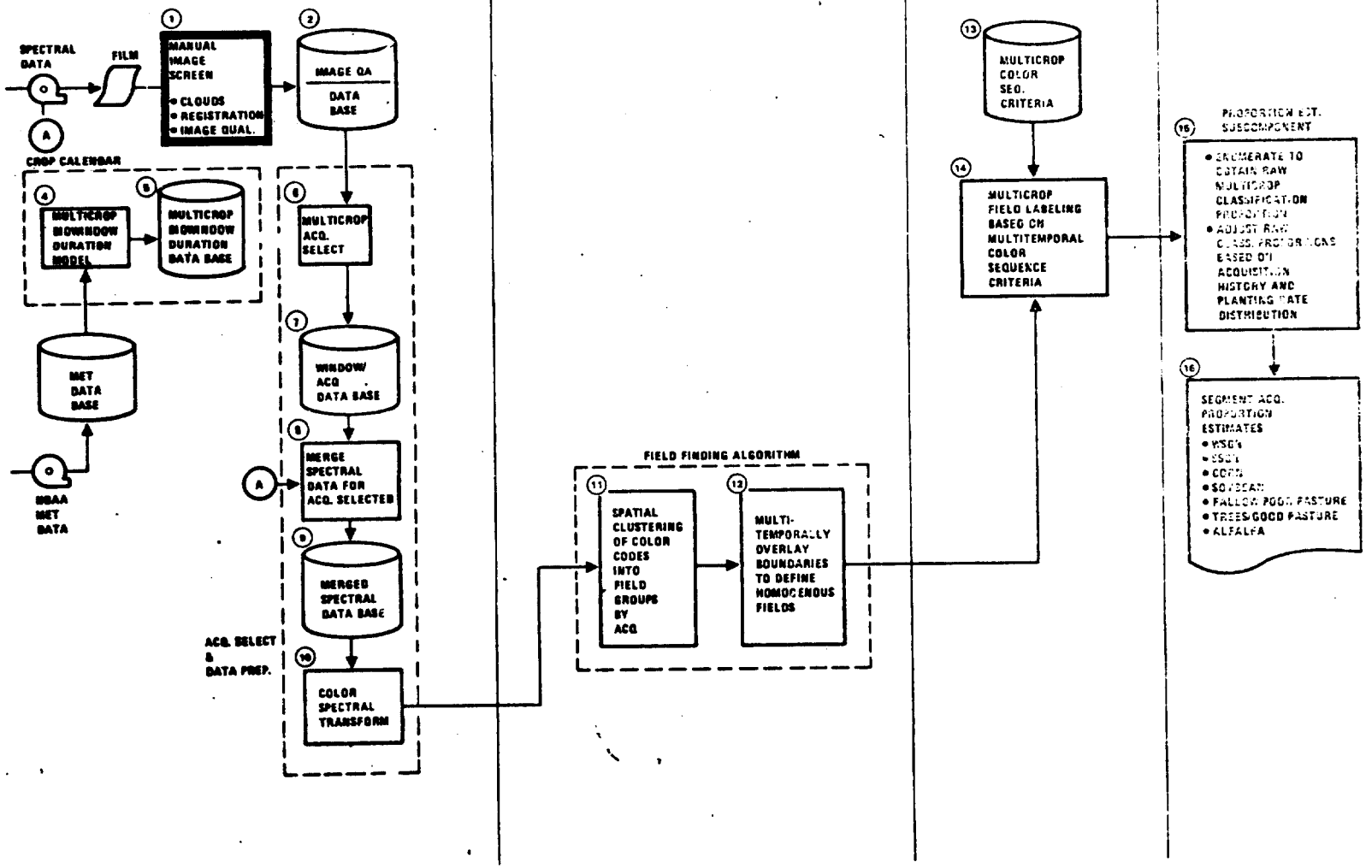
A3-2

LEVEL	TYPE	TYPE CODE	REGION	CROP PROC.	NO.	VAR.	PROCEDURE NAME	DATE
SUBSYSTEM	AREA ESTIMATION	A	U.S.	MC	1		MULTICROP COLOR SEQUENCE	8/22/81

ANALYSIS DATA PREP.	CROP CALENDAR	ACQ. SELECT & ACQUISITION DATA PREP.	LABELING TARGET IDENT	LABELING	PROPORTION ESTIMATION



LEVEL	TYPE	TYPE CODE	REGION	CROP PROC.	NO.	VAR.	PROCEDURE NAME	DATE
SUBSYSTEM	AREA ESTIMATION	A	MULTICROP	MC	1		SPATIAL/COLOR SEQUENCE	

(1) Visual determination of acquisition quality with respect to clouds, misregistration, and noise.

