Lockheed Electronics Company, Inc.
A SUBSIDIARY OF LOCKHEED CORPORATION
1830 NASA Road 1, Houston, Texas 77058
Tel. 713-333-5411

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TECHNICAL MEMORANDUM

COMPOSITION AND ASSEMBLY OF A SPECTRAL-MET DATA BASE FOR SPRING AND WINTER WHEAT

VOLUME I

By

M. H. Trenchard, M. L. Sestak,
M. C. Kinsler, and D. E. Phinney

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16. Abstract

An extensive data set has been assembled for LARS users which consolidates the spectral, meteorological, and ground-truth observations at 26 intensive test sites during the three phases of LACIE. Details of the data sources and the manner in which they were assembled are accompanied by a documentation of each component of the data base.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Landsat data Ground truth Multispectral data Meteorological data Crop model	

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CONTENTS

TABLES

ACRONYMS AND ABBREVIATIONS

ASCS	Agriculture Stabilization and Conservation Service
CMS	conversational monitoring system
EOD-LARSYS	Earth Observations Division of the LARS System
FCIC	Federal Crop Insurance Corporation
FN	file name
FT	file type
ITS	intensive test site
LACIE	Large Area Crop Inventory Experiment
Landsat	Land Satellite
LARS	Laboratory for Applications of Remote Sensing
NOAA	National Oceanic and Atmospheric Administration
Spectral-Met	spectral meteorological
$STAT	statistics
USDA	U.S. Department of Agriculture

1. INTRODUCTION

During the Large Area Crop Inventory Experiment (LACIE), the spectral data gathered by the Land Satellite (Landsat) was used almost exclusively in crop identification and acreage estimation strategies, whereas ground observations alone were used as inputs to crop calendar and yield modeling efforts. Plans were generated for combining the spectral, meteorological, and ground observations data into a data base that would be available to Laboratory for Applications of Remote Sensing (LARS) users. Future research plans include using this data base for the development of hybrid spectral meteorological (Spectral-Met) crop calendar and yield models.

A prime source of data for this undertaking was the 28 LACIE segments designated as intensive test sites (ITS's) during LACIE Phases I, II, and III. To complement the imagery gathered by the Landsat, detailed ground-truth data were also acquired for specific fields at these sites. The ground-truth data included periodic observations of crop development and conditions as well as ancillary information concerning cropping practices, crop type, acreage, and final yield estimates. In addition, climatological data of daily maximum and minimum temperatures and precipitation, which were published for cooperative stations located near the ITS's, were obtainable.

Because of the way all these data were acquired, their components were not entirely compatible or easily used by the research community. The spectral data were accessible only with special software developed primarily for classification techniques. Ground-truth data were assembled and stored on tape by the U.S. Department of Agriculture (USDA). Climatological data were available only through the National Oceanic and Atmospheric Administration (NOAA) publications or specially ordered tapes. Therefore, an effort was made to assemble a comprehensive data base which was compact, internally consistent, and easy to use. This paper is a report on the effort to assemble the Spectral-Met data base.

2. PROCEDURE

The first step of the task was the selection of ITS's and the fields within them. Of the original 28 ITS segments, two segments (one in Glacier County, Montana, and one in Shelby County, Indiana) were eliminated completely because of inadequate ground-truth data or missing spectral data. The remaining 26 segments, represented by one or more years as ITS's are listed in table 2-1. The individual fields in each segment were also screened and selected based upon data completeness. The fields were then uniquely renumbered with a code for crop type.

The second step was to designate a set of fields for which all data would be separated and withheld from users as a test set. The choice of these fields was made after certain segments were designated entirely for testing (see table 2-2). The yields for the remaining fields were stratified into three levels (high, medium, and low), of approximately equal size. About 40 to 50 percent of the fields in each level were selected randomly and designated as test fields. The overall field allocation by LACIE Phase appears in table 2-3. A more detailed breakdown appears in table 2-4.

