44685

PERMISSION TO MICROFILM — AUTORISATION DE MICROFILMER

● Please print or type — Écrire en lettres moulées ou dactylographier

Full Name of Author — Nom complet de l'auteur

Lee Grant Kennedy Armstrong

Date of Birth — Date de naissance	Country of Birth — Lieu de naissance
Sept 19-1946	CANADA

Permanent Address — Résidence fixe

3504 112th ST. Edmonton, ALBERTA

Title of Thesis — Titre de la thèse

A Computer-Assisted Landsat Instruction Program
For Social Studies Educators

University — Université

University of Alberta

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

M. Ed.   Elementary Education

Year this degree conferred — Année d'obtention de ce grade	Name of Supervisor — Nom du directeur de thèse
1980	Dr. Joseph M. Kirman

Date	Signature
Jan 30/80	Lee Grant Armstrong

NL-91 (4/77)

NOTICE

AVIS

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us a poor photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de mauvaise qualité.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

THIS DISSERTATION
HAS BEEN MICROFILMED
EXACTLY AS RECEIVED

LA THÈSE A ÉTÉ
MICROFILMÉE TELLE QUE
NOUS L'AVONS REÇUE

THE UNIVERSITY OF ALBERTA

A COMPUTER-ASSISTED LANDSAT INSTRUCTION

PROGRAM FOR SOCIAL STUDIES EDUCATORS

by

LEE GRANT KENNEDY-ARMSTRONG

Ⓒ

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF ELEMENTARY EDUCATION

EDMONTON, ALBERTA
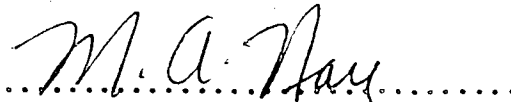
SPRING, 1980

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and

recommend to the Faculty of Graduate Studies and Research,

for acceptance, a thesis entitled A Computer-Assisted Landsat

Instruction Program for Social Studies Educators submitted by

Lee Grant Armstrong in partial fulfilment of the requirements for

the degree of Master of Education in Elementary Education.

....
Supervisor

....

....
External Examiner

Date ...12/13/79..........

ABSTRACT

This study involved the design, development, implementation, and evaluation of a computer-assisted instruction (CAI) program for social studies teacher education. The program instructed education students in Landsat satellite infra-red false color image interpretation.

The Landsat CAI program 'Omega' recorded each student's performance as he or she progressed through the program. This information was used to provide student feedback and to improve the design of the program to enhance the learning experiences of subsequent groups of students.

The results of the study indicated that students can learn to interpret Landsat satellite infra-red false color images with the aid of computer-assisted instruction. The findings also indicated that the majority of students who participated in the study expressed highly favourable attitudes toward the CAI program.

The conclusions reached in this study suggest that CAI may have potential benefit for social studies teacher education, in general and that more research is needed over a longer period of time with a larger sample to determine the implications of this type of training. Specific research problems for further investigation were suggested.

ACKNOWLEDGEMENTS

DEDICATED

To Dad, who always claimed I could never do it

To Mom, who always knew I would

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

> Man must rise above the earth to the top of
> the atmosphere and beyond - for only thus
> will he fully understand the world in which
> he lives.
>
> (Socrates - 500 B.C.)

It took mankind over 2,000 years to confirm the validity of
Socrates' statement. Today, with the aid of modern technology, man
has indeed risen above his atmosphere, visited the moon and circled
the globe. Since the launching of Sputnik in 1957, virtually thousands
of satellites have been launched into space providing scientists with
timely and accurate data about our environment, urban planning, geology,
water resources and agriculture.

Socrates is also important for another reason. Father of the
"Socratic" method of instruction, he individually taught his students
by using a method of question and answer in what is now generally
regarded as the highest form of individualized instruction. In the
past, educators have tried to achieve the ideal of individualized
instruction for every student. Contemporary educational researchers
are still trying to achieve that goal. However, given current
time, space and staff limitations facing most institutions of higher
learning as a result of budgetary cutbacks, it is unlikely that the
ideal pupil teacher ratio of 1:1 will ever be achieved.

Recent developments in computer-assisted instruction (CAI) would
suggest however, that students can be taught individually in large
groups at low cost. The introduction of CAI is not intended as a way
of improving the instruction that takes place in the traditional
classroom, but to provide an alternative to it.

1

The application of computer-assisted instruction to the field of social studies is relatively new. This feasibility study - computer-assisted land satellite imagery interpretation, is the first of its kind in map skill training in Canada.

The basic purpose of this study is to generate preliminary data with a limited sample of participants to determine the feasibility of carrying out further definitive research on the topic.

The various aspects of the problem under investigation are discussed in chapter one. Included in that chapter are the purpose of the study, definition of terms, rationale, implications for social studies, and delimitations of the study. Chapter two presents a review of the literature pertinent to the problem under investigation.

The third chapter deals with procedures and research design. Chapter four contains the results of the study and discussion of the findings. The last chapter presents the conclusions and recommendations for future research.

THE PROBLEM

1. Purpose of the Study

The objectives of this study were to design, develop, implement and evaluate a computer-assisted instruction (CAI) program to teach pre-service teachers the fundamentals of Landsat satellite infra-red false color image interpretation.

The study involved the authoring of a computer-program to achieve the following objectives:

    1) to develop a computer-assisted instruction course
        in Landsat satellite infra-red false color image
        interpretation, and

2) to determine if students could learn to
    interpret infra-red false color Landsat images
    with the aid of CAI.

II. Definition of Terms

Cathode Ray Tube (C.R.T.) the television like tube on which the

text of all the material presented to the student is displayed; is

often referred to as the screen.

Computer Assisted Instruction (CAI) is the name given to a

teaching process which makes extensive use of a computer in presenting,

testing and interacting with the student.

Constructed Response refers to the type of response whereby the

subject fabricates or constructs his answer with external cues. This

is in contrast to the multiple choice type of response where the

answer is already constructed for him and he has only to recognize

the response from a set of alternatives.

Composite False Color refers to the color produced on Landsat

maps composed of data derived from different satellite spectrum

scans of the same area.

ERTS - Earth Resources Technology Satellite formerly the name

of Landsat satellites.

Infra-red False Color refers to that portion of the spectrum

corresponding to infra-red, and used to delineate green vegetation

on Landsat maps.

Landsat Map refers to a representation of the land surface of

the earth produced with the aid of a Landsat satellite.

Landsat refers to Landsat satellites, scanning the surfaces of

the earth from an attitude of approximately 929 km. high.

Non Visible Light Spectrum refers to that portion of the light

spectrum not visible to the human eye.

Near Polar Orbit refers to the orbit of a satellite where the path is nearly over the earth's poles.

Visible Light Spectrum refers to that portion of the light spectrum visible to the human eye.

III. Rationale

The need for better programs of pre-service and in-service education has been widely acclaimed in the literature related to professional growth in education. Hass (1957) demonstrated the need for in-service education in a discussion of factors such as rapid accumulation of academic and professional knowledge, the rapid cultural changes which characterize modern times, and the importance of making it possible for excellent teachers to make use of their creative abilities (pp. 13-34). Taba (1965) emphasized the need to revise current in-service practices. Among the implications Taba discussed, was a caution that providing content background to teachers without a simultaneous effort at instructional implementation does not assure that the background will be used in instruction, except perhaps in transmitting to students this knowledge in practically the same way it was received (p. 466).

In social studies teacher education, the last decade has produced a wide variety of instructional methods including the discovery, inquiry method, mastery learning, simulation and games. While it is true that such methods are currently valid, current research on social studies teacher education points out that "teacher educators are likely to use and rely on lecture and recitation methods in their

own classes" (Masemore, 1973, p. 97). Massialas and others have stated that the low interest of social studies teacher educators in research is to be lamented. It would appear then, that drastic surgery is needed if we are to maintain the interests of our students in our social studies programs (1975).

Given the current state of the art, it seemed reasonable to this writer to search out alternative models of social studies pre-service teacher education. Two relatively recent advancements in modern technology used together would seem to provide an acceptable alternative to traditional modes of instruction.

Landsat satellite maps are a new social studies resource and the accuracy and timeliness of these maps as well as their potential uses will help better prepare the teacher to understand and teach about our planet. In addition, the use of computer-assisted instruction to teach about Landsat satellite images will expose pre-service teachers to an alternate mode of instruction while at the same time demonstrating its potential in the field of social studies.

IV. Implications for Social Studies

The two most important characteristics of Landsat maps for social studies is their accuracy and timeliness. The ability to work with Landsat maps provides an excellent opportunity to examine timely accurate data on the natural resources of our environment. The Identification of crops, detection of plant diseases, location of fresh water supplies, forest and wild life management, surface geology, sediment transport and the movement of ice are only a few of the interesting features that provide a new dimension of study for social

studies. Finally, an introduction to Landsat satellite image interpretation and CAI as a mode of instruction will enlarge the teaching repertoire of teachers.

The application of computer-assisted instruction to a wide variety of disciplines other than social studies is well documented (Hunka, 1978). The possibility of applying CAI to content areas in social studies merits examination.

V. Delimitations of the Study

1) This study was limited to a sample of twenty-two pre-service teachers enrolled in a senior social studies Curriculum and Instruction (Ed. C.I.) 413 course offered by the University of Alberta's Faculty of Education in the 1979 fall session.

Three factors contributing to the number of students in the sample were:

     a) The number of terminals available for use was limited by the heavy scheduling of other CAI courses by the Division of Educational Research Services.

     b) The difficulty of arranging a terminal time to suit students who were carrying more than one course.

     c) Time limitations imposed by other course requirements.

2) The use of infra-red false color images.

CHAPTER II

Review of the Related Literature

Computer-Assisted Instruction (CAI)

1. Computers and their use in Education

   Computers and their use in the field of education are not a recent
phenonemon. In the last decade there has been a steady flow of
literature describing various studies where computer-assisted instruc-
tion has been applied to a given education situation (Hunka, 1978,
p. 29).

   The most important fact about computers is that they are here to
stay and are not likely to go away. Third generation computers have
come and gone since the computer genesis twenty years ago and the
'mini-computer' has signalled the arrival of the fourth generation
computers in North America.

   Thimbeley (1976: 241) noted that the computer is the only
commodity that is steadily decreasing in cost while all others are
steadily rising. Commenting further, Thimbeley noted that since
the performance to cost ratio of mini-based systems in particular has
increased by such a dramatic amount in the past five years, it is
doubtful whether the costs of computers is a serious barrier to their
use in the classroom - academic inertia appears to be the main
obstacle (Thimbeley, 1976; p. 245).

2. Advantages of Computer-Assisted Instruction

   Magidson (1977: 5) stated very succintly that the educational
promise of CAI lies in its ability to individualize and personalize

the instructional process and to simulate experiences not readily available. Continuing, he described some of the advantages of computer-assisted instruction:

> CAI lessons can serve as text, test and
> tutor while compelling students to be active
> participants in their own learning. Students
> can work at their own pace while their CAI
> program monitors their progress. Students
> are kept informed of their progress through
> immediate feedback and achievement summaries.
> Students have varying amounts of control over
> their learning in that they can review
> previous instruction, request special help,
> or continue on to enrichment activities. The
> instruction can be systematically prepared,
> sequenced, tested and revised (Magidson, 1977,
> p. 5).

3. CAI Instructional Strategies

Considerable dialogue has been generated among educators over the advantages of CAI versus traditional modes of instruction. Most CAI courses are currently being used to supplement and compliment traditional instruction, not to replace it, which makes it extremely difficult to compare CAI and traditional instruction. However, the learning theory underlying the instructional strategies of both modes of instruction is remarkably similar. Both CAI and traditional modes of instruction make use of Bloom's taxonomy of educational objectives.

With CAI, the specification of educational objectives and the application of learning theory to the following instructional strategies is paramount:

> 1) Drill and Practice - this mode of instruction
>   has proved to be the most widespread, probably
>   because it is the easiest to prepare and can
>   be used to free teachers from the drudgery of
>   making up and checking practice exercises.
>
> 2) Tutorial - in the tutorial mode, students are
>   presented with instruction interspersed with

> appropriate questions. Question formats are
> commonly multiple-choice, matching, fill in,
> and short answer. Sophisticated CAI systems
> can catch or allow for misspellings, judge as
> correct a variety of possible answers and
> even allow students to touch portions of the
> display to elicit a computer response.
>
> 3) Simulation - the simulation mode is perhaps
> the most exciting for it can allow the student
> to use the computer as a tool to discover and
> generate new information i.e. educational
> games (Hicks and Hunka, 1972, p. 67).

The hierarchy of capabilities that can be established by learning as

described by Gagne (1974) are also incorporated into the CAI

instructional strategies.

4. The Effectiveness of CAI

A goodly number of studies have been published attesting to the

effectiveness of computer-assisted instruction (Hunka, 1976, p. 6).

The majority of these publications cite the following reasons as to

why CAI related learning can be useful:

a) evidence of student achievement

b) evidence of increased institutional
   productivity

c) a variety of applications in many subjects
   and courses

d) the teaching of computer literacy (uses
   and impact of computers)

e) an outstanding computer science or data
   processing program, and

f) an impact on other people and institutions
   (Kulik, JA and P. Jaska, 1977, pp. 12-19).

Published studies comparing the effectiveness of CAI to traditional

instruction report conflicting results but generally conclude that

CAI is more effective (fifty-five percent) than traditional instruction

(Kulik and Jaksa, 1977, p. 7). Almost all of these studies reported that students using CAI had highly positive attitudes toward their learning and that CAI learning requires less time.

Magidson (1978) conducted an extensive study of student attitudes toward the 'Plato' CAI system and reported the following results:

1. Students who used Plato were highly positive in their assessment of the system

2. They did not believe CAI to be de-humanizing

3. They found its use helpful as a learning aid

4. They spent some of their free-time using it

5. They enjoyed using Plato, and

6. They experienced only minor difficulties operating the terminals and they believed computer and terminal breakdowns posed minor difficulties

5. Problems Associated With CAI

Without doubt, the effectiveness of CAI is dependent upon the quality and reliability of hardware, software and courseware. Following are some of the problems generally encountered by students using CAI as reported by (Ofiesh and Meierhenry, 1974, pp. 207-210).

1. Difficulty in operating terminals

2. Computer and/or terminal breakdown

3. Insufficient terminal time at a single setting

4. Poor scheduling of CAI time

5. Difficulty in reading information from the CRT screen

6. Poor lighting conditions, and

7. Insufficient introduction to the CAI
    operating system.

The foregoing would suggest that there is a strong need to train pre-service and in-service teachers on how best to use CAI and how to work with instructional developers and other content specialists in preparing new courses. Further, it is important that teachers and administrators be made aware of the capabilities of this technology especially where it has been demonstrated that this technology can improve the quality of education.

Satellite Images

The use of Landsat infra-red composite false color images is a new resource in social studies. Robbins (1966) provided a clear picture of the impact satellites would have on education. "Teachers will have to change their traditional method of teaching geography and social studies in order to keep pace with modern technology and to fully understand the world in which they live".

Recognition by the National Council for Social Studies of Landsat as an important resource in social studies came a decade later with the appearance of an article in Social Education by William P. Nixon and Richard E. McCormack entitled "Landsat: A Tool for Your Classroom" (1977).

Kirman (1977) studied the use of infra-red composite false color images with teachers of grades three, four and five. He concluded that teachers for those levels were able to understand and teach about Landsat maps to their children. However, the level of instruction appeared related to the background knowledge of the teacher (Kirman, 1977, p. 23).

It would appear that the use of Landsat images as a resource in
the field of social studies is increasing as evidenced by the growing
number of educational materials. The following materials are avail-
able for teacher use in the area of Landsat image interpretation:

1. Brosius, Craig, A., Gervin, Janette C., & Ragusa, James M.
    Remote Sensing and the Earth. Titusville, Florida:
    School Board of Brevard County, 1977, p. 472.

    This document was a cooperative effort between the

    Educational Programs Division of National Aeronautic and

    Space Administration (NASA's) Kennedy Space Center and the

    School Board of Brevard County, Florida. The document was

    developed to enhance student understanding of how remotely

    acquired data are obtained, analyzed and used. Activities

    for the senior high school student included map reading

    and analysis, characteristics of the visible spectrum and

    other areas relevant to remote sensing.

2. Kirman, Joseph M. Primer for Satellite Maps. Edmonton:
    Puckrin Publishing House, 1978, pp. 60.

    This is essentially a resource kit for Elementary school

    teachers to introduce Landsat into their classrooms. The

    kit includes composite false color images of selected areas

    of Canada and the world, slides and teachers' guide.

    Activities are aimed at introducing students to how the data

    is received, interpreted and used to help manage the environ-

    ment.

3. Kopp, O.W. et al. Elementary School Aerospace Activities:
    A Resource for Teachers. Washington: National Aeronautics
    and Space Administration, 1977, pp. 127.

    This document was the result of a cooperative effort between

the Educational Programs Division of NASA and the Department
of Elementary Education at the University of Nebraska-Lincoln.
Through a resource book for elementary school teachers on
aerospace activities, the student is exposed to a variety of
activities concerning the use of unmanned satellites, Skylab,
the management of resources and the significance to earth
of space exploration.

4. Petrillo, Anthony J. What's the Use of Land? Washington:
   National Aeronautics and Space Administration, 1976, p. 57.

   This is a secondary school social studies project, in
   which activities are geared to show how NASA's space observa-
   tions can integrate with other data sources in environmental
   education.

5. Tindal, Margaret A. Constructing a Landsat Photomosiac
   Using Lattitude and Longitude. Greenbelt, Maryland:
   Goddard Space Flight Center, 1977, p. 10.

   This publication aims to assist students to construct a
   photo-mosiac using latitude and longitude and sets of Landsat
   pictures.

6. Tindal, Margaret A. Educator's Guide for Mission to Earth:
   Landsat Views the World. Greenbelt, Maryland: NASA
   Goddard Space Flight Center, 1978, pp. 59.

   This educator's guide is designed to accompany NASA
   publication Mission to Earth: Landsat Views the World.
   The teacher's guide is an effort to offer upper elementary
   and junior high school teachers some suggestions for using
   Landsat imagery in their classrooms. The materials included
   in the guide are organized around four broad content themes,
   namely 1) Earth Source-Geology; 2) Environmental Studies;

3) Geography; and 4) Social and Urban Studies.

7. Weinkauf, Ronald. Georgraphy on Landsat Images: Student Resources. Brookings, South Dakota: Ronald Weinkauf, 1976, pp. 22.

This is essentially a resource kit; activities aim at

helping college level students understand how information

about the earth is gathered from space, interpreted, and

used to help manage our environment.

8. Vogt, Gregory L. Remote Sensing of the Earth with the Landsat Multispectial Scanner. Washington: NASA Lewis Research Center, 1977, pp. 28.