(2) File of acquisition quality ratings.

(3) Meteorological data for each segment (maximum/minimum temperatures).

(4) Meteorological model for predicting the beginning and end dates of each spectral biowindow.

(5) Data base containing biowindow dates for each segment.

(6) Acquisition selection algorithm to choose best available combination of acquisitions, or reject segment as nonprocessable.

(7) Listing of acquisitions chosen for each segment.

(8) Merging of spectral data for each segment.

(9) Merged spectral data for all chosen acquisitions.

(10) Normalization through division by channel means followed by conversion to channel rankings codes.

(11) Definition of boundaries of vegetated areas in each acquisition using channel ranking codes.

(12) Overlaying of vegetated areas on all acquisitions to define fields which follow homogeneous sequences of vegetated and nonvegetated areas.

(13) Predetermined labeling logic algorithm that states which vegetated/nonvegetated sequences are to be considered WSG, SSG, corn, soybeans, fallow/poor pasture, trees/good pasture, alfalfa, and other.

(14) Labeling of each field.

(15) Summing of number of pixels contained in fields that are labeled as to each crop type to obtain conservative estimate of proportion. This is followed by an increase in the estimate based on the calculated omission rate which is modeled using interaction of acquisition history and predetermined planting date distribution. This accounts for fields which were missed due to early or late planting.

(16) Final proportion estimate for each segment.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(3)	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

BIOWINDOW DURATION MODELS

- Derived from TY data bases on special fields (SSG, C/S) and LACIE ITS fields (WSG)
- Overlays of individual crop graphs each showing GDD periods when majority of fields visible but not yet turned.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
3	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

ELEMENTS OF COLOR SEQUENCE LABELING CRITERIA

- BASED ON FIELD SPECTRAL APPEARANCE (SA) CATEGORIES USED IN SSG:

  - SA1 = NONVEGETATED
  - SA2 = VEGETATION VISIBLE BUT NOT YET TURNED
  - SA3 = TURNED VEGETATION
  - SA4 = NONVEGETATED PRECEDED IN TIME BY VEGETATION

- TO SPLIT CORN AND SOYBEANS, SA2 IS SUBDIVIDED INTO LIGHT RED (2L) AND DARK RED (2D) USING VALUE (BRIGHTNESS ANALOG) OF RED PIXELS ONLY.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
3	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

COLOR DEFINITIONS OF SPECTRAL APPEARANCE (SA) STAGES

HUE	FALSE COLOR MNEMONIC	NORMALIZED CHANNEL RANKINGS	HUE	FALSE COLOR MNEMONIC	NORMALIZED CHANNEL RANKINGS
☐	GREEN	2 > 1 > 4	☐	RED	4 > 1 > 2
☐	BLUE	1 > 2 > 4	☐	ORANGE	4 > 2 > 1
☐	PURPLE	1 > 4 > 2	☐	YELLOW	2 > 4 > 1

- VEGETATED - 50% OR MORE OF PIXELS IN A FIELD ARE PURPLE/RED/ORANGE
- NON-VEGETATED - 50% OR MORE OF PIXELS IN A FIELD ARE GREEN/BLUE/YELLOW

SPECTRAL STAGE

1 - NON-VEGETATED WITH ALL PREVIOUS ACQUISITIONS NON-VEGETATED

2L **2D** - VEGETATION - NOT TURNED (NOT SATISFYING STAGE 3 CRITERIA)
2L - 50% OF RED PIXELS HAVE COLOR VALUE 5
2D - 50% OF RED PIXELS HAVE COLOR VALUE 5