Assembling the four components of the data base was the third step. A major phase was the generation of the spectral data base. This involved careful delineation of the fields within each segment. Each Dell Foster deck of field coordinates was further processed by reformatting and combining with a set of control cards which were acceptable to the Earth Observations Division version of the LARS System (EOD-LARSYS) software package. The statistics ($STAT) processor option was used to select the Landsat spectral data from magnetic tape and generate scene and individual field statistics. These data, which include the mean and standard deviation for the four channels of each field for each acquisition, were coded and punched on cards in a format described in tables 2-5 and 2-6. In all, over 300 tape files were scanned for spectral data. These cards make up three files, one for each LACIE Phase, and represent the spectral component of the data base.

Two other components, the ground-truth inventory and the ground-truth observations were produced by a reduction of the USDA tape assembled for all fields in each LACIE Phase. These two components exist as six files, three of each type by LACIE Phase. The format appears in tables 2-5, 2-7, and 2-8. The code key for the ground-truth observations appears in appendix A.

The final component of the data base was daily meteorological data for a representative station for each segment. The stations and pertinent details appear in table 2-1. This part of the data consists of the daily meteorological observations, maximum and minimum air temperatures, and total precipitation. These data were coded and punched on cards for the period of January 1, 1974 through December 31, 1977. The format for these data appears in table 2-9. Ancillary satellite data by LACIE Phase, segment, and acquisition date appear in table 2-10.

All data relating to a particular field designated to be used in testing were removed and placed in a corresponding test data base.

TABLE 2-1.— LACIE SEGMENTS USED IN THE SPECTRAL-MET DATA BASE WITH METEOROLOGICAL STATION DETAILS

Segment number	County	State	Station name	Station number	Coordinates		Elevation	
					Latitude	Longitude	Meters	Feet
1687	Hand	SD	Miller	395561	44.52° N.	98.98° W.	483.7	1587
1960	Finney	KS	Garden City	142980	37.98° N.	100.82° W.	865.6	2840
1961	Morton	KS	Elkhart	142432	37.00° N.	101.90° W.	1103.4	3620
1962	Saline	KS	Salina	147160	38.80° N.	97.63° W.	383.1	1257
1963	Rice	KS	Sterling	147796	38.22° N.	98.20° W.	498.7	1636
1964	Ellis	KS	Russell	147046	38.87° N.	98.82° W.	568.1	1864
1965	Burke	ND	Bowbells	320961	48.80° N.	102.25° W.	596.8	1958
1966	Williams	ND	Wildrose	329400	48.63° N.	103.17° W.	691.9	2270
1967	Divide	ND	Crosby	321871	48.90° N.	103.30° W.	595.0	1952
1969	Toole	MT	Goldbutte	243617	48.98° N.	111.40° W.	1066.1	3498
1970	Liberty	MT	Joplin	244512	48.58° N.	110.78° W.	1024.1	3360
1971	Hill	MT	Havre	243996	48.55° N.	109.77° W.	787.6	2584
1972	Whitman	WA	Rosalia	457180	47.23° N.	117.37° W.	731.5	2400
1973	Whitman	WA	LaCrosse	454338	46.82° N.	117.88° W.	451.1	1480
1974	Whitman	WA	Colfax	451586	46.88° N.	117.38° W.	595.8	1955
1975	Oneida	ID	Malad	105544	42.20° N.	112.27° W.	1432.6	4700
1976	Franklin	ID	Preston Sugar Factory	107353	42.07° N.	111.85° W.	1438.7	4720
1977	Bannock	ID	Fort Hall Indian Agency	103297	43.03° N.	112.43° W.	1359.4	4460
1978	Randall	TX	Canyon	411430	34.98° N.	101.93° W.	1094.2	3590
1979	Deaf Smith	TX	Hereford	414098	34.80° N.	102.47° W.	1170.4	3840
1980	Oldham	TX	Vega	419330	35.25° N.	102.42° W.	1222.2	4010
1982	Madison	IN	Anderson Sewage Plant	120177	40.10° N.	85.72° W.	258.1	847
1983	Boone	IN	Whitestown	129557	40.00° N.	86.33° W.	249.6	819
1986	Hand	SD	Miller	395561	44.52° N.	98.98° W.	483.7	1587
1987	Polk	MN	Crookston NW Experiment Station	211891	47.80° N.	96.62° W.	269.1	883
1988	Finney	KS	Garden City	142980	37.98° N.	100.82° W.	865.6	2840