This is an activity guide to demonstrate how black and

white and color satellite images are produced, transmitted to

earth, and interpreted.

A mini-course series on the fundamentals of remote sensing is

marketed by the Countinuing Education Administration of Purdue

University in West Lafayette, Indiana. The series includes seven

mini-courses, a study guide, audiotape and a set of slides. The

Laboratory for Applications of Remote Sensing at Purdue, also has a

program to provide digital analysis capabilities for remote sensing

research.

The Educational Programs Division of the National Aeronautic and

Space Administration in Washington has published a film catalogue

of background audio visual materials. A number of technical publica-

tions by specialists in remote sensing have appeared on the market.

These range from Dorothy Harper's Eye in the Sky: Introduction to

Remote Sensing (1977) to the Manual of Remote Sensing (Ed.) Robert

G. Reeves, published by the American Society of Photogrammetry. Vol.

Theory, Instruments and Techniques. Vol. 2 Interpretation and

Applications. Falls Church, Virginia, 1975. However, these documents are aimed at specialists in remote sensing and have limited appeal to educators.

While courses in remote sensing are being offered in thirteen Canadian Universities, all of them are offered by departments outside faculties of education and do not employ CAI as the mode of instruction.[3]

Here at the University of Alberta, pre-service and in-service teachers are introduced to Landsat image interpretation in Social Studies Ed. C.I. 212 and 413 classes. It appears then, that the University of Alberta is the only Canadian Institution offering instruction in Landsat image interpretation to students specializing at the elementary school level.

In 1979, Project Omega was formed under the direction of Dr. Joseph M. Kirman, Professor of Social Studies, Department of Elementary Education at the University of Alberta. Project Omega is an umbrella name for an on-going series of studies on remote sensing and applications in education. The scope of the project includes everything from training of classroom teachers and faculty of education undergraduates to the abilities of students to work with remote sensing technology.

There are currently three faculty members and one graduate student engaged in planning and research in Project Omega. Studies in progress include: children's perceptions of Landsat imagery; in-service Landsat training of science and social studies teachers by one-way television with telephone conferencing; capacities of students to work with black and white Landsat imagery; and a computer-assisted Landsat satellite interpretation instruction program.

Both the Alberta Remote Sensing Center in Edmonton, and the Canada Centre for Remote Sensing in Ottawa offer seminar type courses in remote sensing. However, their courses are geared to specialists outside the field of education and there are few teacher participants.

In summary, the review of the literature indicates that while computer-assisted instruction has been applied to a wide variety of educational disciplines, it is virtually absent in the field of social studies. Research on the effectiveness of CAI suggests that it is generally considered more effective than traditional modes of instruction but that there are a number of problems associated with CAI which students should be made aware of. Landsat infra-red composite false color images are a relatively new resource in social studies and where used, the traditional mode of instruction is employed. While there are courses offered in Remote Sensing at several universities, they are all, with the exception of the University of Alberta, not geared to the preparation of pre-service teachers. It would appear that this study - a computer-assisted instruction program in Landsat imagery interpretation for pre-service teacher training is the first of its kind.

CHAPTER III

Procedures and Research Design

1. The Sample

A sample of twenty-two students was obtained from a class of pre-service teachers enrolled in a senior course in social studies curriculum and instruction in the 1979 fall session of the Faculty of Education at the University of Alberta. All students participating in the study were enrolled as full-time undergraduates in the Bachelor of Education program.

II. Research Questions

For the purpose of this exploratory study, the following research questions were asked:

> a) Is it possible to develop a computer-assisted instruction program to teach Landsat satellite map interpretation?
>
> b) Can pre-service teachers understand and derive information from Landsat satellite maps with the aid of a computer-assisted instruction program?

III. Design and Development of the CAI Program

A. The Program Language

The writer undertook an independent course of study in computer-assisted instruction with the Division of Educational Research services in the Faculty of Education. The CAI course entitled "Coursewriter II" is designed to teach the coursewriter authoring language in approximately twenty-five hours of CAI terminal time including ten labs.

Upon completing the Coursewriter II course requirements, the writer commenced authoring the CAI Landsat satellite map interpretation program. The process consisted of the following eight stages:

1) Setting the objectives
2) Organizing the material
3) Preparing the material for the computer
4) Debugging the program
5) Trial sessions
6) Sessions with experimental group
7) Performance recordings
8) Documenting the program

B. Course Content

The material for the CAI course was gleaned from a number of different sources. The Alberta Remote Sensing Center in Edmonton and the Canada Center for Remote Sensing were particularly helpful in supplying pertinent literature.

The course was divided into ten segments. Each segment was broken down into topic areas. Following is a description of the topics which comprised the course:

A. Segment 1 - Introduction to remote sensing

B. Segment 2 - Landsat satellites

C. Segment 3 - Characteristics of wave bands

D. Segment 4 - Interpretation techniques

E. Segment 5 - Landsat imagery interpretation

F. Segment 6 - Winnipeg August image summary

G. Segment 7 - Winnipeg December image summary

H. Segment 8 - Image analysis equipment

I. Segment 9 - Remote sensing agencies

J. Segment 10 - Final review options

C. The Human Factor

In the design of the programs, some consideration was given to the 'human factor' element. In most cases, the design of man-machine systems has been the sole responsibility of hardware-oriented engineers who often use only economic or physical science criteria, rather than those of a psychologist (Baker, 1971). Failure to realize the importance of this element may lead to difficulties in the implementation of the computer programs:

> If the human factor is not properly
> valued, then morale problems after the
> system is operational may demand remedia-
> tion. For example, if the task analysis
> of personnel in the training system result
> in overly specific and monotonous tasks,
> absenteeism, turnover, and other problems
> may result (Meany, 1972, p. 120).

Therefore, the design of this program was influenced by the need to personalize or humanize the nature of the course. For example, the student's first name was used in some screen displays of course material. In addition, the use of cartoons and humor were incorporated into the feedback messages of the program to help relieve any student monotony or boredom that might arise.

D. Debugging the Program

Five students volunteered to be tested on the CAI program in order to:

1) Debug the program, and

2) Check the instructional strategy

The debugging process was continued with a second trial group consisting of three graduate students and two professors: one from the Division of Educational Research Services responsible for the IBM/1500 CAI system; the other, a Professor of Elementary Education

specializing in social studies. A final trial run was made using twenty-two volunteers from a senior social studies course (Ed. C.I. 413) offered in the summer session in the Faculty of Education at the University of Alberta.

Once this latter group of students had completed the program, the author made final revisions to the program based on their respective comments and criticisms and removed any remaining technical errors prior to using it with the experimental group. While stage four is normally reserved for the debugging of the program, additional debugging took place in stages five through seven.

IV. Curriculum Kit

Thirteen curriculum kits were prepared for use at the terminal with the CAI program. The following materials were included in the curriculum kit:

1) Winnipeg composite false color image
   August 26th, 1976, path 33, row 25

2) Winnipeg composite false color image
   December 6th, 1975, path 33, row 25

3) Standard road map of Winnipeg

4) Transparent numbered grid for use with
   the above-mentioned images

5) Magnifying glass

The images and road map within the curriculum kit were laminated so that the materials could be used by subsequent students.

V. Administration of the Course

Each student with the experimental group signing on to the course was given a short introduction to the use of the computer terminal. Here the students received instruction in entering responses to

questions presented during the course, using both the light pen and the keyboard. During the terminal introduction, the program asked for the student's name which was stored and used later in the program.

The student was then given a brief introduction to the course itself. This section provided an overview of the course including the various topics in each of the ten segments.

The students were then instructed on how to branch to another segment in the course, should they wish to review. After each topic area had been covered, the student was given the opportunity to continue on to the next segment, or review the segment presented. The number of times a student made use of this learner control feature was recorded by the program. In addition to allowing the student to reinforce his comprehension of materials by reviewing, this feature also permitted the author to identify any weakness in instructional strategy and to revise the program accordingly.

Throughout the course, each student was asked a number of questions related to the course material. The student answered questions by typing a response on the keyboard, or by pointing at the answers with a light pen. The student had to enter a correct response to each question before being allowed to move ahead in the course. A student unsuccessful in obtaining the correct answer after two attempts, was given the correct answer and asked to type it in. The program kept a record of the number of questions to which the student had entered a correct response on the first and second attempt. If a student took too long in answering a question (timeout) or typed in an unrecognized response (UN), the program recorded his performance. This information was later used to improve the instructional strategy

and feedback messages in the program.

VI. Instruments

Four instruments were used in this feasibility study: a survey questionnaire prepared in cooperation with the Alberta Remote Sensing Center; an achievement test; a "Likert-type" attitudinal questionnaire and a written comment sheet prepared by the writer. All four instruments were administered by the writer.

The survey questionnaire and achievement test are subject to the following limitations:

1. No previous comparable studies have been found utilizing Landsat satellite maps with pre-service teachers.

2. The purpose of this study is to determine if the participating students are capable of understanding and deriving information from infra-red false color Landsat maps with the aid of a CAI program.

A. The Survey Questionnaire

A survey questionnaire consisting of thirteen questions was administered to the sample group in class one week before participating in the CAI program. An overhead transparency of an infra-red composite false color image of Edmonton and surrounding area, July 14th, 1974, path 45, row 23 was used with the survey questionnaire. A sample of the survey questionnaire with corresponding answer key is included in Appendix A.

B. The Achievement Test

An achievement test consisting of twenty-five questions based on the content of the CAI program was prepared and administered by the writer in class five days after all students in the sample group had completed the CAI program. Two overhead transparencies of the

following infra-red composite false color images were used with the achievement test:

Calgary March 3rd, 1977 Path 45 Row 24

Calgary August 5th, 1975 Path 45 Row 24

A sample of the achievement test and corresponding answer key is included in Appendix B.

C. Landsat CAI Program Attitude Questionnaire

The attitude questionnaire used in this study consisted of fourteen items designed to measure student attitudes toward the Landsat image interpretation program with CAI as a mode of instruction. Students were required to respond to each item in terms of seven categories of agreement or disagreement. This type of questionnaire is often referred to as a "Likert-type scale" (Selltiz et al., 1965, p. 366). Numerical values assigned to items ranged from one point for strongly disagree to seven points for strongly agree.

1) Limitations of Attitude Scales

The writer examined attitude scales developed by Likert, Thurstone and Gutman and selected the Likert-type scale as being the most appropriate for this study. However, Borg and Gall (1979: 110) caution that the majority of attitude scales are direct self-report measures and are subject to the following limitations:

a) We can never be sure of the degree to which the subject's response reflect his true attitudes.

b) An individual may not really know how he feels about an issue or situation.

c) He may never have given the idea serious consideration, and

d) An individual may conceal his real attitude, and express socially acceptable opinions.

In consideration of the above limitations, any results arising out of the use of the Likert-type attitude scale should be interpreted with caution. A sample of the Landsat CAI program attitude questionnaire is included in Appendix C.

D. The Written Comment Sheet

In order to obtain another measure of student opinions about Landsat satellite image interpretation and CAI as a mode of instruction, a written comment sheet allowing for response to four open-ended questions was administered at the same time as the Likert-type attitude questionnaire. A sample of the written comment sheet is included in Appendix D.

CHAPTER IV

Results and Discussion

Results of the Investigation

1. The Survey Questionnaire

Members of the experimental group were asked to respond to a thirteen item questionnaire administered one week before participating in the Landsat CAI program. The mean score for the survey questionnaire was 1.636, the standard deviation, 1.524.

Responses to the three questions on the survey questionnaire pertaining to the student's prior knowledge of Landsat images before taking the Landsat CAI program indicated that only five students had ever worked with Landsat images before, and only two students in the sample had taken courses dealing with Landsat image interpretation. All members of the sample group felt they had little if any knowledge of Landsat image interpretation.

2. The Landsat CAI Program

The Omega program recorded the following measures on each student.

    i) percentage of students covering all sections of the program,

    ii) percentage of questions answered correctly on first attempt;

    iii) number of time branching feature used, and

    iv) amount of time to complete the program.

    I) Percentage of Students Covering All Sections of the Program

All members of the experimental group covered the complete program in one or two sessions at the computer terminal within a five day period.

ii) Percentage of Questions Answered Correctly on First Attempt

Approximately 66% of the 26 questions concerning the course material were answered correctly on the first attempt by all students taking the program.

iii) Number of Time Branching Feature Used

The results indicated that this group of students made little use of the branching feature to review; only two percent of all possible branching options were executed by the experimental group.

iv) Amount of Time to Complete the Program

The mean time for all students to complete the program was 121 minutes; the standard deviation was 0.023. All results pertaining to section two of this chapter are summarized in Table 1.

3. The Achievement Test

An achievement test consisting of twenty-five questions based on the content of the Landsat CAI program was administered to the experimental group one week after all students had completed the CAI program. The mean score on the achievement test was 17, the standard deviation was 3.811. Percentages of students correctly answering each question and the results of the achievement test are shown in Table II.

4. Landsat CAI Attitude Questionnaire

The attitude questionnaire used in this study consisted of fourteen items designed to measure student attitudes toward the Landsat CAI program. Students were required to respond to each item in terms of seven categories of agreement or disagreement. Numerical values assigned to individual items ranged from one point for checking

TABLE I

STUDENT PERFORMANCE MEASURES RECORDED
BY THE CAI LANDSAT PROGRAM OMEGA

	Mean and/or %
i) Percentage of Students Covering all Sections of Program	$\overline{X}$ = 100%
ii) Percentage of Questions Answered Correctly on First Attempt 26 questions	$\overline{X}$ = 66%
iii) Number of Times Branching Feature Used	
- Segment 1	(9)*
- Quiz 1	(1)
- Segment 3	(2)
- Quiz 4	(2)
- Quiz 5	(2)
- Quiz 6	(5)
- Segment 9	(4)
- Segments 4 - 9 incl.	(6)
- Complete Review	(6)
The total number of students using the branching option was 17.	
iv) Mean Time to Complete the Program	$\overline{X}$ = 121 minutes S.D. - 0.23

* denotes number of students exercising branching option

TABLE II

ACHIEVEMENT TEST QUESTION ANALYSIS

Question	% Correct	% Partially Correct	% Incorrect
1	68.15 (15)*	---	31.82 (7)
2a	81.82 (18)	---	18.18 (4)
b	81.82 (18)	---	18.18 (4)
3	63.64 (14)	---	36.36 (8)
4	81.82 (18)	---	18.18 (4)
5	95.45 (21)	---	4.55 (1)
6	77.27 (17)	---	22.73 (5)
7	50. (11)	---	50. (11)
8	59.09 (13)	---	40.91 (9)
9	72.73 (16)	---	27.27 (6)
10	63.64 (14)	---	36.36 (8)
11	77.27 (17)	---	22.73 (5)
12	40.91 (9)	9.09 (2)	50. (11)
13	86.36 (19)	---	13.64 (3)
14	72.73 (16)	---	27.27 (6)
15	59.09 (13)	---	40.91 (9)
16	63.64 (14)	---	36.36 (3)
17	68.18 (15)	---	31.82 (7)
18	72.73 (16)	---	27.27 (6)
19	40.91 (9)	36.36 (8)	22.73 (5)
20	50. (11)	22.73 (5)	27.27 (6)
21	50. (11)	9.09 (2)	40.91 (9)
22	86.36 (19)	---	13.64 (3)
23	72.73 (16)	9.09 (2)	18.18 (4)
24	36.36 (8)	4.55 (1)	59.09 (13)
25	36.36 (8)	---	63.64 (14)

* Brackets denote number of students

N = 22   Range = 11-23

$\bar{X}$ = 17

strongly disagree to seven points for strongly agree.

The results of the student attitude questionnaire clearly indicated that the students viewed the program favourably. On the average, over 80% of 'the students rated each of the evaluation items as a four or better on the Likert scale ranging from one - strongly disagree to seven - strongly agree with the statements presented.

The majority of students felt the course was useful in helping them to learn the material; that taking the course was a good investment of their time, and would recommend the Landsat CAI course to other students. Few students had been taught any portions of the material previously. While the majority of students felt the course was reasonably easy to understand and had a good basic knowledge concerning Landsat satellite images, the same students expressed the need for more instruction to improve their ability to interpret satellite images. The items which received the highest rating concerned the students attitudes toward CAI: the majority liked taking the Landsat course via computer-assisted instruction; found the course interesting, and expressed a desire to take other courses via CAI. The results clearly indicated that the majority of students preferred CAI as a mode of instruction over the traditional lecture method and would themselves, as future social studies teachers, teach Landsat image interpretation with the aid of CAI. The results of the student attitudinal questionnaire are summarized in Table III.

Scores on the attudinal questionnaire were then compared with scores on the achievement test. There was no statistical correlation between scores on the Likert type attitudinal questionnaire and scores on the achievement test at the .01 and .05 Alpha levels.

TABLE III

MEANS AND STANDARD DEVIATIONS OF LIKERT TYPE ATTITUDINAL QUESTIONS AND CORRELATIONS
AND PROBABILITY LEVELS BETWEEN ACHIEVEMENT TEST AND LIKERT TYPE ATTITUDINAL QUESTIONS

Likert Question	Mean	Standard Deviation	Correlations with Posttest (r)	Probability Levels (p)
1	4.500	1.530	0.347	0.114
2	5.182	1.336	-0.009	0.969
3	4.773	1.241	0.394	0.069
4	1.500	1.118	-0.005	0.981
5	6.455	0.782	-0.099	0.661
6	5.818	1.029	0.104	0.644
7	5.773	1.346	-0.230	0.302
8	3.545	1.827	-0.222	0.321
9	5.136	1.179	0.192	0.392
10	5.091	1.276	0.341	0.120
11	3.818	0.886	-0.269	0.226
12	4.273	1.052	0.187	0.405
13	5.182	1.556	0.234	0.295
14	5.273	1.601	0.324	0.141

N=22
DF=20

5. Student Written Comments Sheet

All members of the sample group were provided with the opportunity to express in writing their comments as to their experience with the Landsat CAI program. The students were asked to respond to the following four questions:

    1. What is your opinion of the Landsat CAI program?

    2. What problems, if any, did you experience while taking the program?

    3. How might the CAI program be improved?

    4. Would you as a future teacher of social studies teach Landsat satellite image interpretation by the traditional lecture method or by computer-assisted instruction? Give reasons for your answer.

Question One   What is your opinion of the CAI Landsat program?

The findings indicated that 20 students responded positively to the CAI program; one student was neutral in his response and one student was negative in his attitude toward the CAI program.

Question Two   What problems, if any, did you experience while taking the program?

Fourteen students indicated they experienced some problems while taking the program; three students did not experience any problem and five students did not respond to the question.

Question Three   How might the CAI program be improved?

Fourteen students responded to this question.

Question Four   Would you as a future teacher of social studies teach Landsat satellite image interpretation by the traditional lecture method or by computer-assisted instruction? Give reasons for your answer.