3 - TURNED VEGETATION WITH MORE THAN 40% OF FIELD PIXELS ORANGE/YELLOW OR SUM OF PURPLE/ORANGE MORE THAN 40% OF SUM OF RED/PURPLE/ORANGE

4 - NON-VEGETATED WITH A PREVIOUS VEGETATED ACQUISITION

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
3	DEVELOPMENT	MS-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

SUMMARY OF LABELING LOGIC

BIOWINDOW	①	②	③	④
GROWING DEGREE DAY DIVISIONS	200 →	700 →	1250 →	1600 → 2600
CROPS				
WSG	2L, 2D	3, 4, 0 *	3, 4, 0	3, 4, 0
SSG	1, 0	2L, 2D	3, 4, 0	3, 4, 0
CORN	1, 0	1, 0	2D	2D, 3, 4, 0
SOYBEANS	1, 0	1, 0	1, 2L, 2D, 0	2L

* 0 = MISSING ACQUISITION

A3-8

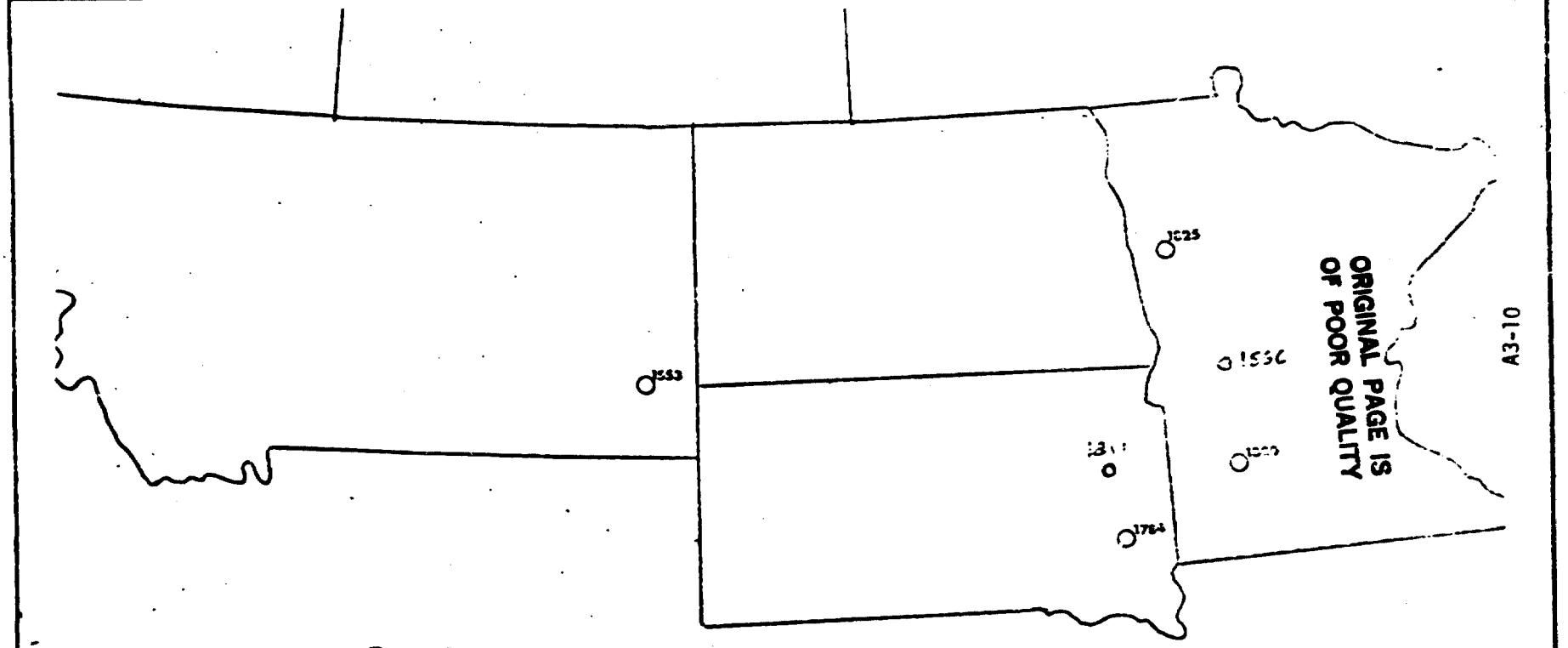
TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(3)	DEVELOPMENT	PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