TABLE 2-2.— ENTIRE SEGMENTS DESIGNATED AS TEST

Segment	County	State	LACIE Phase	Number	
				Fields	Acquisitions
1964	Ellis	Kansas	I	20	1
1964	Ellis	Kansas	II	34	7
1964	Ellis	Kansas	III	39	11
1967	Franklin	Idaho	I	8	8
1969	Toole	Montana	II	21	4
1973	Whitman(3)	Washington	II	14	9
1973	Whitman(3)	Washington	III	16	7
1980	Oldham	Texas	I	20	5
1980	Oldham	Texas	II	2	10
1983	Boone	Indiana	II	5	7

TABLE 2-3.— FIELD DESIGNATIONS BY LACIE PHASE

Purpose	Number of fields			
	LACIE Phase I	LACIE Phase II	LACIE Phase III	Overall
Modeling	183	285	86	554
Test and evaluation	171	234	111	516
Total	354	519	197	1070

TABLE 2-4.— BREAKDOWN OF FIELD DESIGNATIONS BY LACIE PHASE WITH NUMBER OF USABLE ACQUISITIONS FOR THE SEGMENT

Segment		LACIE Phase I				LACIE Phase II				LACIE Phase III			
Number	County	Number of fields			Number of acquisitions	Number of fields			Number of acquisitions	Number of fields			Number of acquisitions
		Model	Test	Total		Model	Test	Total		Model	Test	Total	
1687	Hand(1)					31	30	51	6	17	12	29	4
1960	Finney	13	8	21	1								
1961	Morton	10	8	18	3	5	3	8	7				
1962	Saline	15	10	25	2	32	0	32	16	19	14	33	8
1963	Rice	9	8	17	1	7	3	10	7	8	4	12	13
1964	Ellis	0	20	20	1	0	34	34	7	0	39	39	11
1965	Burke	8	5	13	4	8	5	13	7				
1966	Williams					32	21	53	2				
1967	Divide					5	3	8	6				
1969	Toole					0	21	21	4				
1970	Liberty					6	3	9	8				
1971	Hill					17	11	28	8				
1972	Whitman(1)	9	6	15	1	20	10	30	1				
1973	Whitman(2)	9	6	15	1	0	14	14	9	0	16	16	7
1974	Whitman(3)	10	8	18	1	19	12	31	6				
1975	Oneida	14	8	22	4	15	9	24	13				
1976	Franklin	0	8	8	8	7	5	12	5				
1977	Bannock	14	8	22	7	15	10	25	5				
1978	Randall	14	10	24	1	11	7	18	8	4	2	6	7
1979	Deaf Smith	2	2	4	1	7	4	11	9				
1980	Oldham	0	20	20	5	0	2	2	10	4	3	7	6
1982	Madison	4	3	7	4	2	1	3	8				
1983	Boone					0	5	5	7	2	1	3	2
1986	Hand(2)	7	4	11	4					5	3	8	6
1987	Polk	45	29	74	2	12	7	19	6	11	7	18	4
1988	Finney					34	24	58	11	16	10	26	8