Fourteen students indicated they would teach Landsat image interpretation by computer-assisted instruction. Four students indicated

they would use both CAI and the lecture method and four students indicated they would teach Landsat image interpretation using the traditional lecture mode of instruction. Responses to these four questions are summarized in Table IV.

Discussion of Results

1. The Survey Questionnaire

The mean score of 1.636 and standard deviation of 1.524 suggests that all students in the sample had little, if any, prior knowledge of Landsat image interpretation. Further, the survey questionnaire scores of the five students who indicated they had either worked with or had taken courses dealing with Landsat image interpretation, were not significantly different from those students who had no prior exposure to the subject. Further, the achievement test scores of these five students were not significantly different from the scores of those students who had no prior exposure to Landsat satellite images. It would appear from the foregoing, that what little prior knowledge these students claimed to have, did not effect their performance.

It should be noted that all students in the experimental group expressed the view that at the time the survey questionnaire was administered, their knowledge of Landsat satellite images was very meager.

2. The Landsat CAI Program

The average student time to complete the CAI program was 121 minutes, the standard deviation 0.23, the range 39 minutes to 212

TABLE IV

STUDENT RESPONSES TO FOUR QUESTIONS ON COMMENT SHEET

QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4	
Has promise	Wanted to ask questions	Ask more questions	Both	- CAI is confusing by itself
Good	Did not know what was important	Improve on problems	CAI	- Would do follow-up in traditional way
Very good	Too many facts	More explanation		
Excellent	Its a chore to take notes	Give a brief summary	CAI	- More enjoyable, exciting
Enjoyable, great addition	Difficulty interpreting images, can't see anything	Ok as is	Both	- Can compare techniques
Fine	Cannot type fast	OK	Both	- Advantages to both
O K	Nervous	Broader answers	CAI	- Good to vary one's technique
Very Challenging	No background	More questions	Traditional	- Not possible to use CAI in schools
Good source of information	No problems	More questions		
Very good	No problems	More time to study images	Traditional	- More studies need to be done in CAI
Interesting	Takes too long		CAI	- Allows us to work at our own speed
Good	Sore eyes			
Interesting	Need a glossary of terms		CAI	- Holds children's attention
Very Interesting	Define terms		CAI	- No explanation provided
All right	More review		CAI	- More interesting
Useful technique	Provide definitions		Both	- Teacher can provide added dimensions
Boring			CAI	- Nobody talking at you, its lots of fun
Novel			CAI	- Immediate feedback
Very Interesting			Both	- Cannot ask questions
			Traditional	- Need a voice
			CAI	- No explanation provided
			CAI	- No explanation provided

N=22 20 responses   16 responses   11 responses   19 responses

minutes. Only one student completed the program in 39 minutes and one student in 212 minutes. The mean time of 121 minutes is more representative of the majority of students. The range of time demonstrates the capacity of CAI to allow for different paces of learning by the students.

The collection of data on each student's performance is an important characteristic of CAI. Such information is available for use by the instructor, for student feedback, and for research purposes. For the purposes of this study, the performance recordings permitted examination of differences between students who took the program. In addition, the use of performance records enabled the author to detect technical programming errors and were an invaluable aid in determining which parts of the program were poorly designed, particularly in regard to certain question items, and in deciding what improvements could be made to the program. For example, the parameters for acceptable answers to selected questions were, on several occasions, expanded as a result of student feedback during trial runs. In response to the question "What do the small while rectangles alongside the Winnipeg River indicate?" the range of acceptable answers included forest clearing, wood cutting, forest cutting, and timber cutting. Three students typed in lumbering which is an equally acceptable answer.

15 students (68%) of the sample, answered the 26 questions which dealt with the course material correctly on the first attempt. Undoubtedly, this proportion would have been higher but for some technical errors which resulted in lower scores for some students than would have been the case.

An analysis of the performance recordings revealed that some of the questions were poorly presented or that the student did not fully comprehend the automatic introductory instructions on how to use the key board and light pen at the computer terminal. For example, some of the questions were designed to accept a light pen response. On several occasions, three response alternatives to a given question were placed on the screen under which was the instruction 'Point to a, b or c.' Several students pointed to either a, b or c in this instruction, rather than one of the choices above it. Because the program was designed to accept a light pen response only where the choices were located, these student's responses were recorded as incorrect or unrecognizable for their first attempt. Had some of the question items been presented more clearly, then the proportion of students responding correctly to those questions would have been higher.

The type of feedback message given to students after their initial response would also seem to influence the accuracy of subsequent responses. It is difficult to maintain the delicate balance between providing too little or too much information in constructing feedback messages. More research on the effect of feedback messages on student response is needed.

In general, the results indicated that a large portion of the questions concerning the course material were answered correctly on the first attempt. Inability to type, or use the keyboard and light pen properly also appears to have contributed to the lowering of scores. The achievement test scores of those students who experienced problems operating the terminals were about ten percent lower than

those students who did not experience any difficulty. Specific

student suggestions on how the Landsat CAI program might be improved

will be dealt with later in this chapter.

The results indicated that the program's branching feature was

little used by the students. Out of the nine possible branching

features available in the program, less than two percent of the

sample exercised this feature of the program. While less than two

percent of all possible branching options were executed by the sample,

the fact that some students used this feature more than once suggests

that it should be kept as part of the program for those students who

would like to make use of this feature. Because of the heavy

schedule of CAI courses currently offered by the Division of Educational

Research Services, the amount of time available to the student to

complete the program may have influenced his or her decision to

execute the branching feature. In response to suggestions made by

a number of students in the experimental group, the branching function

within the CAI program was re-examined and modifications were made

where deemed necessary.

3. The Achievement Test

Results of the achievement test indicate that the objectives of

this feasibility study was achieved. Pre-service teachers can under-

stand and derive information from Landsat satellitle maps with the

aid of computer-assisted instruction. The mean score of 17 on the

achievement test attests in some measure to the effectiveness of the

Landsat CAI program.

Generally speaking, the majority of questions on the achievement

test were answered well. However, students experienced minor problems in three areas: characteristics of wave length bands, straight factual information and interpretation.

Questions 15, 16 and 17 dealing with characteristics of wave length bands caused the students some problems. The characteristics of each wave length for bands, 4, 5, 6, and 7 were explained at length in the CAI program and the students were examined on this concept shortly after it was presented. The response analysis for these questions on the posttest would suggest that while students were aware of the individual characteristics of each wave length band, they got them confused. The time lapse between completion of the CAI program and the writing of the posttest may have had some influence on the ability of students to recall the associated characteristics with a particular band number. Modifications were made to the program to highlight the individual band wave length characteristics after all students completed the program and wrote the achievement test.

Questions 19, 20, 21 and 24 also caused the students some minor problems. These questions asked the student to recall straight factual information dealing with various services offered by remote sensing agencies. Analysis of student responses suggest that many of the students knew the services provided by the agencies, but confused them with one another. Modifications were made to the program to highlight for review purposes, the services offered by the remote sensing agencies.

One of the suggestions put forth by the students was to include a glossary of terms in the Landsat CAI program. This suggestion I

believe, is a good one and should serve to help individual students to better comprehend concepts covered later in the program. The program was modified to include a glossary of terms.

Some students experienced minor difficulty with questions 1, 3, 7 and 12 dealing with the interpretation of satellite images. Analysis of the responses to the above-mentioned questions suggest that while the majority of students were aware that water is generally shown as black on a composite false color image, it can also appear in various shades of blue depending on the amount of sedimentation in the water. The section of the program dealing with sedimentation was re-examined and changes were made accordingly.

Few students (8) remembered the scale of Landsat satellite images in response to question 25. Further, several students experienced perceptual problems in interpreting satellite images. Not all students comprehended the fact that Landsat satellite photographs of the earth's surface are taken from a distance of approximately 929 km above the earth, and thus experienced some perceptual problems in attempting to interpret the images.

4. The Landsat CAI Attitude Questionnaire

Earlier in this thesis I alluded to some of the limitations that are associated with the use of attitude questionnaires, suggesting that any results that are reported, should be interpreted with caution and supported, where possible, by other measures. The writer used a written comment sheet which allowed for responses to four open-ended questions as an additional measure to cross-check information obtained from the "Likert-type" attitude questionnaire. Following are some generalizations that can be drawn from the results obtained from the attitude questionnaire.

The results of the study clearly indicate that the majority of students in the experimental group with their limited background and prior knowledge of Landsat satellite imagery, viewed the 'Omega' CAI program favourably, found it to be effective, and a useful and worth-while experience. These same students found the course sifficiently interesting and stimulating to want to obtain further instruction in satellite imagery interpretation. This fact would tend to support current research findings which suggest that teachers who are exposed to CAI in conjunction with classroom instruction, are usually desirable of more indepth instruction in the same subject matter (Hunka, 1976, p. 18).

Certainly the students in the experimental group recognized the difficulty, and at the time of this writing, the impossibility of having a CAI system installed in every school. However, given the opportunity, as future teachers of social studies, they would make definite use of this technology. The important thing here is that exposure to both computer-assisted instruction and satellite imagery interpretation has enlarged the student's repetoire of resources.

Previously in this chapter, I stated that the scores on the Likert attitude questionnaire were correlated with scores on the achievement test at the .01 and .05 Alpha levels. The results suggest that we cannot predict with any degree of accuracy that a student who responded positively toward CAI on any of the 14 variables, will also perform well on an achievement test. Stated another way, there is no statistical significant correlation between scores on the attitude questionnaire and scores on the achievement test.

5. Student Written Comment Sheet

- Being aware of the possibility of various shades of nuances which might be attached to various expressions used in the student's responses, the author cross-checked their choice of words with their attitudes expressed on the Likert questionnaire to make sure that what the students expressed in writing was congruent with their attitudes previously expressed. It may be stated that the written responses of the students show a high degree of congruency with their previously expressed attitudes on the Likert attitudinal questionnaire.

Responses to question 1 confirm current research findings that students who are exposed to CAI for the first time are highly favourable toward this mode of instruction. Further, the novelty of the Landsat CAI program would appear to have the staying power that is common to most CAI programs which generally lasts throughout the course (Hunka, 1976, p. 17).

Student responses to question 2 were comparable to the responses of the several hundred students who have participated in the introductory statistics course "stats-1" via CAI. These responses ranged from: "I wanted to ask questions, I was nervous, had no background, to I cannot type and had sore eyes." It should be noted that many of the problems experienced by the students are related to factors of emotion and discomfort rather than being a reflection on the Landsat CAI program.

It seems clear from the general comments, that the students were fairly apprehensive about being exposed to two forms of modern technology at the same time. While the majority of students enjoyed the program, there was an initial period of uncertainty or uneasiness that prevailed during the early stages of the course. However, this seemed to dissipate as the students became more actively involved

with the computer. Dr. Hunka, coordinator of the Division of Educational Research Services expressed the view that the anxiety level of many students generally rises when beginning other CAI courses offered by DERS and usually subsides as students progress through the program.

It was mentioned at the outset of this thesis that CAI is an alternative to, not a replacement for the traditional lecture mode of instruction. The majority of students taking the Landsat CAI program felt strongly , the need for an instructor or competent person to be available in the terminal room to respond to questions. The writer made himself available in the terminal room throughout all student sessions. Of the few questions that were asked while students were in the terminal room, the majority related to the functioning of the terminal as opposed to the content of the CAI program. During the student sessions at the terminal, several students complained of sore eyes resulting from glare or reflection off the cathode ray tube and satellite images. Investigation of these and other problems relating to perception would seem to be called for.

Student responses to question 3 were very helpful although less than half the sample responded. Their specific suggestions can be cagegorized into the following areas: more questions, more inter-action, a glossary of terms, and different explanations when reviewing material.

An analysis of the student performance recordings and instructional strategies in the program would seem to call for the inclusion of more questions in the program. More interaction is needed as each topic is covered to maintain student interest and comprehension of the course material. Further research is recommended in this area.

Several students suggested that the number of branching options be increased and that less material be covered before a review option is made available. Because little use was made of the branching option, more research is required to determine if this aspect of the program is useful and effective.

These results permitted the writer to re-examine the Landsat CAI program and to make some modifications to the program to better serve and enhance the learning experience of subsequesnt groups of students. The importance of incorporating user suggestions into the program cannot be underestimated. However, additional research is necessary to evaluate the effect of these modifications with a larger sample. It can, and has been argued amongst interested CAI authors that the design of a CAI program is never complete (Hunka & Romaniuk, 1979). There is always something one can do to improve the program as a result of student feedback and the analysis of performance records. This study is not exempt from that statement.

Student responses to question 4 did not bring any surprises. As expected, the majority of students indicated a preferance for CAI as a mode of instruction, while others preferred both the CAI and traditional lecture method. Until CAI can be installed in the schools on a large scale basis with ongoing research and evaluation, it is understandable why some students in the sample preferred the traditional lecture mode of instruction. Still there were some skeptics in the sample and justifiably so; CAI as a mode of instruction is only one of many interesting and stimulating forms of instruction. It is worth noting however, that teacher inertia (which may have various causes) is one of the outstanding deterrents to the use of the newer media (Gillett, 1973, p. 83).

In summary, the results of the achievement test showed that students can understand and derive information from Landsat satellite images with the aid of computer-assisted instruction. The results of the student attitude questionnaire revealed that the student's felt the course material was interesting and well presented, that they benefited from taking the course, and that they would not hesitate to recommend the 'Omega' CAI program to others. In addition, the majority of students indicated they would teach Landsat satellite image interpretation with CAI or both the CAI and traditional lecture methods. Specific student suggestions to improve the CAI program gleaned from their written comments, have been incorporated into the Landsat CAI program.

CHAPTER V

Conclusions and Recommendations

The results of the study showed that a computer-assisted instruction program can be developed to teach Landsat satellite image interpretation. Secondly, the results clearly demonstrated that students can understand and derive information from Landsat satellite images with the aid of CAI.

The findings also revealed that the majority of students in the sample expressed a highly favourable attitude towards the 'Omega' CAI program. Consequently, another conclusion reached from this study was that the Landsat CAI program could be a beneficial addition to a social studies teacher education program.

The study also demonstrated that CAI can be used to present the Landsat course material in a detailed and well organized manner, which suggests that other programs could be developed that have particular significance for social studies. In addition, the study has shown that the quality of a CAI program can be continually upgraded through the acquisition of information obtained from the students' performance recordings. In this regard, the precise monitoring of each student's performance during the course cannot be equalled by the traditional lecture and examination approach.

Recommendations for further research

From the results of this exploratory study, it is recommended that more research on CAI in the social studies be conducted. Following are some suggested research problems for further investigation:

44

1. Will multistudent performance at a single terminal result in higher achievement scores than a single student at a single terminal?

2. Can students understand and derive information from black and white Landsat satellite images with the aid of CAI?

3. Is there one optimum CAI instructional strategy for working with Landsat satellite images?

4. To what extent do student perceptual problems effect their learning of CAI course material?

5. Is learner control (the freedom to move about in a program) a desirable feature of a CAI program?

6. In what other content areas in the social studies can CAI be applied?

In summary, the two objectives of this study have been achieved. A Landsat satellite computer-assisted instruction program was developed to teach satellite imagery interpretation, and students were able to understand and derive information from Landsat satellite images with the aid of CAI.

Afterthoughts

The Landsat satellite program 'Omega' is now part of the operational CAI system in the Division of Educational Research Services. A second group of social studies Ed. C & I 413 students have completed the Omega program. A general survey of the attitudes of this second group of students toward the Landsat CAI program support and confirm the results of the earlier exploratory study.

FOOTNOTES

[1]Hunka, Steve S. Catalogue of CAI Courses. Edmonton: Division of Educational Research Services, University of Alberta, 1978, p. 29.

[2]An ERIC computor search (CIJE and RIE) was made using the following search code: Teacher Education, Map Skills, Location Skills, Social Studies. In addition a search was made using the RESORS system (Canada Centre for Remote Sensing Computor Based On-Line Document Retrieval System), the Canadian Education Index and Education Index.

[3]Howarth, Phillips J. "Remote sensing/photogrammetry education in the United States and Canada". Hanover, P.A.: Photogrammetric Engineering and Remote Sensing. Vol. 43, No. 3, March 1977, pp. 259-284.

BIBLIOGRAPHY

BIBLIOGRAPHY

Baker, F. "Computer-based instructional management systems: a first look". Review of Educational Research, 1971, 41, 51-70.

Borg, Walter R. and Gall, D. Educational research and introduction. New York: Longman, Inc., 1979, p. 210.

Brosius, Craig A., Gervin, Janette C., and Raguson, James M. Remote sensing and the earth. Titusville, Florida: School Board of Brevard County, 1977, p. 472.

Gagne, Robert and Briggs, Leslie. Principals of Instructional design. New York: Holt, Rinehart and Winston, Inc., 1974, pp. 99-108.

Gillett, Margaret. Educational technology: toward demystification. Toronto: Prentice-Hall Ltd., 1973, p. 83.

Harper, Dorothy. Eye in the sky: introduction to remote sensing. Montreal: Multiscience Publications Ltd., 1977, p. 164.

Hass, C.G. "In-service education today". In N.B. Henry (ed.), In-service education for teachers, supervisors, and administrators. Chicago: Fifty-sixth yearbook of the National Society for the Study of Education, 1957, pp. 17-29.

Hicks, B.L. and Hunka, Steve S. Principals of instructional design. New York: Holt, Rinehart and Winston, Inc., 1972, pp. 67-108.

Howarth, Phillip J. "Remote sensing/photogrametry education in the United States and Canada". Hanover, P.A.: Photogrammetric Engineering and Remote Sensing. Vol. 43, No. 3., March, 1977, pp. 259-284.

Hunka, Steve S. Catalogue of CAI courses. Edmonton: Division of Educational Research Services, University of Alberta, 1978, p. 29.

Hunka, Steve S. Prospectives in educational research. Edmonton: Division of Educational Research Services, University of Alberta, 1978, p. 18.

Hunka, Steve S. Report on the use of the computer-assisted instruction course stat-1. Edmonton: Division of Educational Research Services, University of Alberta, 1976, p. 6.

Kirman, Joseph. Primer for satellite maps. Edmonton: Puckrin Publishing House, 1978, p. 60.

Kirman, Joseph M. "The use of infra-red false color satellite maps by grades 3, 4, and 5 pupils and teachers". Edmonton: Alberta Journal of Educational Research. Vol. XXIII, No. 1, March, 1977, pp. 52-64.

Kopp, O.W. et al. Elementary school areospace activities: a resource for teachers. Washington: National Areonautics and Space Administration, 1977, p. 127.

Kulik, J.A. and Jaska, P. " SI and other educational technologies in college teaching". Educational Technology, 1977, pp. 7-19.

Mag dson, Errol. "Student assessment of Plato: what students like an islike about Plato". Educational Technology, 1977, Vol. VIII, No. 8, p. 5.