COMMENTS OF LABELING LOGIC

- ONLY ONE ACQUISITION PER BIOWINDOW
- THREE ACQUISITIONS MINIMUM
- IF ACQUISITION FOR BIOWINDOW 1 MISSING, CANNOT ESTIMATE WSG
  IF ACQUISITION FOR BIOWINDOW 2 MISSING, CANNOT PROCESS
  IF ACQUISITION FOR BIOWINDOW 3 MISSING, CANNOT PROCESS
  IF ACQUISITION FOR BIOWINDOW 4 MISSING, CANNOT ESTIMATE SOYBEANS OR CORN
- ALL SEQUENCE COMBINATIONS AVAILABLE IN TABLE ARE DIAGNOSTIC FOR CROPS. SEQUENCES NOT IN TABLE GO TO OTHER.

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
(3)	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

MAP OF TEST SEGMENT LOCATIONS



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SEGMENTS

TEST NO.	TEST TYPE	CROP PROCEDURE NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
③	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

TEST RESULTS

GENERAL TEST DESCRIPTION: SHAKEDOWN TEST FOR MC-1

SEGMENT	STATE	WINTER & SPRING GRAINS EST	WINTER & SPRING GRAINS GT	CORN EST	CORN GT	SOYBEANS EST	SOYBEANS GT	OTHER EST	OTHER GT
1380	MN	18.9	9.8	38.3	35.4	28.2	43.1	14.5	11.7
1553	MT	18.4	15.9	1.1	0.0	0.0	0.0	80.5	84.1
1566	MN	37.3	36.5	*		*		*	
1784	SD	37.8	24.7	22.9	31.6	4.5	2.2	34.3	41.5
1611	SD	27.7	30.2	34.5	28.7	6.0	0.0	31.9	41.1
1825	MN	32.8 (Error on one Field)	36.2	10.4	4.9	3.8	0.8	53.1	58.1
MC1 BIAS		+3.3		+1.4		-0.1		-3.9	
MC1 RMSE		6.8		5.5		7.3		6.0	
NO. OF SEGMENTS		6		5		5		5	
SSG4 BIAS		+4.5		*NO 4TH BIOWINDOW ACQUISITION					
SSG4 RMSE		7.8							

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
3	DEVELOPMENT	PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

PROCEDURES EFFICIENCY DATA

GROUP	FUNCTION		MANUAL OPERATIONS						COMPUTER OPS.				THROUGH-PUT TIME (DAYS)
			ANALYST					TECHNICIAN	BATCH		INTERACTIVE		
	NO.	NAME	CONTACT	CLER.	QA	DATA HANDLING	STATUS & TRACKING		CPU	CONNECT	CPU	OPR.	
			MIN	MIN	MIN	MIN	MIN	MIN	MIN: SEC	MIN:SEC	MIN: SEC	MIN: SEC	
DATA PREP. FOR ANALYSIS					TBD								
LABELING													
PROPORTION ESTIMATION													
		TOTAL											

TEST NO.	TEST TYPE	CROP PROCEDURE/NAME	PROC. TYPE	TEST LEVEL	TEST REGION	DATA SET		DATE	TEST PERIOD	
						SEGS.	ACQS.		FROM	TO
3	DEVELOPMENT	MC-1 PROTOTYPE MULTICROP SPATIAL/COLOR SEQUENCE	AREA ESTIMATION	SUBSYSTEM	MONTANA MINNESOTA S. DAKOTA	'78-1 '78-3 '78-2		5/27/81	5/18	5/22

EVALUATION/RECOMMENDATIONS

- PROCEDURE APPEARS READY FOR TESTING
  - --RECOMMEND TEST CORN/SOYBEANS ON '78/'79 CORN/SOYBEANS PILOT SEGMENTS
  - --RECOMMEND TEST WINTER GRAINS ON SPECIAL DATA SET (SEGMENTS TBD)