TABLE 2-5.— DATA BASE COMPONENTS

(a) Types of data

Data	Block number	Number of files	LACIE Phase or segment number	Approximate number of card images
Spectral	1	3	One file per Phase	3 500
Ground-truth inventory	2	3	Three files per Phase	400
Ground-truth periodic observations	3	3	Three files per Phase	1 600
Meteorological (daily)	4	26	One file per segment	7 000
Total		35		12 500

(b) Data base components on LARS tape 3931

[Note: Four blocks in conversational monitoring system format]

Block number and number of files	File	
	Name	Type
1 } 3 files	1	MSPEC
1	2	MSPEC
1	3	MSPEC
2 } 3 files	1	MGRND
2	2	MGRND
2	3	MGRND
3 } 3 files	1	MOBS
3	2	MOBS
3	3	MOBS
4 } 26 files	The segment number	MET

TABLE 2-6.— FORMAT OF SPECTRAL DATA BASE

(a) Card image types

Type	Definition
Segment	Contains segment statistics only
Field	Contains individual field statistics and segment means

(b) Format for all cards

[Note: For assembling, one segment card precedes a set of field cards for each acquisition.]

Column numbers	Definition	Fortran format
1 through 4	Segment number	I4
5 through 8	Acquisition date (Julian)	I4
9	First digit of segment number or code for crop type of field	A1
10 through 12	Last three digits of segment number or three digit field number	I3
13 through 18	Channel 1 mean of segment or field	F6.2
19 through 24	Channel 2 mean of segment or field	F6.2
25 through 30	Channel 3 mean of segment or field	F6.2
31 through 36	Channel 4 mean of segment or field	F6.2
37 through 41	Channel 1 standard deviation of segment or field	F5.2
42 through 46	Channel 2 standard deviation of segment or field	F5.2
47 through 51	Channel 3 standard deviation of segment or field	F5.2
52 through 56	Channel 4 standard deviation of segment or field	F5.2
57 through 62	Channel 1 mean of segment only	F6.2
63 through 68	Channel 2 mean of segment only	F6.2
69 through 74	Channel 3 mean of segment only	F6.2
75 through 80	Channel 4 mean of segment only	F6.2

TABLE 2-7.— FORMAT OF GROUND-TRUTH INVENTORY

Column number	Definition
1 through 4	ITS segment number
5 through 8	Data base selection field number
9 through 12	LACIE field number
13 through 14	Crop year (harvest)
15 through 20	Date inventory began
21 through 26	Data inventory ended
27 through 30	Field acreage (tenths)
31 through 33	Land use code
34	Fertilized (Y/N)
35	Irrigated (Y/N)
36 through 41	Planting date
42 through 47	Date harvest information collection began
48 through 53	Date harvest information collection ended
54 through 59	Harvest date
60 through 63	ASCS yield
64 through 67	Farmer estimate of yield
68 through 71	Sample weight yield
72 through 75	FCIC yield
76	Stand quality index
77	Comments (Y/N)

Symbol definitions:

ASCS — Agriculture Stabilization and Conservation Service.
FCIC — Federal Crop Insurance Corporation.
Y/N — Yes or no.

TABLE 2-8.— FORMAT OF GROUND-TRUTH PERIODIC OBSERVATIONS

(Note: If an observation was missed, fields after column 34 are blank.)

Column number	Definition
1 through 4	ITS segment number
5 through 8	Data base selection field number
9	Blank
10 through 13	LACIE field number
14	Blank
15 through 16	Crop year (harvest)
17	Blank
18 through 19	Observation number
20	Blank
21 through 26	Satellite pass date
27	Blank
28 through 33	Observation date
34	Blank
35 through 38	Rainfall since last observation (tehths of an inch)
39	Blank
40 through 43	Field acreage (tenths)
44	Blank
45 through 47	Land use code
48	Blank
49 through 50	Growth stage code
51	Blank
52 through 53	Ground cover code
54	Blank
55 through 57	Plant height inches
58	Blank
59	Surface moisture code
60	Blank
61	Weed growth code
62	Blank
63 through 64	Field operation code
65	Blank
66 through 67	Growth/yield detractants
68	Blank
69	Stand quality code
70	Blank
71	Comments (Y/N)

Symbol definition:

Y/N — Yes or no.