Magidson Errol. "Trends in computer-assisted instruction". Educational Technology, 1978, Vol. XXII, No. 12, p. 47.

Masemore, Ira G. An assessment of instruction of modes used by secondary social studies teacher trainers in the social studies methods course in Pennsylvania. Unpublished doctoral dissertation, University of Pennsylvania, 1973, p. 97.

Massialas, Byron G., Sprague, Nancy F., and Sweeney, Jo Ann. "Traditional teachers, parochial pedagogy". School Review, 1971, 79, pp. 561-578.

Meany, J. "Man-machine alternatives in computer-based counsellor training systems". Counsellor Education and Supervision, 1972, 12, pp. 15-22.

Nixon, William P., and McCormack, Richard E. "Landsat: A tool for your classroom". Social Education, 1971, 41, pp. 606-622.

Ofiesh, Gabriel and Meirhenry, Wesley. Trends in programmed instruction. Washington: National Education Association, 1974, pp. 207-210.

Petrillio, Anthony J. What's the use of land? Washington: National Aeronautics and Space Administration, 1976, p. 57.

Reeves, Robert G. (Ed.). Manual of remote sensing (2 vols.). Falls Church, Virgina: American Society of Photogrammetry, 1975, p. 1104.

Robbins, R.C. "Impact of satellites on education". Teacher's Educational Review, 1966, 6, pp. 14-17.

Selltiz, C., Jahoda, M., Deutsch, M., and Cook, S.W. Research methods in social relations (Rev. ed.). New York: Holt, Rinehart and Winston, 1965, p. 339.

Taba, H. "Techniques of in-service training". Social Education. Washington: NCSS, 1965, 29, pp. 464-474.

Tindal, Margaret A. Constructing a landsat photomosiac using latitude and longitude. Greenbelt, Maryland: Goddard Space Flight Center, 1977, p. 10.

Tindal, Margaret A. Educator's Guide for mission to Earth: Landsat
    views the world. Greenbelt, Maryland: NASA Goddard Space Flight
    Center, 1978, p. 59.

Vogt, Gregory L.. Remote sensing of the earth with the landsat
    multispectral scanner. Washington: NASA Lewis Research Center,
    1977, p. 28.

Weinkauf, Ronald. Geography on landsat images: student resources.
    Brookings, South Dakota: Ronald Weinkauf, 1976, p. 22.

APPENDICES

APPENDIX A

THE SURVEY QUESTIONNAIRE WITH ANSWER KEY

THE UNIVERSITY OF ALBERTA

Department of Elementary Education

SURVEY QUESTIONNAIRE

Name _____

INSTRUCTIONS

Please fill in the answers to the questions in the space provided.

1. What is it that you are looking at (be specific).

   _____

   _____

2. How do you think this was created?

   _____

   _____

3. Have you ever worked with this before? Yes ____ No ____ . If
   yes, how?

   _____

   _____

4. What features do you see under Grid number __1__ .

   _____

   _____

   _____

   _____

5. What features do you see under Grid number __12__ .

   _____

   _____

   _____

   _____

6. What features do you see under Grid number __6__ .

_____

_____

_____

_____

7. What does the color red on this projection indicate?

_____

_____

_____

_____

8. What do the small rectangles shown on this projection indicate?

_____

_____

9. Under Grid __8__ , what does the black indicate?

_____

_____

10. Under Grid __15__ , what does the blue indicate?

_____

_____

11. What do you think the normal scale of this projection is?

_____

_____

12. Have you ever taken any courses that dealt with what you are looking at? No _____ Yes _____. If yes, give place and course number.

_____

13. My knowledge of projections of this nature is:

Very meager   Very extensive

    1   2   3   4   5   6   7

_____

Survey Questionnaire Answer Key

Question

1 Landsat satellite map (image

2 Satellite photograph

3 n/a *

4 River

5 City

6 roads

7 vegetation

8 Farms or farmland

9 Water or lake

10 water or lake with sedimentation

11 1:1 million

12 n/a

13 n/a

* denotes - not applicable

APPENDIX B

THE ACHIEVEMENT TEST WITH ANSWER KEY

56

THE UNIVERSITY OF ALBERTA

Department of Elementary Education

Landsat C.A.I. Program

ACHIEVEMENT TEST

NAME _____

Instructions

Please fill in the answers to the questions in the space provided and/or circle the letter which best indicates your choice of answer.

*NOTE - There will be two transparancy projections used during the post-test.

1. What feature is most conspicuous within Grid number 4?

   _____

2. Two areas on this image are white in color.

   (a) Name the Grid number within which there is evidence of cloud cover.

   _____

   (b) Name the Grid number within which there is evidence of snow.

   _____

3. What does the blue color within Grid number 5 indicate?

   _____

4. What does the color red on this projection indicate?

   _____

   _____

5. Name three Grid numbers within which there is evidence of water.

   _____

6. Name a Grid number within which a city is located.

   _____

7. Name a Grid within which you find evidence of sedimentation.

   _____

8. What feature on this projection is indicated by the small rectangles?

   _____

9. The blue lines shown on this projection represent:

   a) rivers
   b) valleys
   c) highways
   d) lakes

10. The tiny criss-crossing lines shown on this image within Grid number 7 represent:

    a) city streets
    b) roads
    c) fences
    d) rivers

*NOTE: A new transparency will be inserted at this point.

11. This image would have most likely been created in:

    a) mid-summer
    b) early fall
    c) mid-winter
    d) late spring

12. Explain why the area within Grids 7 and 8 is not covered by snow.

    _____

    _____

    _____

    _____

13. Name a Grid number within which there is evidence of mountains.

    _____

14. Name a Grid number within which there is evidence of open water.

    _____

15. Band 4 is useful for which of the following characteristics:

    a) detecting cultural features
    b) vegetation classifications
    c) detecting turbidity in water
    d) geological classifications
    e) all of the above
    f) none of the above

16. Band 7 is useful for all of the following characteristics except:

    a) detection of water
    b) detecting conifer and deciduous forest areas
    c) reflectance of wet soils
    d) detecting the extent of blight and insect infestations

17. Band 6 is most useful for its water characteristics (Answer true or false)

    True _____ False _____

18. In the visible spectrum, Band 5 lies between .600 and .700 milli-microns in wave length and is most useful for discriminating vegetation types. (Answer true or false).

    True _____ False _____

19. Canada has two Landsat receiving stations. Name their locations.

    _____

    _____

20. Define Remote Sensing.

    _____

    _____

    _____

    _____

21. What kind of service does the EROS Data Center provide?

    _____

    _____

22. The images that you worked with at the C.A.I. terminal and the image that is currently projected are known as:

    _____

23. The wave length band numbers included in the make up of these images (see question 22) are:

    Bands _____

24. What service does Integrated Satellite Information Service (ISIS) provide?

    _____

25. What is the normal scale of a Landsat satellite image?

_____

Achievement Test Answer Key

Question

1 Lake

2a 12

2b 9

3 Water or lake

4 Vegetation

5 3,5,7,10,12

6 11, 7

7 10

8 farms or farmland

9 rivers

10 roads

11 mid-winter

12 chinook or warm southern wind from the Rockies

13 9, 14

14 9

15 All of the above

16 Detecting conifer and deciduous forest areas

17 False

18 True

19 Prince Albert Sask. and Shoe Cove Nfld.

20. The art of acquiring information about material objects from measurements made at a distance without actually touching the object.

21 World wide images and technical information

22 Infra-red composite false color images (satellite images)

23 4,5,6,7

24 Distributes a daily set of satellite microfiche to clients

25 1:1 million

APPENDIX C

LANDSAT CAI PROGRAM ATTITUDE QUESTIONNAIRE

LANDSAT CAI PROGRAM ATTITUDINAL QUESTIONNAIRE

1. I found the course was useful in helping me learn the material.

    Strongly   Strongly
    Disagree   Agree

    1   2   3   4   5   6   7

2. The material in this course was:

    Very   Very
    Boring   Interesting

    1   2   3   4   5   6   7

3. This material was easy to understand.

    Strongly   Strongly
    Disagree   Agree

    1   2   3   4   5   6   7

4. What portion of this material had you been taught previously?

    None   All

    1   2   3   4   5   6   7

5. Someone who is knowledgeable of the course content should be
    available in the terminal room.

    Strongly   Strongly
    Disagree   Agree

    1   2   3   4   5   6   7

6. When the course lecturer or assistant was in the terminal room,
    I felt that person did a good job in answering my questions.

    Strongly   Strongly
    Disagree   Agree

    1   2   3   4   5   6   7

7. I still feel I need more instruction to interpret satellite images.

Strongly   Strongly
Disagree   Agree

1   2   3   4   5   6   7

8. It would have been easier to learn this material by classroom instruction.

Strongly   Strongly
Disagree   Agree

1   2   3   4   5   6   7

9. Taking this course was a good investment of my time.

Strongly   Strongly
Disagree   Agree

1   2   3   4   5   6   7

10. I would recommend this course to other students or educational personnel.

Strongly   Strongly
Disagree   Agree

1   2   3   4   5   6   7

11. I would rate the difficulty level of this course as being:

Very   Very
Easy   Difficult

1   2   3   4   5   6   7

12. I feel I have a good basic knowledge concerning landsat satellite images.

Strongly   Strongly
Disagree   Agree

1   2   3   4   5   6   7

13. I liked taking this course via Computer-Assisted Instruction.

Strongly   Strongly
Disagree   Agree

1   2   3   4   5   6   7

14. I would like to take other courses via Computer-Assisted Instruction.

Strongly
Disagree
Strongly
Agree

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

APPENDIX D

LANDSAT CAI PROGRAM WRITTEN COMMENT SHEET

67

COMMENT SHEET

1. What is your opinion of the CAI Landsat program?

2. What problems, if any, did you experience while taking the program?

3. How might the CAI program be improved?

4. Would you as a future teacher of social studies teach Landsat satellite image interpretation by the traditional lecture method or by computer-assisted instruction?

   By traditional method _____   By C.A.I. _____

   Give reasons for your answer.

APPENDIX E

LANDSAT SATELLITE CAI PROGRAM 'OMEGA'

COURSE NAME: OMEGA   SEGMENT: OOO   DATE LISTED: DEC 12, 1979   PAGE: 1
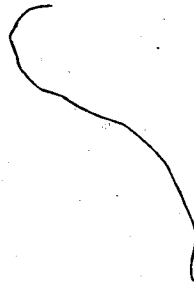
```
OMEGA
  1 BR   INTRO\
  2 LD   0¬/S1\

INTRO
  1 LD   1¬/S0\
  2 LD   1¬/S1\
  3 FN2  UA2¬/0\

UA2END
  1 PRR  \
  2 DE   0¬/32\
  3 NO   COPY¬/DRWMCK-2¬,DRWMCK-35¬,SDRAW-4\
  4 CM.  DRWMCK¬/0¬,0\
 38 NO   EM\
 39 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
 40 DE   0¬/32\
 41 DE   0¬/32\
 42 DTI  2,17¬/2,2¬/40,0¬/<OMEGA%%%%>          \
 43 DT   6,2¬/2,6¬/40,0¬/<A COMPUTER>-<ASSISTED INSTRUCTION COURSE%%%%
         %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%>
 44 DTI  10,18¬/2,10¬/40,0¬/<ON%%>\
 45 DT   15,11¬/2,15¬/40,0¬/<LANDSAT SATELLITE%%%%%%%%%%%%%%%%%%%>
 46 DTI  20,8¬/2,20¬/40,0¬/<IMAGERY INTERPRETATION%%%%%%%%%%%%%%%%%%%%%
         %%>\
 47 DT   25,8¬/2,25¬/40,0¬/<AUTHOR LEE G>.  <ARMSTRONG%%%%%%%%%%%%%%%%%
         %%%%%%%%>\
 48 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\

SEG1
  1 NO   EM\
  2 PRR  \
  3 DE   0¬/32\
  4 DT   6,0¬/2,6¬/40,0¬/<MAN MUST RISE ABOVE THE EARTH TO THE >\
  5 DTI  10,0¬/2,10¬/40,0¬/<TOP OF THE ATMOSPHERE AND BEYOND >-\
  6 DTI  14,0¬/2,14¬/40,0¬/<FOR ONLY THUS WILL HE FULLY UNDERSTAND >\
  7 DTI  18,0¬/2,18¬/40,0¬/<THE WORLD IN WHICH HE LIVES>.  \
  8 DTI  21,12¬/2,21¬/40,0¬/(<S>OCRATES - 500 <B C >)\
  9 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
 10 DTI  6,0¬/2,6¬/40,0¬/\
 11 DTI  6,0¬/2,6¬/40,0¬/<M>AN HAS INDEED PROVEN THAT <S>OCRATES \
 12 DT   9,0¬/2,9¬/40,0¬/WAS RIGHT.    <T>ODAY THERE ARE
         INDEED RIGHT.    <T>ODAY THERE ARE\
 13 DT   12,0¬/2,12¬/40,0¬/VIRTUALLY THOUSANDS OF SATELLITES IN \
 14 DT   15,0¬/2,15¬/40,0¬/ORBIT CIRCLING THE GLOBE TAKING
         LEING THE GLOBE TAKING\
 15 DT   18,0¬/2,18¬/40,0¬/PICTURES OF THE EARTH'S SURFACE.     OF
         THE EARTH'S SURFACE.  <T>HE\
 16 DT   21,0¬/2,21¬/40,0¬/<I>NFORMATION OBTAINED FROM THESE \
 17 DT   24,0¬/2,24¬/40,0¬/SATELLITES IS BEING USED TO MANAGE \
 18 DT   27,0¬/2,27¬/40,0¬/THE ENVIRONMENT. \
 19 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

```
SEG1
|  20 DE  0¬/32\
|  21 DTI 6,0¬/2,6¬/40,0¬/<T>HE COURSE YOU ARE ABOUT TO UNDERTAKE.\
|  22 DTI 9,0¬/2,9¬/40,0¬/WILL INTRODUCE YOU TO THE WORLD OF \
|  23 DTI 12,0¬/2,12¬/40,0¬/REMOTE SENSING AND WILL TEACH YOU THE \
|  24 DTI 15,0¬/2,15¬/40,0¬/BASIC SKILLS OF LAND SATELLITE IMAGERY \
|  25 DTI 18,0¬/2,18¬/40,0¬/INTERPRETATION.\
|  26 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|  27 DE  0¬/32\
|  28 DT  0,0¬/2,0¬/40,0¬/<T>HE NEXT SCREEN DISPLAY WILL PRESENT \
|  29 DT  3,0¬/2,3¬/40,0¬/THE <T>ABLE OF <C>ONTENTS. <T>HE <T>ABLE OF\
|  30 DT  6,0¬/2,6¬/40,0¬/<C>ONTENTS SERVES TWO MAIN PURPOSES. \
|  31 DTI 11,0¬/2,11¬/40,0¬/1. <I>T WILL GIVE YOU A QUICK REFERENCE \
|  32 DTI 13,4¬/2,13¬/40,0¬/AS TO WHAT MATERIAL IS TO BE COVERED\
|  33 DTI 15,4¬/2,15¬/40,0¬/IN THE PROGRAM,AND\
|  34 DTI 20,0¬/2,20¬/40,0¬/2. <I>T CAN BE USED A A REFERENCE POINT \
|  35 DTI 22,4¬/2,22¬/40,0¬/TO BRANCH TO ANY OF THE SEGMENTS IN THE \
|  36 DTI 24,4¬/2,24¬/40,0¬/PROGRAM SHOULD YOU DESIRE A REVIEW. \
|  37 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|  38 DE  0¬/32\
|  39 DT  0,11¬/2,0¬/40,0¬/<TABLE OF CONTENTS >\
|  40 DL  3,11¬/17\
|  41 DT  6,0¬/2,6¬/40,0¬/<S>EG-1  <I>NTRODUCTION TO REMOTE SENSING \
|  42 DT  9,0¬/2,9¬/40,0¬/<S>EG-2  <L>ANDSAT SATELLITES \
|  43 DT  12,0¬/2,12¬/40,0¬/<S>EG-3  <C>HARACTERISTICS OF WAVE BANDS \
|  44 DT  15,0¬/2,15¬/40,0¬/<S>EG-4  <I>NTERPRETATIONS TECHNIQUES \
|  45 DT  18,0¬/2,18¬/40,0¬/<S>EG-5  <L>ANDSAT IMAGERY INTERPRETATION \
|  46 DT  21,0¬/2,21¬/40,0¬/<S>EG-6  <S>UMMER IMAGE INTERPRETATION\
|  47 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|  48 DE  0¬/32\
|  49 DT  0,11¬/2,0¬/40,0¬/<TABLE OF CONTENTS >\
|  50 DL  3,11¬/17\
|  51 DT  8,0¬/2,8¬/40,0¬/<S>EG-7  <W>INTER IMAGE INTERPRETATION\
|  52 DT  11,0¬/2,11¬/40,0¬/<S>EG-8  <I>MAGE ANALYSIS EQUIPMENT \
|  53 DT  14,0¬/2,14¬/40,0¬/<S>EG-9  <R>EMOTE SENSING AGENCIES \
|  54 DT  17,0¬/2,17¬/40,0¬/<S>EG-10 <F>INAL REVIEW OPTIONS \
|  55 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|  56 DE  0¬/32\
|  57 FN  XP¬/4¬/16¬/4¬/<REMEMBER>\
|  58 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|  59 DE  0¬/32\
|  60 DT  4,0¬/2,4¬/40,0¬/<Y>OU WILL BE GIVEN THE OPPORTUNITY TO \
|  61 DT  7,0¬/2,7¬/40,0¬/REVIEW%%%%%____  MANY OF THE SECTIONS OF TH
|       \E\
|  62 DT  10,0¬/2,10¬/40,0¬/COURSE. <T>HE COMPUTER WILL FOLLOW \
|  63 DT  13,0¬/2,13¬/40,0¬/YOUR PROGRESS THROUGHOUT THE COURSE \
|  64 DT  16,0¬/2,16¬/40,0¬/AND WILL ADVISE YOU WHEN A REVIEW \
|  65 DT  19,0¬/2,19¬/40,0¬/OPTION IS COMING UP. <S>O FEEL FREE TO \
|  66 DT  22,0¬/2,22¬/40,0¬/EXERCISE TH REVIEW OPTION. <I>T WAS \
|  67 DT  25,0¬/2,25¬/40,0¬/DESIGNED WITH YOU %%%%___  IN MIND.\
|  68 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|  69 DE  0¬/32\
|  70 N   XP¬/4¬/0¬/9¬/<RELAX>\
|  71 N   XP¬/4¬/9¬/2¬/<AND ENJOY>\
```