TABLE 2-9.— FORMAT OF DAILY METEOROLOGICAL DATA BASE

(a) Card image types

Type	Definition
Header	Contains ancillary station data
Precipitation	Contains daily precipitation totals
Control card	Separates precipitation and temperature cards
Temperature	Contains daily maximum and minimum temperature values

(b) Format for all cards

[Note: For assembling, one header card followed by precipitation cards for four years, then one control card followed by temperature cards for four years.]

Column numbers	Definition	Fortran format
HEADER		
1 through 4	LACIE segment number	I4
5	Blank	1X
6 through 7	State abbreviation code	A2
8	Blank	1X
9 through 10	Code number of the state	I2
11 through 14	Station code number	I4
15	Blank	1X
16 through 20	Station latitude (degrees)	F5.2
21	Blank	1X
22 through 27	Station longitude (degrees)	F6.2
28	Blank	1X
29 through 32	Station elevation (feet)	I4
33	Blank	1X
34 through 45	County name of segment location	3A4
PRECIPITATION		
1 through 2	Code number of state	I2
3 through 6	Station code number	I4
7 through 9	Julian date of first day's data on card	I3
10	Blank	1X
11 through 74	16 daily precipitation totals (0.01 inch)	16I4
75 through 78	Blank	4X
79 through 80	Calendar year	I2
CONTROL CARD		
1 through 6	Blank	6X
7 through 9	Julian date value of -99 (separator)	I3
TEMPERATURE		
1 through 2	Code number of state	I2
3 through 6	Station number	I4
7 through 9	Julian date of first day's data on card	I3
10 through 69	10 daily maximum and minumum temperatures (°F)	20I3
70	Blank	1X
71 through 72	Calendar year	I2

TABLE 2-10.— SATELLITE DETAILS BY LACIE PHASE NUMBER, SEGMENT NUMBER, AND ACQUISITION DATE

Segment number	LACIE Phase I			LACIE Phase II			LACIE Phase III		
	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite
1987				6097	42	2	6289	31	2
1987				6128	53	2	6290	31	2
1987				6182	56	2	7086	38	2
1987				6236	47	2	7194	53	2
1987				6254	42	2			
1987				6272	36	2			
1960	5150	60	2						
1961	4291	36	1	5277	41	2			
1961	4345	23	1	6002	22	2			
1961	5169	60	2	6020	24	2			
1961				6164	59	2			
1961				6200	56	2			
1961				6236	50	2			
1961				6254	46	2			
1962	4324	26	1	5274	40	2	6287	36	2
1962	5131	57	2	5292	35	2	6305	30	2
1962				5293	35	2	6323	25	2
1962				5311	29	2	7083	40	2
1962				5328	25	2	7101	46	2
1962				5364	21	2	7155	56	2
1962				6053	31	2	7156	56	2
1962				6107	50	2	7227	49	2
1962				6125	55	2			
1962				6126	55	2			
1962				6162	59	2			
1962				6197	56	2			
1962				6198	56	2			
1962				6233	50	2			
1962				6234	50	2			
1962				6251	46	2			
1963	5131	57	2	5275	40	2	6287	36	2
1963				5293	35	2	6288	35	2
1963				5311	29	2	6305	30	2
1963				6108	50	2	6306	30	2
1963				6162	59	2	6323	25	2
1963				6198	56	2	6234	25	2
1963				6234	50	2	6360	20	2
1963							7029	24	2
1963							7030	23	2
1963							7048	28	2
1963							7066	34	2
1963							7101	46	2
1963							7156	56	2

TABLE 2-10.– Continued.

Segment number	LACIE Phase I			LACIE Phase II			LACIE Phase III		
	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite
1964	5113	52	2	6127	55	2	6288	35	2
1964				6162	59	2	6306	30	2
1964				6198	56	2	6234	25	2
1964				6217	53	2	6342	21	2
1964				6234	50	2	6361	20	2
1964				6235	50	2	7048	28	2
1964				6253	45	2	706[illegible]	34	2
1964							70[illegible]4	40	2
1964							7156	56	2
1964							7193	54	2
1964							7211	51	2
1965	5136	53	2	5281	31	2			
1965	5154	56	2	6131	51	2			
1965	5155	56	2	6132	52	2			
1965	5191	55	2	6149	55	2			
1965				6150	55	2			
1965				6222	48	2			
1965				6258	38	2			
1966				6204	52	2			
1966				6222	48	2			
1967				6150	55	2			
1967				6186	55	2			
1967				6204	52	2			
1967				6222	48	2			
1967				6240	43	2			
1967				6258	38	2			
1969				5287	29	2			
1969				5305	23	2			
1969				6030	18	2			
1969				6156	55	2			
1970				5304	23	2			
1970				6101	42	2			
1970				6102	43	2			
1970				6137	53	2			
1970				6227	47	2			
1970				6245	42	2			
1970				6263	36	2			
1970				6264	36	2			
1971				6136	52	2			
1971				6137	53	2			

TABLE 2-10.– Continued.

Segment number	LACIE Phase I			LACIE Phase II			LACIE Phase III		
	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite
1971				6155	55	2			
1971				6208	51	2			
1971				6227	47	2			
1971				6244	42	2			
1971				6245	42	2			
1971				6263	36	2			
1972	5218	51	2	6142	54	2			
1973	5183	56	2	5308	23	2	6285	30	2
1973				6124	50	2	6286	30	2
1973				6141	54	2	7045	22	2
1973				6142	54	2	7046	22	2
1973				6178	56	2	7100	42	2
1973				6195	54	2	7118	47	2
1973				6196	54	2	7208	50	2
1973				6231	47	2			
1973				6268	36	2			
1974	5182	56	2	5308	23	2			
1974				6124	50	2			
1974				6142	54	2			
1974				6195	54	2			
1974				6231	47	2			
1974				6268	36	2			
1975	5159	59	2	6136	56	2			
1975	5178	59	2	6137	56	2			
1975	5195	57	2	6155	58	2			
1975	5232	50	2	6172	58	2			
1975				6173	58	2			
1975				6190	56	2			
1975				6191	56	2			
1975				6208	54	2			
1975				6209	54	2			
1975				6226	50	2			
1975				6227	50	2			
1975				6244	46	2			
1975				6245	46	2			
1976	4299	30	1	5304	29	2			
1976	4317	25	1	6136	56	2			
1976	4335	21	1	6190	56	2			
1976	5159	59	2	6208	54	2			
1976	5177	59	2	6226	50	2			
1976	5195	57	2						

TABLE 2-10.— Continued.

Segment number	LACIE Phase I			LACIE Phase II			LACIE Phase III		
	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite
1976	5213	54	2						
1976	5214	54	2						
1977	4299	29	1	6101	46				
1977	4300	29	1	6137	55				
1977	4317	24	1	6227	50				
1977	4335	20	1	6245	45				
1977	4336	20	1	6263	40				
1977	5196	56	2						
1977	5214	53	2						
1978	5133	58	2	5313	32	2	6290	37	2
1978				5349	25	2	6307	33	2
1978				6056	34	2	7032	27	2
1978				6074	41	2	7049	31	2
1978				6092	47	2	7050	31	2
1978				6110	52	2	7158	56	2
1978				6164	59	2	7194	54	2
1978				6218	54	2			
1979	5133	58	2	5277	42	2			
1979				5313	32	2			
1979				6020	26	2			
1979				6056	35	2			
1979				6074	41	2			
1979				6092	42	2			
1979				6164	59	2			
1979				6218	54	2			
1979				6236	51	2			
1980	4291	38	1	5277	42	2	6290	37	2
1980	4327	28	1	5313	32	2	7014	24	2
1980	4345	25	1	5349	25	2	7032	27	2
1980	5133	58	2	6020	25	2	7050	30	2
1980	5151	60	2	6056	34	2	7158	56	2
1980				6074	41	2	7194	54	2
1980				6200	56	2			
1980				6218	54	2			
1980				6236	51	2			
1980				6272	42	2			
1982	4281	37	1	5284	36	2			
1982	4299	32	1	5285	36	2			
1982	5005	20	1	5303	30	2			
1982	5140	58	2	5321	25	2			