```
SEG1
|    72 FN   XP¬/4¬/20¬/0¬/<THE COURSE>\
|    73 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|    74 DE   0¬/32\
|    75 DE   0¬/32\
GLOSS
|     1 DE   0¬/32\
|     2 CM   DRWMGK¬/0¬,0\
|    13 NO   COPY¬/DRWMGK-2¬,DRWMGK-13¬,SDRAW-5\
|    14 CM   DRWMGK¬/0¬,0\
|    27 FN   XP¬/2¬/16¬/4¬/<GLOSSARY OF TERMS >\
|    28 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|    29 DE   0¬/32\
|    30 DTI  8,0¬/2,8¬/40,0¬/<C>OMPOSITE <F>ALSE <C>OLOR%%%%%%%%%%%%%%%
|            - REFERS TO THE \
|            %%%
|    31 DTI  11,0¬/2,11¬/40,0¬/COLOR PRODUCED ON <L>ANDSAT MAPS COMPOSED \
|    32 DTI  14,0¬/2,14¬/40,0¬/OF DATA DERIVED FROM DIFFERENT SATELLITE\
|    33 DTI  17,0¬/2,17¬/40,0¬/SPECTRUM SCANS OF THE SAME AREA.\
|    34 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|    35 DE   0¬/32\
|    36 DTI  6,0¬/2,6¬/40,0¬/<E>LECTROMAGNETIC <S>PECTRUM%%%%%%%%%%%%%%%%
|            - REFERS TO THE\
|            %%%%%%%%
|    37 DTI  9,0¬/2,9¬/40,0¬/ORDERED ARRAY OF KNOWN ELECTROMAGNETIC \
|    38 DTI  12,0¬/2,12¬/40,0¬/RADIATIONS EXTENDING FROM THE SHORTEST \
|    39 DTI  15,0¬/2,15¬/40,0¬/COSMIC RAYS, %%%%%%%%%%%%%%%%%%%%%%%,THROUGH G
|            AMMA RAYS,<X>-RAYS, %%%%%%%%%%%%%%%%%%%%%%
|    40 DTI  18,0¬/2,18¬/40,0¬/ULTRAVIOLET RADIATION,VISIBLE RADIATION%%%%
|    41 DTI  21,0¬/2,21¬/40,0¬/INFRARED RADIATION,AND ALL OTHER WAVE %%%%%
|            %%%%%%%%%%%%%%%%%%%%%%%
|    42 DTI  24,0¬/2,24¬/40,0¬/LENGTHS OF RADIO ENERGY.\
|    43 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|    44 DE   0¬/32\
|    45 DT   0,0¬/2,0¬/40,0¬/<ERTS>-<E>ARTH <R>ESOURCES <T>ECHNOLOGY \
|    46 DT   2,0¬/2,2¬/40,0¬/<S>ATELLITE%%%%%%%%%%%%%%%  - FORMERLY THE
|            NAME OF <L>ANDSAT\
|    47 DT   4,0¬/2,4¬/40,0¬/SATELLITES.\
|    48 DT   7,0¬/2,7¬/40,0¬/<I>NFRA-RED <F>ALSE <C>OLOR%%%%%%%%%%%%%%%%
|            - REFERS TO THAT \
|            %%%
|    49 DT   10,0¬/2,10¬/40,0¬/PORTION OF THE SPECTRUM CORRESPONDING TO \
|    50 DT   13,0¬/2,13¬/40,0¬/INFRA-RED, AND USED TO DELINEATE \
|    51 DT   16,0¬/2,16¬/40,0¬/VEGETATION (GREEN) ON <L>ANDSAT MAPS.\
|    52 DTI  21,0¬/2,21¬/40,0¬/<L>ANDSAT%%%%%%%%  - REFERS TO <L>ANDS
|            AT SATELLITES \
|    53 DTI  24,0¬/2,24¬/40,0¬/SCANNING THE SURFACES OF THE EARTH FROM \
|    54 DTI  27,0¬/2,27¬/40,0¬/AN ALTITUDE OF APPROXIMATELY 929KM HIGH.\
|    55 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|    56 DE   0¬/32\
|    57 DT   0,0¬/2,0¬/40,0¬/<L>ANDSAT <M>AP%%%%%%%%%%%%%%%  - REFER
|            S TO A REPRESENTATION\
|    58 DT   3,0¬/2,3¬/40,0¬/OF THE LAND SURFACE OF THE EARTH \
|    59 DT   6,0¬/2,6¬/40,0¬/PRODUCED WITH THE AID OF A <L>ANDSAT \
```

GLOSS
60	DT	9.0¬/2.9¬/40.0¬/SATELLITE.\
61	DT	13.0¬/2.13¬/40.0¬/<"">ILLIMICRON%%%%%%%%%% - <A >F
		ORMER UNIT EQUAL TO \
62	DT	16.0¬/2.16¬/40.0¬/10 TO THE -9M; REDESIGNATED NANOMETER\
63	DT	19.0¬/2.19¬/40.0¬/UNDER THE '<I>NTERNATIONAL <S>YSTEM OF \
64	DT	22.0¬/2.22¬/40.0¬/<U>NITS'.\
65	EPI	30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
66	DE	0¬/32\
67	DT	0.0¬/2.0¬/40.0¬/<N>ON <V>ISIBLE <L>IGHT <S>PECTRUM%%%%%%%%%%% - REFERS TO \
		%%%%%%%%%%%%%%%%
68	DT	3.0¬/2.3¬/40.0¬/THAT PORTION OF THE LIGHT SPECTRUM NOT \
69	DT	6.0¬/2.6¬/40.0¬/VISIBLE TO THE HUMAN EYE.\
70	DT	10.0¬/2.10¬/40.0¬/<P>OLAR <O>RBIT - REFERS TO THE ORBIT OF A \
71	DT	13.0¬/2.13¬/40.0¬/SATELLITE WHERE THE PATH IS OVER THE \
72	DT	16.0¬/2.16¬/40.0¬/EARTH'S POLES.\
73	DTI	20.0¬/2.20¬/40.0¬/<R>ADIATION%%%%%%%% - <T>HE EMISS
		ION AND PROPAGATION\
74	DTI	23.0¬/2.23¬/40.0¬/OF ENERGY THROGH SPACE IN THE FORM OF \
75	DTI	26.0¬/2.26¬/40.0¬/WAVES. <T>HE PROCESS OF EMITTING RADIANT \
76	DTI	29.0¬/2.29¬/40.0¬/ENERGY.\
77	EPI	30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
78	DE	0¬/32\
79	DT	4.0¬/2.4¬/40.0¬/<R>EMOTE <S>ENSING %%%%%%%%%%%%%%% - MEANS SENSING THINGS \
80	DT	7.0¬/2.7¬/40.0¬/AT A DISTANCE; THAT IS, DETECTING AND \
81	DT	10.0¬/2.10¬/40.0¬/MEASURING SOME PROPERTY OF AN OBJECT \
82	DT	13.0¬/2.13¬/40.0¬/WITHOUT ACTUALLY COMING INTO CONTACT \
83	DT	16.0¬/2.16¬/40.0¬/WITH IT.\
84	DT	20.0¬/2.20¬/40.0¬/<V>ISIBLE <L>IGHT <S>PECTRUM%%%%%%%%%%%%%% - REFERS TO THAT \
		%%%%%%%%
85	DT	23.0¬/2.23¬/40.0¬/PORTION OF THE LIGHT SPECTRUM VISIBLE \
86	DT	26.0¬/2.26¬/40.0¬/TO THE HUMAN EYE.\
87	EPI	30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
88	DE	0¬/32\
89	FN	XP¬/3¬/16¬/2¬/<INTRODUCTION>\
90	EPI	30.39¬/2.30¬/1.39¬/¬1¬/ZZ\

SEG1A
1	DE	2¬/30\
2	DTI	0.0¬/2.0¬/40.0¬/<W>E SEE MOST OF THE OBJECTS ABOUT US \
3	DTI	3.0¬/2.3¬/40.0¬/BY REFLECTED LIGHT. <I>F WE TURN OFF \
4	DTI	6.0¬/2.6¬/40.0¬/THE LIGHTS, WE NO LONGER SEE ANYTHING;\
5	DTI	9.0¬/2.9¬/40.0¬/THERE ARE NO LIGHT RAYS FOR THE \
6	DTI	12.0¬/2.12¬/40.0¬/OBJECTS TO REFLECT.\
7	DTI	16.0¬/2.16¬/40.0¬/<A>N EYE IS LIKE A CAMERA. <E>ACH HAS A \
8	DTI	19.0¬/2.19¬/40.0¬/LENS; IN THE CASE OF THE EYE THE SCENE \
9	DTI	22.0¬/2.22¬/40.0¬/IS FOCUSED ON THE RETINA; IN THE CASE \
10	DTI	25.0¬/2.25¬/40.0¬/OF A CAMERA, IT IS FOCUSED ON A FILM.\
11	EPI	30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
12	DE	0¬/32\
13	DTI	4.0¬/2.4¬/40.0¬/<A>S YOU KNOW WE ARE USED TO SEEING THINGS\
14	DT	7.0¬/2.7¬/40.0¬/IN COLOR. <L>ETS HAVE A LOOK AT THE \
15	DT	10.0¬/2.10¬/40.0¬/<ELECTROMAGNETIC SPECTRUM >WHICH \

SEG1A
```
16 DTI  13.0¬/2.13¬/40.0¬/ILLUSTRATES THE COMPLETE RANGE OF \
17 DTI  18.0¬/2.16¬/40.0¬/LIGHT WAVES FROM VERY SHORT WAVE \
18 DTI  19.0¬/2.18¬/40.0¬/LENGTHS (<X>-RAYS) TO LONG WAVE LENGTHS \
19 DTI  22.0¬/2.22¬/40.0¬/(RADIO WAVES) TO FIND OUT IN FACT \
20 DT   25.0¬/2.25¬/40.0¬/HOW WE DO SEE. \
21 EPI  30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
```

SEG1B
```
 1 DE   0¬/32\
 2 DT   0.2¬/2.0¬/40.0¬/<W>HEN YOU EXAMINE THE 'ELECTROMAGNETIC \
 3 DT   3.0¬/2.3¬/40.0¬/SPECTRUM' ON THE NEXT SCREEN DISPLAY. \
 4 DT   6.0¬/2.6¬/40.0¬/PLEASE TAKE NOTE OF THE FOLLOWING \
 5 DT   9.0¬/2.9¬/40.0¬/INFORMATION: \
 6 DT   12.0¬/2.12¬/40.0¬/1. <T>HE HUMAN EYE CAN ONLY SEE A SMALL \
 7 DT   15.0¬/2.15¬/40.0¬/PART OF THE SPECTRUM. <M>ORE SPECIFIC-\
 8 DT   18.0¬/2.18¬/40.0¬/ALLY, BETWEEN .400 AND .700 MILLICRONS. \
 9 DT   21.0¬/2.21¬/40.0¬/2. <T>HE WAVE LENGTH BAND COLORS IN THIS \
10 DT   24.0¬/2.24¬/40.0¬/VISIBLE RANGE INCLUDE BLUE, GREEN \
11 DT   27.0¬/2.27¬/40.0¬/AND RED. <T>HE RANGE IS FROM ULTRAVIOLET \
12 DT   30.0¬/2.30¬/40.0¬/TO NEAR INFRA-RED.\
13 EPI  30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
14 DE   0¬/32\
15 DT   0.7¬/2.0¬/40.0¬/¬E¬L¬E¬C¬T¬R¬O¬M¬A¬G¬N¬E¬T¬I¬C ¬S¬P¬E¬C¬T¬R¬U
       ¬M\
16 DT   4.12¬/2.4¬/40.0¬/*
       PPP\                                                      P
17 DT   6.0¬/2.6¬/40.0¬/<X>-<RAYS ULTRA>-<VIOLET INFRARED MICROWAVE >
18 DL   8.0¬/40\
19 DT   11.7¬/2.11¬/40.0¬/¬B¬L¬U¬E\
20 DL   13.7¬/32\
21 DTI  15.7¬/2.15¬/40.0¬/¬B¬L¬U¬E\                .400MC .500MC .600MC .700MC\
22 DTI  15.15¬/2.15¬/25.15¬/<,¬G¬R¬E¬E¬N >\
23 DTI  15.22¬/2.15¬/18.22¬/<,¬R¬E¬D >\
24 DL   17.7¬/32\
25 DT   19.9¬/2.19¬/40.0¬/'¬V¬I¬S¬I¬B¬L¬E ¬S¬P¬E¬C¬T¬R¬U¬M'\
26 PRR  24.0¬/2.24¬/40.0¬/<N>OTE%%%%_____ - 1 <M>ILLIMICRON = 0.000000
       001METERS\
27 DT   27.0¬/2.27¬/40.0¬/                     =1 X 10 TO THE POWER OF -9 METERS||
       |||||||||\
29 EPI  30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
```

SEG1C
```
 1 DE   0¬/32\
 2 DTI  3.2¬/2.3¬/38.2¬/<A>S YOU CAN SEE, THE EYE (OUR SENSOR) \
 3 DTI  6.0¬/2.6¬/40.0¬/IS ONLY SENSITIVE TO A VERY SMALL \
 4 DTI  9.0¬/2.9¬/40.0¬/PART OF THE ¬E¬L¬E¬C¬T¬R¬O¬M¬A¬G¬N¬E¬T¬I¬C ¬S
       ¬P¬E¬C¬T¬R¬U¬M.                          <MAGNETIC SPECTRUM>.\
 5 DTI  13.0¬/2.13¬/38.2¬/<C>AMERAS ARE ALSO SENSORS WHICH OPERATE \
 6 DTI  16.0¬/2.16¬/40.0¬/IN THE VISIBLE REGION AND PRODUCE \
 7 DTI  19.0¬/2.19¬/40.0¬/A PERMANENT RECORD OF WHAT THE EYE \
 8 DTI  22.0¬/2.22¬/40.0¬/SEES.\
 9 EPI  30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
10 DE   0¬/32\
```

SEG1C
```
11 DTI 8.2-/2.8-/40.0-/<O>THER SENSORS HAVE BEEN DEVELOPED \
12 DTI 11.0-/2.11-/40.0-/WHICH CAN <SEE%%%>  ___  IN THOSE PARTS OF THE

13 DTI 14.0-/2.14-/40.0-/SPECTRUM WHICH LIE ABOVE (<I>NFRARED) \
14 DTI 17.0-/2.17-/40.0-/AND BELOW(ULTRAVIOLET) THE <VISIBLE%%%%%%>

15 DTI 20.0-/2.20-/40.0-/REGION. \
16 EPI 30.39-/2.30-/1.39-/-/1-/ZZ\
17 DE  0-/32\
18 DTI 0.2-/2.0-/40.0-/<T>HESE SENSORS HAVE BEEN PLACED \
19 DTI 3.0-/2.3-/40.0-/ABOARD SATELLITES THAT ARE ORBITING \
20 DTI 6.0-/2.6-/40.0-/THE EARTH TAKING PHOTOGRAPHS OF ITS \
21 DTI 9.0-/2.9-/40.0-/SURFACE. \
22 DTI 12.2-  . /40.0-/<T>HIS ART OF ACQUIRING INFORMATION \
23 DTI 15.0-  2.  -/40.0-/ABOUT MATERIAL OBJECTS FROM \
24 DTI 18.0-/2.18-/40.0-/MEASUREMENTS MADE AT A DISTANCE \
25 DTI 21.0-/2.21-/40.0-/WITHOUT ACTUALLY TOUCHING THE \
26 DTI 24.0-/2.24-/40.0-/OBJECTS IS KNOWN AS:
27 DTI 27.12-/2.27-/40.0-/-R-E-M-O-T-E -S-E-N-S-I-N-G \
28 EPI 30.39-/2.30-/1.39-/-/1-/ZZ\
```

SEGLD
```
 1 DE  0-/32\
 2 DT  0.0-/2.0-/40.0-/<W>HICH OF THE FOLLOWING ARE -N-O-T%%%   \
 3 DTI 3.0-/2.3-/40.0-/EXAMPLES OF <REMOTE SENSING>?\
 4 DTI 8.0-/2.8-/40.0-/A  <W>ATCHING A MOON LANDING ON <T V>.\
 5 DTI 12.0-/2.12-/40.0-/B  <L>ISTENING TO THE RADIO.\
 6 DTI 16.0-/2.16-/40.0-/C  <Y>OU FEEL THE FLOOR BENEATH YOUR FEET
 7 DTI 18.0-/2.18-/40.0-/   TO BE WET.\
 8 DTI 22.0-/2.22-/40.0-/-D  <W>ATCHING A HORSE RACE.\
 9 EPP -/SEGLD -OO9\
10 NX
11 DT  26.0-/2.26-/40.0-/<Y>OU TOOK TO LONG IN MAKING A RESPONSE.\
12 DT  28.0-/2.28-/40.0-/<R>EMOTE SENSING IMPLIES DISTANCE -F-R-O-M.