TABLE 2-10.– Concluded.

Segment number	LACIE Phase I			LACIE Phase II			LACIE Phase III		
	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite	Acquisition date	Sun angle, deg	Satellite
1982				6082	40	2			
1982				6154	58	2			
1982				6226	51	2			
1982				6243	47	2			
1983				5303	30	2	6352	19	2
1983				5321	25	2	7130	53	2
1983				6082	40	2			
1983				6100	47	2			
1983				6172	58	2			
1983				6226	51	2			
1983				6224	47	2			
1986	5150	57	2				6307	25	2
1986	5150	58	2				7139	53	2
1986	5169	58	2				7140	53	2
1986	5187	57	2				7157	55	2
1986							7194	53	2
1986							7211	50	2
1987	5151	56	2	5312	22	2	7121	48	2
1987	5186	56	2	6127	51	2	7175	54	2
1987				6145	55	2	7193	52	2
1987				6163	56	2	7211	49	2
1987				6181	56	2			
1987				6199	53	2			
1988				5295	34	2	6253	46	2
1988				5312	30	2	6289	35	2
1988				5349	23	2	6290	35	2
1988				6001	22	2	6362	20	2
1988				6002	21	2	7067	23	2
1988				6037	26	2	7104	47	2
1988				6038	27	2	7175	56	2
1988				6109	51	2	7211	51	2
1988				6127	55	2			
1988				6164	59	2			
1988				6272	49	2			

3. PRODUCT AND USAGE

The data for the test fields has been removed, and the entire data base is available to LARS users; the tape number is 3931 in conversational monitoring system (CMS) format. A card image tape is available upon request.

The following information is significant to users of the Spectral-Met data base. The data base has four main components of data which are spectral data, ground-truth inventory, ground-truth periodic observations, and meteorological data. Each component is segmented on the tape as blocks and the blocks consist of files which are segregated by file name (FN) and file type (FT). In the first nine files, the FN designates the LACIE Phase number for the data, and the FT designates the type of the data. In the last 26 files, the FN designates the represented ITS segment number, and the FT is for meteorological data. A total of 35 files and approximately 12 500 card images are in a data set (see table 2-5). A complete dump of the contents of the files appears in Volume II of this document.

Data sets are sorted by ITS segment number, field number, and acquisition date. All fields were screened for completeness of data and the field eliminated if missing data were evident.

APPENDIX

ITS DATA BASE GROUND-TRUTH OBSERVATION CODE KEY

APPENDIX

ITS DATA BASE GROUND-TRUTH

OBSERVATION CODE KEY

PART I: Land Use Crop Codes

100 - Spring Wheat (General)
101 - Fortuna Hrs
102 - Thatcher
103 - Durum
104 - Chris Spring
105 - Wells Durum
106 - Leeds Durum
107 - Justin Spring
108 - Rolette Durum
109 - Hercules Durum
110 - Lark Spring
111 - Bonanza Spring
112 - Waldron Spring
113 - Rushmore
114 - Crim
115 - Empire
116 - Manitou
117 - Valley
118 - Canthatch
119 - Pitic
120 - 1809
121 - Neepewa
122 - Glendea
123 - Selkirk
124 - Era
125 - Wascana
126 - Olaf
200 - Barley (General)
201 - Larker
202 - Vanguard
203 - Bonanza
204 - Dickson
205 - Primus
206 - Shawbet
207 - Piroline
208 - Betzes
209 - Steptoe
210 - Fergus
211 - Paragon
212 - Herta
213 - Conquest
214 - Wisconsin
215 - Hector
216 - Hypana
217 - Moravian
300 - Oats (General)
201 - Russell
302 - Basin
303 - Kelsey
304 - Rodney
305 - Lodi
306 - Kinsey
307 - Harmon
308 - Mission
400 - Winter Wheat (General)
401 - Dark Hard Northern
402 - Scout
403 - Parker
404 - Eagle
405 - Apache
406 - Triumph
407 - Satanta
408 - Centurk
409 - Bison
410 - Wanser
411 - McCall
412 - Brevor
413 - Gaines
414 - Nugaines
415 - Druchamp
416 - Moro
417 - Burt
418 - Bridger
419 - Arthur
420 - Tascosa
421 - Sturdy
422 - Concho
423 - Caprock
424 - Eagle Scout
425 - Trapper
426 - Cheyenne
427 - Winalta
428 - Winoka
500 - Grasses/Pasture (General)
501 - Native Grass Pasture
502 - Other Grass Pastures (Bluegrass, Bromegrass, Orchard Grass, etc.)
503 - Mixed Grass/Legume Pasture
504 - Grass For Hay
505 - Alfalfa Hay
506 - Clover Hay
507 - Other Legume Hay
508 - Mixed Grass/Legume Hay

PART I: Land Use Crop Codes (Continued)

600 - Other Crops (General)
601 - Rapeseed
602 - Rye
603 - Mustard
604 - Flax (General)
605 - Noralta Flax
606 - Redwood Flax
607 - Corn
610 - Buckwheat
611 - Sunflowers
612 - Dry Beans
613 - Lentils
614 - Dry Peas
615 - Sugar Beets
616 - Grain Sorghum
617 - Soybeans
618 - Cotton
619 - Mixed Small Grains
700 - Summer Fallow
800 - Non-Agriculture
900 - Unknown Crops

PART II: Field/Crop Description Codes

GROWTH STAGES

01 - Not Planted
02 - Planted No Emergence
03 - Emergence
04 - Tillering, Preboot, Prebud
05 - Booted or Budded
06 - Beginning to Head or Flower
07 - Fully Headed or Flowered
08 - Beginning to Ripen
09 - Ripe Mature
10 - Harvested
11 - Does Not Apply

GROUND COVER (%)

1 - 0- 19
2 - 20- 39
3 - 49- 59
4 - 60- 79
5 - 80-100

SURFACE MOISTURE CONDITIONS

1 - Dry
2 - Damp
3 - Wet
4 - Standing Water

WEED GROWTH

1 - Negligible
2 - Slight
3 - Moderate
4 - Heavy

FIELD OPERATIONS

01 - Bare Ground
02 - Bare Disked/Cultivated
03 - Bare Plowed
04 - Bareseeded
05 - Standing Stubble
06 - Stubble Disked/Cultivated
07 - Stubble Plowed
08 - Stubble Seeded
09 - Burned
10 - Grazed
11 - Windrowed or Swathed
12 - Mowed or Combined
13 - Stacked or Baled
14 - Other

PART II: Field/Crop Description Codes

GROWTH/YIELD DETRACTANTS

01 - Salinity
02 - Insects
03 - Disease
04 - Drought
05 - Moisture
06 - Wind
07 - Hail
08 - Frost
09 - Birds
10 - Pot Holes
11 - Uneven Stand
12 - Weeds
13 - Winterkill
14 - Lodging
15 - Other

STAND QUALITY

1 - Poor
2 - Below Average
3 - Average
4 - Above Average
5 - Excellent
6 - Does Not Apply