13 BR  RE\
14 WAP 2.8.40.0-/WO\
15 DTI 8.0-/2.8-/40.0-/\
16 WAP 2.12.40.0-/W1\
17 DTI 12.0-/2.12-/40.0-/\
18 CAP 2.16.40.0-/C2\
19 DTI 26.0-/2.26-/40.0-/<R>IGHT ON!\
20 WAP 2.22.40.0-/W3\
21 DTI 22.0-/2.22-/40.0-/\
22 UN  U4\
23 DTI 26.0-/2.26-/40.0-/<H>INT! <D>IRECT TOUCH IS NOT REMOTE SENSIN
        G\

24 BR  RE\
25 PR
26 PAE\
```

SEG2
```
 1 DE  0-/32\
 2 FN  XP-/4/10-/5-/<LANDSAT>\
```

SEG2

```
 3  EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
 4  DE   0¬/32\
 5  NO   COPY¬/DRWMTT-2¬,DRWMTT-35¬,SDRAW-8\
 6  CM   DRWMTT¬/0¬,0\
40  NO   EM\
41  EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
42  DE   0¬/32\
43  DT   0.16¬/2.0¬/40.0¬/<LANDSAT%%%%%>\
44  DT   5.2¬/2.5¬/40.0¬/<T>ODAY, THROUGH|THE SERVICES OF SPACE \
45  DT   8.0¬/2.8¬/40.0¬/TECHNOLOGY. MAPS OF THE EARTH'S SURFACE \
46  DT   11.0¬/2.11¬/40.0¬/ARE BEING MADE BY ORBITING SATELLITES. \
47  DTI  14.0¬/2.14¬/40.0¬/<T>HESE LAND SATELLITE(LANDSAT) MAPS WERE \
48  DT   17.0¬/2.17¬/40.0¬/PREVIOUSLY REFERRED TO AS <ERTS >MAPS \
49  DT   20.0¬/2.20¬/40.0¬/(<E>ARTH <R>ESOURCES <T>ECHNOLOGY <S>ATELLI
          TE).\
50  DT   24.2¬/2.24¬/40.0¬/<T>HE MAPS WERE FIRST OBTAINED WHEN \
51  DT   27.0¬/2.27¬/40.0¬/<L>ANDSAT-1 WAS LAUNCHED ON <J>ULY 23,1972.
52  EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
53  DE   0¬/32\
54  FN   XP¬/3¬/10¬/4¬/JULY 23 1972 \
55  EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
56  DE   0¬/32\
57  FN   XP¬/3¬/6¬/4¬/<GOT THAT>1\
58  FN   XP¬/3¬/18¬/4¬/<JULY >23 1972\
59  EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
```

SEG2A

```
 1  PRR  \
 2  DE   0¬/32\
 3  DT   0.2¬/2.0¬/40.0¬/<PLEASE ANSWER THE FOLLOWING QUESTIONS>\
 4  DTI  5.1¬/2.5¬/40.0¬/1. <O>N WHAT DATE WAS <L>ANDSAT-1 LAUNCHED?
             1. <O>N WHAT DATE WAS <L>ANDSAT-1 LAUNCHED?\
 5  DTI  7.4¬/2.7¬/40.0¬/((<S>PECIFY MONTH DAY AND YEAR)\
 6  LD   JULY 23.72 7¬/B1\
 7  EPI  10.4¬/2.10¬/36.4¬/600¬/99¬/SEG2A -007\
 8  NX   \
 9  DT   28.0¬/2.28¬/40.0¬/<S>LOWPOKE1 <I >HAVE IT TO YOU ¬T¬W¬I¬C¬E!!
          !\
10  BR   RE\
11  FN2  COD¬/1,1\
12  FN2  SQ¬/CG¬/((1.2.3)+(4.2¬3))\
13  DE   0¬/32\
14  NO   COPY¬/DRWMEU-2¬,DRWMEU-17¬,SDRAW-5\
15  CM   DRWMEU¬/0¬,0\
31  NO   EM\
32  FN   XP¬/4¬/26¬/8¬/<GREAT>\
33  EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
34  BR   SEG2B\
35  UN   U1\
36  DT   28.0¬/2.28¬/40.0¬/<H>INT1 <T>RY THE EARLY 1970'S. \
37  FN2  SQ¬/C2¬/((1+4).3)\
38  DT   28.0¬/2.28¬/40.0¬/<Y>ES! <J>ULY 23 1972\
39  UN   U3\
```

```
SEG2A
| 40 DE    0¬/32\
| 41 NO    COPY¬/DRW2CS-2¬,DRW2CS-39¬,SDRAW-1\
| 42 CM    DRW2CS¬/0¬,0\
| 68 NO    EM\
| 69 DTI   28.0¬/2,28¬/40,0¬/TYPE <J>ULY 23 1972\
| 70 DTI   30,39¬/2,30¬/40,0¬/¬:\
| 71 PAE   \
| 72 DT    30,39¬/2,30¬/40,0¬/\
| 73 BR.   PRO\

SEG2B
|  1 PRR   0¬/32\
|  2 DE    0¬/32\
|  3 DT    0,11¬/2,0¬/40,0¬/<SATELLITE SENSORSXXXXXXXXXXXXX>
|  4 DTI   6,0¬/2,6¬/40,0¬/<T>HERE ARE TWO SENSORS ON BOARD EACH \
|  5 DTI   9,0¬/2,9¬/40,0¬/SATELLITE WHICH TRANSMIT <C>ANADIAN \
|  6 DTI   12,0¬/2,12¬/40,0¬/IMAGE DATA TO SATELLITE RECEIVING \
|  7 DT    15,0¬/2,15¬/40,0¬/STATIONS AT <P>RINCE  >LBERTXXXXXXXXXXXX
|          <S>ASKATCHEWAN \                        . <N>EW
|  8 DTI   18,0¬/2,18¬/40,0¬/AND <S>HOE \<C>OVE%%%%%%
|          FOUNDLAND. \
|  9 EPI   30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 10 DE    0¬/32\
| 11 DTI   14,0¬/2,14¬/40,0¬/<T>HE <R>ETURN <B>EAM  IDECON(<RBV>) TAKE
|          S\
| 12 DTI   17,0¬/2,17¬/40,0¬/PHOTOGRAPHS OF THE EARTH IN THREE \
| 13 DTI   20,0¬/2,20¬/40,0¬/WAVE LENGTH BANDS CORRESPONDING \
| 14 DTI   23,0¬/2,23¬/40,0¬/TO THE COLORS <GREEN>,<RED >AND NEARXXXXX
|          %%%%%%%%%%%      %
| 15 DTI   26,0¬/2,26¬/40,0¬/<INFRARED%%%%%%%>      .%%%%%%%%%%
| 16 EPI   30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 17 DE    0¬/32\
| 18 DTI   8,2¬/2,8¬/40,0¬/<T>HE <M>ULTISPECTRAL <S>CANNER SWEEPS AN \
| 19 DT    11,0¬/2,11¬/40,0¬/AREA CONTINUOUSLY FROM SIDE TO SIDE \
| 20 DT    14,0¬/2,14¬/40,0¬/RECORDING EACH SCENE IN FOUR WAVE \
| 21 DT    17,0¬/2,17¬/40,0¬/LENGTH BANDS (4,5,6,AND 7)\
| 22 DT    20,0¬/2,20¬/40,0¬/SIMULTANEOUSLY.\
| 23 EPI   30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 24 DE    0¬/32\
| 25 DII   0,3¬/2,0¬/40,0¬/<T>HE IMAGES THAT ARE PRODUCED HAVE A \
| 26 DT    3,0¬/2,3¬/40,0¬/SCALE OF 1:1 MILLION.(1 CM. EQUALS \
| 27 DTI   6,0¬/2,6¬/40,0¬/10 <K>M. THEY CAN BE ENLARGED TO A SCALE \
| 28 DTI   9,0¬/2,9¬/40,0¬/OF 1:250,000)\
| 29 DTI   13,3¬/2,13¬/40,0¬/<T>HE <L>ANDSAT IMAGES COVER AN AREA OF \
| 30 DTI   16,0¬/2,16¬/40,0¬/OVER 34,225 SQUARE KM. AND CAN SHOW \
| 31 DT    19,0¬/2,19¬/40,0¬/FEATURES 30 METRES AND LARGER.\
| 32 EPI   30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 33 DE    0¬/32\
| 34 FN    XP¬/4¬/16¬/4¬/<SCALE>\
| 35 EPI   30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 36 DE    0¬/32\
| 37 FN    XP¬/3¬/4¬/4¬/<REMEMBER>\
```

SEG2B
38 DTI 12,0-/2,12-/40,0-/<T>HE IMAGES THAT ARE PRODUCED HAVE A \
39 DTI 15,0-/2,15-/40,0-/SCALE OF :-\
40 FN XP-/3-/20-/4-/L:LMILLION.\
41 EPI 30,39-/2,30-/1,39-/-1-/ZZ\
42 DE 0-/32\

SEG2C
1 PRR \
2 DE 0-/32\
3 DE 0-/32\
4 DTI 4,9-/2,4-/40,0-/<HOW DATA IS RECEIVED >\
5 DL 6,9-/20\
6 DTI 10,2-/2,10-/40,0-/<E>ACH SATELLITE CONVERTS THE \
7 DTI 13,0-/2,13-/40,0-/PHOTOGRAPHIC IMAGES TO RADIO SIGNALS \
8 DTI 16,0-/2,16-/40,0-/WHICH ARE SENT TO THE GROUND \
9 DTI 19,0-/2,19-/40,0-/RECEIVING STATIONS WHERE COMPUTERS \
10 DTI 22,0-/2,22-/40,0-/RECONSTRUCT THE IMAGES FROM THE RADIO \
11 DTI 25,0-/2,25-/40,0-/SIGNAL TO PRODUCE BLACK AND WHITE \
12 DTI 28,0-/2,28-/40,0-/OR COMPOSITE FALSE COLOR IMAGES.\
13 EPI 30,39-/2,30-/1,39-/-1-/ZZ\

SEG2D
1 PRR \
2 DE 0-/32\
3 DTI 3,4-/2,3-/40,0-/<THE PASS QUICK LOOK SYSTEM>\
4 DL 5,4-/26\
5 DTI 10,0-/2,10-/40,0-/<T>HE '<P>ASS <Q>UICK <L>OOK <S>YSTEM' WAS\
6 DTI 13,0-/2,13-/40,0-/DESIGNED TO ENABLE STATION PERSONNEL \
7 DTI 16,0-/2,16-/40,0-/TO CHECK ON THE QUALITY OF THE DATA%%%%%%%%%%
   %%%%
8 DTI 19,0-/2,19-/40,0-/BEING RECEIVED, AND TO MAKE ANY \
9 DTI 22,0-/2,22-/40,0-/CORRECTIONS THAT MIGHT PROVE \
10 DTI 25,0-/2,25-/40,0-/NECESSARY. \
11 EPI 30,39-/2,30-/1,39-/-1-/ZZ\

SEG2H
1 DE 0-/32\
2 DTI 4,7-/2,4-/40,0-/<INTEGRATED SATELLITE >\
3 DTI 6,5-/2,6-/40,0-/<INFORMATIONS SERVICES LTD >\
4 DL 8,5-/25\
5 DTI 12,0-/2,12-/40,0-/<I>NFORMATION FROM SATELLITES IS \
6 DTI 15,0-/2,15-/40,0-/RECORDED ON 28 TRACK TAPE WHICH IS \
7 DTI 18,0-/2,18-/40,0-/THEN FED INTO A FORMATTER WHICH \
8 DTI 21,0-/2,21-/40,0-/PREPARES THE DATA. \
9 EPI 30,39-/2,30-/1,39-/-1-/ZZ\

SEG2F
1 PRR \
2 DE 0-/32\
3 DTI 2,2-/2,2-/40,0-/<T>HE FORMATTER OPERATES A 70MM CAMERA \
4 DTI 5,0-/2,5-/40,0-/WHICH TAKES A COMPLETE PICTURE OF \
5 DTI 8,0-/2,8-/40,0-/AN AREA 185KM <X >185KM SQ. OFF THE \
6 DTI 11,0-/2,11-/40,0-/<C R T>. <T>HE MASTER NEGATIVES ARE THEN \
7 DTI 14,0-/2,14-/40,0-/DISTRIBUTED DAILY AS A SET OF \
8 DT 17,0-/2,17-/40,0-/<MICROFICHE%%%%%%%%%%%> WHICH CAN
   BE OBTAINED \
9 DTI 20,0-/2,20-/40,0-/FROM <ISIS L>TD. IN <P>RINCE <A>LBERT. \

```
SEG2F
      10 DTI  23,0¬/2,23¬/40,0¬/<S>ASKATCHEWAN, ON A SUBSCRIPTION BASIS. \
      11 EPI  30,39¬/2,30¬/1,39¬/¬1¬/ZZ\

<L>ISTA
       1 PRR  \
       2 DE   0¬/32\
       3 DT   6,8¬/2,6¬/40,0¬/<THE EROS DATA CENTER >\
       4 DL   8,8¬/20\
       5 DT   12,3¬/2,12¬/40,0¬/<W>ORLD WIDE IMAGES AND TECHNICAL%%%%%%%%%
              %%%%%%%%%%%%%%%%%%%%
       6 DT   15,0¬/2,15¬/40,0¬/INFORMATION PERTAINING TO THESE IMAGES \
       7 DTI  18,0¬/2,18¬/40,0¬/CAN BE OBTAINED FROM THE <E>ROS <D>ATA \
       8 DTI  21,0¬/2,21¬/40,0¬/<C>ENTER LOCATED AT <S>IOUX <F>ALLS, <S>OUT
              H\
       9 DTI  24,0¬/2,24¬/40,0¬/<D>AKOTA. \
      10 EPI  30,39¬/2,30¬/1,39¬/¬1¬/ZZ\

<H>IGHL
       1 PR   \
       2 DE   0¬/32\
       3 DT   0,8¬/2,0¬/40,0¬/<SERVICE AGENCY HIGHLIGHTS >\
       4 QT   4,0¬/2,4¬/40,0¬/1. <P>ASS <Q>UICK <L>OOK <S>YSTEM - CHECKS O
              N\
       5 DT   7,5¬/2,7¬/40,0¬/THE QUALITY OF DATA RECEIVED.\
       6 DT   10,0¬/2,10¬/40,0¬/2. <ISIS L>TD - <D>ISTRIBUTES A SET \
       7 DT   13,5¬/2,13¬/40,0¬/MICROFICHE DAILY.\
       8 DT   16,0¬/2,16¬/40,0¬/3. <EROS D>ATA <C>ENTER - <P>ROVIDES WORLD
       9 DT   19,5¬/2,19¬/40,0¬/WIDE IMAGES AND TECHNICAL INFORMATION \
      10 DT   22,5¬/2,22¬/40,0¬/ON WORLD WIDE IMAGES. \
      11 EPI  30,39¬/2,30¬/1,39¬/¬1¬/ZZ\

BRANCH
       1 PRR  \
       2 DE   0¬/32\
       3 DT   0,0¬/2,0¬/40,0¬/<H>I <T>HERE!!! <J>UST THOUGHT <I >WOULD OFFE
              R \
       4 DT   2,0¬/2,2¬/40,0¬/YOU SOME ENCOURAGEMENT. \
       5 DTI  6,0¬/2,6¬/40,0¬/<I >HAVE A COUPLE OF OPTIONS FOR YOU TO \
       6 DTI  8,0¬/2,8¬/40,0¬/THINK ABOUT. <P>LEASE INDICATE YOUR \
       7 DTI  10,0¬/2,10¬/40,0¬/CHOICE WITH THE LIGHT PEN.\
       8 DT   16,3¬/2,16¬/40,0¬/A <R>EVIEW THE SEGMENT JUST COMPLETED.\
       9 DT   24,3¬/2,24¬/40,0¬/B <C>ONTINUE ON TO THE NEXT SEGMENT\
      10 EPP  ¬/BRANCH-01\
      11 NX   \
      12 DT   28,0¬/2,28¬/40,0¬/<P>OINT TO ONE OF THE CHOICES.\
      13 CAP  4,16,40,0¬/CO\
      14 BR   SEG2B\
      15 CAP  4,24,40,0¬/C1\
      16 BR   QUIZ1\
      17 UN   U2\
      18 DT   28,0¬/2,28¬/40,0¬/<P>OINT TO ONE OF THE CHOICES.\

QUIZ1
       1 PRR  \
       2 DE   0¬/32\
       3 DT   0,0¬/2,0¬/40,0¬/<USE THE LIGHT PEN TO INDICATE WHETHER >\
```

```
QUIZ1

 4 DT    2.0¬/2.2¬/40.0¬/<THE STATEMENTS THAT FOLLOW ARE TRUE OR>\
 5 DT    4.0¬/2.4¬/40.0¬/<FALSE>.\
 6 DT    9:2¬/2.9¬/40.0¬/1.  <R>ADIO SIGNALS FROM SATELLITES CAN BE\
 7 DT    11.2¬/2.11¬/40.0¬/CONVERTED INTO BOTH BLACK & WHITE OR \
 8 DT    13.2¬/2.13¬/40.0¬/COMPOSITE FALSE COLOR IMAGES.\
 9 DT    16.2¬/2.16¬/40.0¬/¬T\
10 DT    22.2¬/2.22¬/40.0¬/¬F\
11 EPP   ¬/QUIZ1 -01\
12 NX
13 DT    26.0¬/2.26¬/40.0¬/<Y>OUR TAKING TOO LONG!\
14 DT    28.2¬/2.28¬/40.0¬/<T>RY AGAIN.\
15 BR    RE\
16 CAP   4,16,3,0¬/CO\
17 DTI   28.0¬/2.28¬/40.0¬/<B>INGO!  <Y>OU HIT THE JACKPOT\
18 PAE
19 WAP   4,22,3,0¬/W1\
20 DT    28.0¬/2.28¬/40.0¬/<B>LACK & <W>HITE IMAGES ARE MADE FIRST.\
21 UN    U2\
22 DT    28.1¬/2.28¬/40.0¬/<P>LEASE POINT TO ¬T OR ¬F\
23 PAE
24 BR    RE\
25 PRR
26 DE    0¬/32\
27 DT    9.2¬/2.9¬/40.0¬/2.  <C>ANADA HAS ONLY ONE SATELLITE \
28 DT    11.2¬/2.11¬/40.0¬/RECEIVING STATION.\
29 DT    16.2¬/2.16¬/40.0¬/¬T\
30 DT    22.2¬/2.22¬/40.0¬/¬F\
31 EPP   ¬/QUIZ1 -03\
32 NX
33 DT    26.0¬/2.26¬/40.0¬/<T>OO LONG IN ANSWERING.\
34 DT    28.0¬/2.28¬/40.0¬/<H>ERE WE GO AGAIN!\
35 BR    RE\
36 CAP   2,22,3,0¬/CO\
37 DT    28.1¬/2.28¬/40.0¬/<Y>ES!!  <T>HERE ARE TWO STATIONS.\
38 PAE
39 WAP   4,16,3,0¬/W1\
40 DT    28.1¬/2.28¬/40.0¬/<N>O!  <T>HERE ARE TWO STATIONS.\
41 UN    U2\
42 DT    28.1¬/2.28¬/40.0¬/<P>LEASE POINT TO ¬T OR ¬F\
43 BR    RE\
44 EPI   30.39¬/2.30¬/1,39¬/¬/1¬/ZZ\
45 PRR
46 DE    0¬/32\
47 DT    9.2¬/2.9¬/40.0¬/3.   <U>SERS CAN OBTAIN MICROFICHE FROM \
48 DT    11.6¬/2.11¬/40.0¬/<ISIS L>TD. ON A SUBSCRIPTION BASIS.\
49 DT    16.2¬/2.16¬/40.0¬/¬T\
50 DT    22.2¬/2.22¬/40.0¬/¬F\
51 EPP   ¬/QUIZ1 -05\
52 NX
53 DT    26.0¬/2.26¬/40.0¬/<F>ASTER PLEASE !\
54 DT    28.0¬/2.28¬/40.0¬/<A>ROUND WE GO AGAIN.\
55 BR    RE\
56 CAP   4.16,3,0¬/CO\
```

QUIZ1
```
57 DTI  26.0¬/4.26¬/40.0¬/<Y>OU'RE CORRECT!\
58 WAP  4.22.3.0¬/W1\
59 DT   26.0¬/2.26¬/40.0¬/<H>INT! <N>EGATIVES ARE PRODUCED DAILY.\
60 UN   U2\
61 DTI  26.5¬/4.26¬/40.0¬/<Y>OUR MAKING ME ANXIOUS <T>RY AGAIN!\
62 BR   RE\
63 PRR  \
64 EPI  30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
65 PRR  \
66 DE   0¬/32\
67 DTI  9.0¬/2.9¬/40.0¬/<T>HE <PASS QUICK LOOK SYSTEM >IS DESIGNED\
68 DTI  11.0¬/2.11¬/40.0¬/TO CHECK ON THE QUALITY OF DATA RECEIVED.\
69 DTI  16.0¬/2.16¬/40.0¬/¬T\
70 DTI  22.0¬/2.22¬/40.0¬/¬F\
71 EPP  ¬/QUIZ1 -071\
72 NX   \
73 DT   26.0¬/2.26¬/40.0¬/<C>LUE! IMAGE QUALITY IS IMPORTANT.\
74 DT   28.0¬/2.28¬/40.0¬/<T>RY AGAIN.\
75 BR   RE\
76 CAP  4.16.3.0¬/CO\
77 DT   28.0¬/2.28¬/40.0¬/<Y>ES! <C>ORRECTIONS CAN BE MADE IMMEDIATEL
          Y\
78 WAP  4.22.3.0¬/W1\
79 DTI  28.0¬/4.28¬/40.0¬/<Y>OU NEED SOME SYSTEM OF QUALITY CONTROL.\
80 UN   U2\
81 DTI  28.0¬/4.28¬/40.0¬/<Y>OU'RE MAKING ME DIZZY!\
82 BR   RE\
83 PRR  \
84 EPI  30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
```

SEG3
```
1 PRR  \
2 DE   0¬/32\
3 DTI  0.0¬/2.0¬/40.0¬/<GENERAL CHARACTERISTICS OF WAVE BANDS >\
4 DL   2.1¬/37\
5 DTI  6.3¬/2.6¬/40.0¬/<W>E SAID EARLIER, THAT EACH SCENE IS\
6 DTI  9.0¬/2.9¬/40.0¬/RECORDED BY A MULTISPECTRAL SCANNER IN\
7 DTI  12.0¬/2.12¬/40.0¬/FOUR WAVE BANDS, <'B>ANDS 4,5,6 + 7<'>.\
8 DTI  15.3¬/2.15¬/40.0¬/<T>HE NEXT SCREEN DISPLAY WILL GIVE YOU\
9 DTI  18.0¬/2.18¬/40.0¬/A BRIEF DESCRIPTION OF USEFUL FEATURES\
10 DTI 21.0¬/2.21¬/40.0¬/PERCULIAR TO EACH WAVE LENGTH <BAND%%%%>
11 DTI 25.1¬/2.25¬/40.0¬/S¬O ¬P¬L¬E¬A¬S¬E ¬P¬A¬Y ¬A¬T¬T¬E¬N¬T¬I¬O¬N
12 EPI 30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
```

SEG3A
```
1 PRR  \
2 DE   0¬/32\
3 DTI  3.2¬/2.3¬/40.0¬/<I>N THE SECTION THAT FOLLOWS, WE WILL \
4 DTI  6.0¬/2.6¬/40.0¬/EXAMINE 4 DIFFERENT WAVE LENGTH <BANDS%%%%>_
5 DTI  9.0¬/2.9¬/40.0¬/AND THE CHARACTERISTICS THATS ARE \
6 DTI  12.0¬/2.12¬/40.0¬/IMPORTANT FOR EACH BAND. \
7 DTI  15.2¬/2.15¬/40.0¬/<I>T IS EXTREMELY IMPORTANT THAT YOU \
```

SEG3A

```
 8 DTI  18.0¬/2.18¬/40.0¬/PAY 'CLOSE ATTENTION' TO THE USE%%%        \
 9 DTI  21.0¬/2.21¬/40.0¬/DESCRIBED FOR EACH OF THE <B>ANDS, AS      \
10 DTI  24.0¬/2.24¬/40.0¬/THIS KNOWLEDGE WILL HELP YOU INTERPRET     \
11 DTI  27.0¬/2.27¬/40.0¬/<L>ANDSAT IMAGES IN A SUBSEQUENT SECTION.  \
12 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
13 DE   0¬/32\
14 DT   10.0¬/2.10¬/40.0¬/<PLEASE FEEL FREE TO TAKE NOTES ON >\
15 DT   13.0¬/2.13¬/40.0¬/<THIS SEGMENT AND ANY OTHER THAT >\
16 DTI  16.0¬/2.16¬/40.0¬/<FOLLOWS>.                       \
17 NO   COPY¬/DRWMGK-2¬,DRWMGK-13¬,SDRAW-5\
18 CM   DRWMGK¬/0¬,0\
30 NO   EM\
31 EPI  30.39¬/2.30¬/1,39¬/¬1¬/ZZ\
```

SEG3B

```
 1 PRR  \0¬/32\
 2 DE   0¬/32\
 3 DTI  2.0¬/2.2¬/40.0¬/¬B¬A¬N¬D ¬4 - <R>ECORDING THE BLUE/GREEN     \
 4 DTI  4.0¬/2.4¬/40.0¬/PORTION OF THE VISIBLE SPECTRUM LYING        \
 5 DT   6.0¬/2.6¬/40.0¬/BETWEEN .500 AND .600 MILLIMICRONS IN        \
 6 DT   8.0¬/2.8¬/40.0¬/WAVE LENGTH. <B>AND 4 IS USEFUL FOR          \
 7 DT   10.0¬/2.10¬/40.0¬/DETECTING CULTURAL FEATURES, VEGETATION\
 8 DT   12.0¬/2.12¬/40.0¬/CLASSIFICATIONS, GEOLOGICAL CLASSIF-\
 9 DT   14.0¬/2.14¬/40.0¬/ICATIONS, AND DETECTION OF TURBIDITY\
10 DT   16.0¬/2.16¬/40.0¬/IN WATER.                                  \
11 DT   19.0¬/2.19¬/40.0¬/¬B¬A¬N¬D ¬5 - <R>ECORDING IN THE RED PORTIO
        N OF\
12 DT   21.0¬/2.21¬/40.0¬/THE VISIBLE SPECTRUM LYING BETWEEN         \
13 DT   23.0¬/2.23¬/40.0¬/.600 AND, .700 MILLIMICRONS IN WAVE-\
14 DT   25.0¬/2.25¬/40.0¬/LENGTH. <B>AND 5 IS MOST USEFUL IN         \
15 DT   27.0¬/2.27¬/40.0¬/DISCRIMINATING VEGETATION TYPES AND THE    \
16 DT   29.0¬/2.29¬/40.0¬/DETECTION OF SOME CULTURAL FEATURES.       \
17 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
18 PRR  \0¬/32\
19 DE   0¬/32\
20 DT   0.0¬/2.0¬/40.0¬/¬B¬A¬N¬D ¬6 - <R>ECORDING IN THE NEAR INFRA-RE
        D \
21 DT   2.0¬/2.2¬/40.0¬/PORTION OF THE SPECTRUM JUST BEYOND          \
22 DT   4.0¬/2.4¬/40.0¬/VISIBLE LYING BETWEEN .700 AND .800          \
23 DT   6.0¬/2.6¬/40.0¬/MILLIMICRONS IN WAVE LENGTH. <B>AND 6        \
24 DT   8.0¬/2.8¬/40.0¬/IS MOST USEFUL FOR ITS WATER CHARACTER-\
25 DT   10.0¬/2.10¬/40.0¬/ISTICS. <A>S WATER.ABSORBS INFRA-RED       \
26 DT   12.0¬/2.12¬/40.0¬/RADIATION, THERE WILL BE LITTLE, IF ANY    \
27 DT   14.0¬/2.14¬/40.0¬/INFRA-RED REFLECTION FROM THE WATER        \
28 DT   16.0¬/2.16¬/40.0¬/AND SO WATER AREAS WILL BE SHOWN AS        \
29 DT   18.0¬/2.18¬/40.0¬/BLACK. <I>N ADDITION, THE INFRA-RED        \
30 DT   20.0¬/2.20¬/40.0¬/REFLECTANCE FROM VEGETATION IS ALSO\
31 DT   22.0¬/2.22¬/40.0¬/BEING RECORDED. <T>HIS VEGETATION          \
32 DT   24.0¬/2.24¬/40.0¬/REFLECTANCE IS MOST USEFUL FOR DETECTING\
33 DT   26.0¬/2.26¬/40.0¬/CONIFER (LOW REFLECTANCE) AND DECIDUOUS    \
34 DT   28.0¬/2.28¬/40.0¬/(HIGH REFLECTANCE) FOREST AREAS.           \
35 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
36 PRR  \0¬/32\
37 DE   0¬/32\
```

```
SEG3B
   38 DT   0.0¬/2.0¬/40.0¬/¬B¬A¬N¬D ¬7  <R>ECORDING IN THE MODERATE/NEAR
   39 DT   2.0¬/2.2¬/40.0¬/INFRA-RED PORTION OF THE SPECTRUM WELL \
   40 DT   4.0¬/2.4¬/40.0¬/BEYOND THE VISIBLE RANGE, LYING BETWEEN \
   41 DT   6.0¬/2.6¬/40.0¬/.800 AND 1.00 MILLIMICRONS IN WAVE-\
   42 DT   8.0¬/2.8¬/40.0¬/LENGTH.       <B>AND 7 RETAINS THE WATER \
   43 DT   10.0¬/2.10¬/40.0¬/DETECTION CHARACTERISTIC BUT IN ADDITION\
   44 DT   12.0¬/2.12¬/40.0¬/ALSO PICKS UP THE LOW REFLECTANCE OF \
   45 DT   14.0¬/2.14¬/40.0¬/WET SOILS, SLOUGHS, MARSH AND MUSKEG.\
   46 DT   16.0¬/2.16¬/40.0¬/<B>Y COMPARING <B>AND 6 TO <B>AND 7, OPEN \
   47 DT   18.0¬/2.18¬/40.0¬/WATER BODIES MAY BE DISCRIMINATED FROM \
   48 DT   20.0¬/2.20¬/40.0¬/THE WET SOIL CONDITIONS.  <I>N ADDITION, \
   49 DT   22.0¬/2.24¬/40.0¬/<B>AND 7 PROVIDES MAXIMUM INFRA-RED \
   50 DT   24.0¬/2.24¬/40.0¬/REFLECTANCE FROM VEGETATION, WHICH IS \
   51 DT   26.0¬/2.26¬/40.0¬/USEFUL FOR DETECTING THE EXTENTS OF \
   52 DT   28.0¬/2.28¬/40.0¬/BLIGHTS AND INSECT INFESTATIONS IN \
   53 DT   30.0¬/2.30¬/40.0¬/CROPS AND FORESTS. \
   54 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
   55 DE   0¬/32\
   56 FN   XP¬/2¬/00¬/8¬/<HIGHTLIGHTS>\
   57 FN   XP¬/2¬/07¬/17¬/<OF>\
   58 FN   XP¬/2¬/16¬/4¬/<WAVE LENGTH BAND>\
   59 FN   XP¬/2¬/26¬/4¬/<CHARACTERISTICS>\
   60 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
   61 DE   0¬/32\
   62 DT   0.5¬/2.0¬/40.0¬/<T>HERE ARE 4 SCANNING DEVICES ON THE \
   63 DT   3.0¬/2.3¬/40.0¬/SATELLITE.  <E>ACH ONE OF THEM IS \
   64 DT   6.0¬/2.6¬/40.0¬/SENSITIVE TO A DIFFERENT PORTION OF THE \
   65 DT   9.0¬/2.9¬/40.0¬/LIGHT SPECTRUM. <T>HE SENSORS PRODUCE \
   66 DT   12.0¬/2.12¬/40.0¬/WHAT ARE CALLED BAND 4, BAND 5, BAND 6.\
   67 DT   15.0¬/2.15¬/40.0¬/AND BAND 7 IMAGES.\
   68 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
   69 DE   0¬/32\
   70 DT   0.0¬/2,0¬/40.0¬/<B>AND 4 -  <C>HARACTERISTICS%%%%%%%%%%%%
           %%%%%%%%
   71 DT   2.0¬/2.2¬/40.0¬/<S>ENSITIVE TO THE BLUE GREEN PORTION OF \
   72 DT   5.0¬/2.5¬/40.0¬/THE LIGHT SPECTRUM AND CAN SHOW DEPTH\
   73 DT   8.0¬/2.8¬/40.0¬/AND OR TURBIDITY OF STANDING BODIES OF \
   74 DT   11.0¬/2.11¬/40.0¬/WATER AND CULTURAL FEATURES SUCH AS \
   75 DT   14.0¬/2.14¬/40.0¬/ROADS AND TOWNS.\
   76 DT   17.0¬/2.17¬/40.0¬/<B>AND 5 - <C>HARACTERISTICS%%%%%%%%%%%%%
           %%%%%%%%
   77 DT   20.0¬/2.20¬/40.0¬/<S>ENSITIVE TO THE RED PORTION OF THE \
   78 DT   23.0¬/2.23¬/40.0¬/LIGHT SPECTRUM AND SHOWS TOPOGRAPHICAL\
   79 DT   26.0¬/2.26¬/40.0¬/AND CULTURAL FEATURES SUCH AS DRAINAGE \
   80 DT   29.0¬/2.29¬/40.0¬/PATTERNS AND ALSO ROADS AND TOWNS.\
   81 EPI  30.39¬/2.30¬/1.39¬/¬1¬/ZZ\
   82 DE   0¬/32\
   83 DT   0.0¬/2.0¬/40.0¬/<B>AND 6 - <C>HARACTERISTICS%%%%%%%%%%%%%%
           %%%%%%%%
   84 DT   3.0¬/2.3¬/40.0¬/<S>ENSITIVE TO THE NEAR INFRA-RED PORTION \
   85 DT   6.0¬/2.6¬/40.0¬/OF THE SPECTRUM AND SHOWS TONAL \
   86 DT   9.0¬/2.9¬/40.0¬/CONTRASTS THAT REFLECT VARIOUS LAND USE \
```

```
SEG3B
87  DT   12.0¬/2.12¬/40.0¬/PRACTICES.\
88  DT   16.0¬/2.16¬/40.0¬/<C>HARACTERISTICSXXXXXXXXXXXXX%
                           XXXXXXXX\
89  DT   19.0¬/2.19¬/40.0¬/<S>ENSITIVE TO THE NEAR INFRA-RED PORTION\
90  DT   22.0¬/2.22¬/40.0¬/OF THE SPECTRUM SLIGHTLY HIGHER THAN\
91  DT   25.0¬/2.25¬/40.0¬/THE BAND 6, AND IS BEST FOR LAND AND \
92  DT   28.0¬/2.28¬/40.0¬/WATER DESCRIMINATION.\
93  EPI  30.39¬/2.30¬/1.39¬/1¬/ZZ\
94  DE   0¬/32\
95  DE   0¬/32\

SEG3C
1   PRR  \
2   DE   0¬/32\
3   DT   0.0¬/2,0¬/40.0¬/        <COMPOSITE FALSE COLOR >(<C>1)\
4   DL   2.5¬/24\
5   DTI  5.2¬/2.5¬/40.0¬/<P>AGES 2 AND 3 OF YOUR CURRICULUM KIT \
6   DTI  7.0¬/2.7¬/40.0¬/SHOW TWO SCENES OF <W>INNIPEG IN \
7   DTI  9.0¬/2.9¬/40.0¬/COMPOSITE FALSE COLOR.\
8   DTI  13.2¬/2.13¬/38.2¬/<I>NDIVIDUAL WAVE BAND IMAGES MAY BE \
9   DTI  15.0¬/2.15¬/40.0¬/COMBINED INTO A STACK-LIKE SANDWICH.\
10  DTI  17.0¬/2.17¬/40.0¬/<I>F EACH SEPARATE IMAGE IN THE STACK IS \
11  DTI  19.0¬/2.19¬/40.0¬/THEN COLOR CODED,(I.E. <B>AND 4 PRIN.D)
12  DTI  21.0¬/2.21¬/40.0¬/IN BLUE, <B>AND 5 PRINTED IN GREEN, AND\
13  DTI  23.0¬/2.23¬/40.0¬/<B>AND 7 PRINTED IN <R>ED). THE RESULT IS A

14  DTI  26.0¬/2.26¬/40.0¬/¬C¬O¬M¬P¬O¬S¬I¬T¬E ¬F¬A¬L¬S¬E ¬C¬O¬L¬O¬R ¬I
                          ¬M¬A¬G¬E.\
15  EPI  30.39¬/2.30¬/1.39¬/1¬/ZZ\
16  DE   0¬/32\
17  DT   16.3¬/2.16¬/40.0¬/<T>HIS COMPOSITE TYPE HAS BEEN USED \
18  DTI  19.0¬/2.19¬/40.0¬/TO ADVANTAGE IN AGRICULTURE,FORESTRY \
19  DTI  22.0¬/2.22¬/40.0¬/AND VEGETATION STRESS RELATED \
20  DTI  25.0¬/2.25¬/40.0¬/INVESTIGATIONS. \
21  EPI  30.39¬/2.30¬/1.39¬/1¬/ZZ\
22  PRR  \
23  DE   0¬/32\
24  DT   0.0¬/2,0¬/40.0¬/<H>OWDY <P>ARTNER!!! <I >NOTICED YOU'RE \
25  DT   2.0¬/2,2¬/40.0¬/MOVING RIGHT ALONG.\
26  DTI  7.0¬/2.7¬/40.0¬/<I >HAVE SOME MORE OPTIONS FOR YOU!\
27  DT   16.3¬/2.16¬/40.0¬/¬A <R>EVIEW THIS SEGMENT \
28  DT   24.3¬/2.24¬/40.0¬/¬B <I >WOULD LIKE TO CONTINUE ON!\
29  PRR  ¬/SEG3C -O3O\
30  EPP  ¬/SEG3C -O3O\
31  NX   \
32  DT   28.0¬/2.28¬/40.0¬/<P>OINT TO ONE OF THE CHOICES\
33  CAP  4.16,40.0¬/CO\
34  BR   SEG3\
35  CAP  4.24,40.0¬/C1\
36  BR   PR1\
37  DT   28.0¬/2.28¬/40.0¬/<P>OINT TO ONE OF THE CHOICES. \

QUIZ2
1   PRR  \
2   DE   0¬/32\
```

```
QUIZ2
—| 3 DT   0.0⌐/2.0⌐/40.0⌐/<P>LEASE ENTER THE APPROPRIATE WAVE LENGTH\
—| 4 DT   2.0⌐/2.2⌐/40.0⌐/<B>AND <N>UMBER BESIDE ITS ASSOCIATED USE.\
—| 5 DT   4.0⌐/2.4⌐/40.0⌐/<U>SE A NUMBER BETWEEN 4 AND 7 ⌐O⌐N⌐L⌐Y.\
—| 6 DT   8.0⌐/2.8⌐/40.0⌐/1.      <D>ETECTS LOW REFLECTANCE OF WET\
—| 7 DT   10.6⌐/2.10⌐/40.0⌐/SOILS, MARSH, AND THE EXTENT OF\
—| 8 DT   12.6⌐/2.12⌐/40.0⌐/BLIGHT AND INSECT INFESTATIONS\
—| 9 DT   14.6⌐/2.14⌐/40.0⌐/IN CROPS AND FORESTS.\
—| 10 DT  19.0⌐/2.19⌐/40.0⌐/2.     <U>SEFUL FOR ITS WATER CHARACTER-\
—| 11 DT  21.6⌐/2.21⌐/40.0⌐/ISTICS AND DECTECTION OF CONIFERS\
—| 12 DT  23.6⌐/2.23⌐/40.0⌐/AND DECIDUOUS FOREST AREAS.\
—| 13 LD  <B>AND 7 4 ⬛ 6⌐/B1\
—| 14 EPI 8.2⌐/2.8⌐/4.2⌐/600⌐/4⌐/QUIZ2 -O14\
—| 15 NX  \
—| 16 DT  28.0⌐/2.28⌐/40.0⌐/<E>VEN TURTLES ARE FASTER !!!\
—| 17 BR  RE\
—| 18 FN2 COD⌐/1.1\
—| 19 FN2 SQ⌐/CO⌐/('2)\
—| 20 DT  28.0⌐/2.28⌐/40.0⌐/<Y>OU'RE ON YOUR WAY!!!\
—| 21 FN2 SQ⌐/W1⌐/(3+4+5)\
—| 22 DT  28.0⌐/2.28⌐/40.0⌐/<H>INT! <L>OOK AT THE SPECTRUM'S HIGH END. \
—| 23 UN  U2\
—| 24 DT6 28.0⌐/2.28⌐/40.0⌐/<C>LUE! <B>ETWEEN .800-.1;100 MILLICRONS\
—| 25 UN  U3\
—| 26 DT  28.0⌐/2.28⌐/40.0⌐/<T>YPE 7\
—| 27 PRR \
—| 28 EPI 30,39⌐/2.30⌐/1,39⌐/⌐/1⌐/ZZ\
—| 29 LD  <B>AND 6 4 5 7⌐/B1\
—| 30 EPI 19.2⌐/2.19⌐/1,2⌐/600⌐/4⌐/QUIZ2 -O30\
—| 31 NX  \
—| 32 DT  28.0⌐/2.28⌐/40.0⌐/SLEEPY HEAD!!!\
—| 33 BR  RE\
—| 34 FN2 COD⌐/1.1\
—| 35 FN2 SQ⌐/CO⌐/('2)\
—| 36 DT  28.2⌐/2.28⌐/40.0⌐/<S>MASHING!!! <O>LD <C>HAP\
—| 37 FN2 SQ⌐/W1⌐/(3+4+5)\
—| 38 DT  28.2⌐/2.28⌐/40.0⌐/<C>LUE! <B>ETWEEN .700-.800 <M>ILLICRONS. \
—| 39 UN  U2\
—| 40 DTI 28.0⌐/2.28⌐/.700-.800 IS AT THE SPECTRUM'S HIGH END \
—| 41 UN  U3\
—| 42 DT  28.0⌐/2.28⌐/40.0⌐/<T>YPE 6\
—| 43 PRR \
—| 44 EPI 30.39⌐/2.30⌐/1,39⌐/⌐/1⌐/ZZ\

SEG3D
—| 1 PRR \
—| 2 DE  0⌐/32\
—| 3 DT  2.0⌐/2.2⌐/40.0⌐/<P>LEASE ENTER THE APPROPRIATE WAVE LENGTH>\
—| 4 DT  4.0⌐/2.4⌐/40.0⌐/<LENGTH BAND NUMBER BESIDE ITS ASSOCIATED>\
—| 5 DT  6.0⌐/2.6⌐/40.0⌐/<USE>.    <U>SE A ⌐O⌐N⌐E ⌐D⌐I⌐G⌐I⌐T NUMBER ONLY
—| 6 DT  9.0⌐/2.9⌐/40.0⌐/3.     <D>ESCRIMINATES VEGETATION TYPES. \
—| 7 DT  11.6⌐/2.11⌐/40.0⌐/AND IDENTIFYS CULTURAL FEATURES.\
—| 8 DT  16.6⌐/2.16⌐/40.0⌐/4.     <D>ETECTS CULTURAL FEATURES, VEGET-\
—| 9 DT  18.6⌐/2.18⌐/40.0⌐/ATION  CLASSIFICATIONS AND TURBID
```

SEG3D

10	DT	CLASSIFICATIONS AND TURBID WATER.\
		20,6¬/2,20¬/40.0¬/WATER.\
11	LD	<B>AND 5 4 6 7¬/B1\
12	EPI	9.3¬/2.9¬/1,3¬/600¬/4¬/SEG3D ¬012\
13	NX	
14	DT	28.0¬/2.28¬/40.0¬/<Y>OUR SLIPPING AWAY ON ME -- <T>RY AGAIN!\
15	BR	RE\
16	FN2	COD¬/1,1\
17	FN2	SQ¬/CO¬/(¬2)\
18	DT	28.0¬/2.28¬/40.0¬/<T>HAT MAKES YOU NUMERO UNO!!!\
19	FN2	SQ¬/W1¬/(3+4+5)\
20	DT	28.0¬/2.28¬/40.0¬/<C>LUE! <B>ETWEEN .600 AND .700 <M>ILLICRON
		S\
21	UN	U2\
22	DT	28.0¬/2.28¬/40.0¬/<C>LUE .600-.700 IS BELOW <B>AND 6\
23	UN	U3\
24	DT	28.0¬/2.28¬/40.0¬/<T>YPE 5\
25	PRR	\
26	LD	<B>AND 4 5 6 7¬/B1\
27	EPI	16.3¬/2.16¬/1,3¬/600¬/4¬/SEG3D -027\
28	NX	
29	DT	28.0¬/2.28¬/40.0¬/<Y>OU JUST PUT ME TO SLEEP\
30	FN2	COD¬/1,1\
31	FN2	SQ¬/CO¬/(¬2)\
32	DT	28.0¬/2.28¬/40.0¬/<I >AM BEGINNING TO LIKE YOU!\
33	FN2	SQ¬/W1¬/(3+4+5)\
34	DT	28.0¬/2.¬¬/40.0¬/<C>LUE! <B>ETWEEN .500-.600 MILLICRONS.\
35	UN	U2\
36	DT	28.0¬/2.28¬/40.0¬/<H>INT! .500-.600MC IS BELOW <B>AND 5\
37	UN	U3\
38	DT	28.0¬/2.28¬/40.0¬/TYPE 4\
39	BR	RE\

SEG4

1	PRR	\
2	DE	0¬/32\
3	DT	1.6¬/2.1¬/40.0¬/<INTERPRETATION TECHNIQUES >\
4	DL	3,6¬/25\
5	DT	6.1¬/2.6¬/40.0¬/<S>INCE YOU WILL BE WORKING WITH TWO \
6	DTI	9.1¬/2.9¬/40.0¬/COMPOSITE FALSE COLOR IMAGES, IT IS \
7	DTI	12.1¬/2.12¬/40.0¬/¬V¬E¬R¬Y ¬I¬M¬P¬O¬R¬T¬A¬N¬T YOU BECOME FAMI
		LIAR WITH\
8	DTI	15.1¬/2.15¬/40.0¬/COLORS PRODUCED BY COLOR 'INFRARED' \
9	DTI	18.1¬/2.18¬/40.0¬/FILM. <S>O PLEASE PAY ¬C¬L¬O¬S¬E ¬A¬T¬T¬E¬
		N¬T¬I¬O¬N \
10	DTI	21.1¬/2.21¬/40.0¬/TO THE CHART WHICH WILL BE DISPLAYED \
11	DTI	24.1¬/2.24¬/40.0¬/MOMENTARILY.\
12	EPI	30.39¬/2.30¬/1.39¬/¬1¬/2Z\
13	PRR	\
14	DE	0¬/32\
15	DT	0.1¬/2,0¬/40.0¬/<COLORS PRODUCED BY COLOR INFRARED FILM >\
16	DL	3,1¬/38\
17	DTI	5.0¬/2.5¬/40.0¬/<T>HE CHART INDICATES THE <NATURAL%%%%%>
		COLOR\
18	DTI	7.0¬/2.7¬/40.0¬/OF DIFFERENT VEGETATION AND ALSO THE \

SEG4
|— 19 DTI 9.0¬/2.9¬/40.0¬/<COLOR THIS SAME VEGETATION WOULD APPEAR\
|— 20 DT 11.0¬/2.11¬/40.0¬/IN <INFRARED FILM> %%%%%%%%%%%%%%%%|

|— 21 DTI 14.0¬/2.14¬/40.0¬/<T>HE COLORS YOU SEE NATURALLY WITH THE \
|— 22 DTI 16.0¬/2.16¬/40.0¬/VISIBLE ¬E¬Y¬E ARE SHOWN ON THE ¬L¬E¬F¬T SIDE\
|— 23 DTI 18.0¬/2.18¬/40.0¬/OF THE <V>EGETATION AND OTHER \
|— 24 DTI 20.0¬/2.20¬/40.0¬/SUBSTANCES. ¬C¬O¬L¬O¬R ¬I¬N¬F¬R¬A¬R¬E¬D A

|— 25 DT 22.0¬/2.22¬/40.0¬/ON THE ¬R¬I¬G¬H¬T SIDE OF THE SCREEN. \
|— 26 EPI 30.39¬/2.30¬/1,39¬/¬1¬/ZZ\

SEG4A
|— 1 PRR \
|— 2 DE   0¬/32\
|— 3 DT   0.14¬/2.0¬/40.0¬/¬V¬E¬G¬E¬T¬A¬T¬I¬O¬N
|— 4 DT   3.0¬/2.3¬/40.0¬/¬N¬A¬T¬U¬R¬A¬L ¬C¬O¬L¬O
                          ¬R\

|— 5 DT   5.0¬/2.5¬/40.0¬/¬C¬O¬L¬O¬R   ¬E¬X¬A¬M¬P¬L¬E¬S
                          ¬N¬F¬R¬A¬R¬E¬D\   ¬I

|— 6 DT   8.0¬/2.8¬/40.0¬/<B>RIGHT   <H>EALTHY DECIDUOUS   <B>RIGHT\
|— 7 DT 10.0¬/2.10¬/40.0¬/<G>REEN   TREES.   <R>ED\
|— 8 DT 13.9¬/2.13¬/40.0¬/<G>REEN GRASSES   <P>INK\
|— 9 DTI 16.9¬/2.16¬/40.0¬/<A>LGAE
|— 10 DT 19.0¬/2.19¬/40.0¬/<D>ULL/   <N>EEDLELEAF <T>REES   <M>AGEN
                          TA/
|— 11 DT 21.0¬/2.21¬/40.0¬/<G>REEN   <S>HRUBS. <S>TRESSED   <P>URPL
                          E\

|— 12 DTI 23.9¬/2.23¬/40.0¬/<V>EGETATION. \
|— 13 PRR \
|— 14 EPI 30.39¬/2.30¬/1,39¬/¬1¬/ZZ\
|— 15 DE   0¬/32\
|— 16 DT   0.14¬/2.0¬/40.0¬/¬V¬E¬G¬E¬T¬A¬T¬I¬O¬N\
|— 17 DT   3.0¬/2.3¬/40.0¬/¬N¬A¬T¬U¬R¬A¬L   ¬C¬O¬L¬O¬
                          R\

|— 18 DT   5.0¬/2.5¬/40.0¬/¬C¬O¬L¬O¬R   ¬E¬X¬A¬M¬P¬L¬E¬S   ¬I¬
                          N¬F¬R¬A¬R¬E¬D\
|— 19 DT 13.0¬/2.13¬/40.0¬/<RED   A>UTUMN FOLIAGE/   <GREEN>
|— 20 DT 15.0¬/2.15¬/40.0¬/   <L>OSS OF CHLOROPHYL   <YELLOW
                          >\
|— 21 DT 18.0¬/2.18¬/40.0¬/<WHITE   F>OREST <C>LEARING   <WHI
                          TE>\
|— 22 DTI 21.0¬/4.21¬/40.0¬/<YELLOW   W>HEAT   <WHITE
                          >WHEAT

|— 23 EPI 30.39¬/2.30¬/1,39¬/¬1¬/ZZ\
|— 24 PRR \
|— 25 DE   0¬/32\
|— 26 DT   0.14¬/2.0¬/40.0¬/¬V¬E¬G¬E¬T¬A¬T¬I¬O¬N\
|— 27 DT   3.0¬/2.3¬/40.0¬/¬N¬A¬T¬U¬R¬A¬L   ¬C¬O¬L¬O¬
                          R\

|— 28 DT   5.0¬/2.5¬/40.0¬/¬C¬O¬L¬O¬R   ¬E¬X¬A¬M¬P¬L¬E¬S   ¬I¬
                          N¬F¬R¬A¬R¬E¬D\
|— 29 DT   8.8¬/2.8¬/40.0¬/¬O¬T¬H¬E¬R ¬S¬U¬B¬S¬T¬A¬N¬C¬E¬S\
|— 30 DT 11.0¬/2.11¬/40.0¬/<RED   R>ED <S>OILS   <GREEN>/\

```
SEG4A
| 31 DT   13,0¬/2,13¬/40,0¬/                          <YELLOW>\
| 32 DT   21,0¬/2,21¬/40,0¬/<BLUE              <BLACK>\
| 33 DT   26,0¬/2,26¬/40,0¬/<BLACK     C>LEAR <W>ATER  <BLUE>/\
| 34 DT   28,30¬/2,28¬/40,0¬/<BLACK>    D>ARK BARE SOIL
| 35 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 36 DE   0¬/32\
| 37 DT   0,11¬/2,0¬/40,0¬/<CHANGE DETECTION>\
| 38 DL   2,11¬/16\
| 39 DTI  5,2¬/2,5¬/40,0¬/<V>ISUAL COMPARISON OF TWO SATELLITE \
| 40 DT   7,0¬/2,7¬/40,0¬/IMAGES OF THE <SAME%%%%> ____ AREA TAKEN 18 DA
|         YS
| 41 DT   9,0¬/2,9¬/40,0¬/APART, REVEALS MANY OF THE CHANGED \
| 42 DT   11,0¬/2,11¬/40,0¬/FEATURES IN A SCENE. <H>OWEVER, FINDING \
| 43 DT   13,0¬/2,13¬/40,0¬/ALL OF THE CHANGED AREAS CAN BE TIME \
| 44 DT   15,0¬/2,15¬/40,0¬/CONSUMING. \
| 45 DTI  18,2¬/2,18¬/40,0¬/<A >NEW TECHNIQUE KNOWN AS <CHANGE%%%%%>
|
| 46 DT   20,0¬/2,20¬/40,0¬/<DETECTION%%%%%%%%> _____ ENABLES THESE
|         CHANGES TO BE \
| 47 DT   22,0¬/2,22¬/40,0¬/RECOGNIZED WITHOUT THE VISIBLE IMAGE \
| 48 DT   24,0¬/2,24¬/40,0¬/BEING ACTUALLY CREATED.\
| 49 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 50 DE   0¬/32\
| 51 DT   6,2¬/2,6¬/40,0¬/<R>ECORDS OF THE SAME AREA FROM \
| 52 DTI  9,0¬/2,9¬/40,0¬/DIFFERENT PASSES OF THE SAME SATELLITE \
| 53 DTI  12,0¬/2,12¬/40,0¬/MAY BE COMPARED AUTOMATICALLY, AND \
| 54 DTI  15,0¬/2,15¬/40,0¬/ONLY THE DIFFERENCES BETWEEN THE TWO \
| 55 DTI  18,0¬/2,18¬/40,0¬/WILL BE PRESENTED. \
| 56 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 57 PRR
| 58 DE   0¬/32\

<H>IGH2
| 1 PR    \
| 2 DE    0¬/32\
| 3 DT    0,9¬/2,0¬/40,0¬/<SOME MORE HIGHLIGHTS.>\
| 4 DT    4,0¬/2,4¬/40,0¬/<O>N COMPOSITE FALSE COLOR IMAGES LIKE \
| 5 DT    7,0¬/2,7¬/40,0¬/THOSE INCLUDED IN YOUR CURRICULUM KIT.\
| 6 DT    10,0¬/2,10¬/40,0¬/THE BLUISH-BLACK PORTIONS OF THE IMAGE\
| 7 DT    13,0¬/2,13¬/40,0¬/ARE WATER.\
| 8 DT    16,0¬/2,16¬/40,0¬/<T>HE BLACK SHOWN ON THIS IMAGE INDICATES \
| 9 DT    19,0¬/2,19¬/40,0¬/THE WATER IS CLEAR.\
| 10 DT   22,3¬/2,22¬/40,0¬/<T>HE BLUE INDICATES PARTICLES IN THE \
| 11 DT   25,0¬/2,25¬/40,0¬/WATER WHICH CAN RANGE FROM SEDIMENTATION\
| 12 DT   28,0¬/2,28¬/40,0¬/TO FORMS OF WATER POLLUTION.\
| 13 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
| 14 DE   0¬/32\
| 15 DT   0,0¬/2,0¬/40,0¬/<H>ELLO!!! <Y>OU HAVE JUST FINISHED THE \
| 16 DTI  3,0¬/2,3¬/40,0¬/SEGMENT ON INTERPRETATION TECHNIQUES.\
| 17 DTI  6,0¬/2,6¬/40,0¬/<H>OW ABOUT SOME MORE OPTIONS?
|         ? ?\
| 18 DT   16,3¬/2,16¬/40,0¬/<A    <R>EVIEW THE SEGMENT JUST COMPLETED. \
| 19 DT   24,3¬/2,24¬/40,0¬/<B    <C>ONTINUE ON WITH THE NEXT SEGMENT\
| 20 PRR  \
```

```
<H>IGH2
|   21 EPP  ¬/SEG4A -065\
|   22 NX
|   23 DT   28.0¬/2.28¬/40.0.C¬/<P>OINT TO ONE OF THE CHOICES\
|   24 CAP  4,16,40.0¬/CO
|   25 BR   SEG4\
|   26 CAP  4.24,40.0¬/C1\
|   27 BR   QUIZ3\
|   28 UN   U2\
|   29 DT   28.0¬/2.28¬/40.0¬/<P>OINT TO ONE OF THE CHOICES1\

QUIZ3
|    1 PRR  \
|    2 DE   0¬/32\
|    3 DT   0.0¬/2.0.0¬/40.0¬/<POINT TO THE ¬L¬E¬T¬T¬E¬R WHICH BEST ANSWERS
|                  >\
|    4 DT   2.0¬/2.2¬/40.0¬/ <THE QUESTION>.\
|    5 DT   5.2¬/2.5¬/40.0¬/1. <O>N A COMPOSITE FALSE COLOR IMAGE \
|    6 DTI  7,6¬/2,7¬/40.0¬/CLEAR WATER IS SHOWN AS:\
|    7 DT   12.2¬/2,12¬/40.0¬/¬A.  <B>LUE\
|    8 DT   15.2¬/2,15¬/40.0¬/¬B.  <B>LACK\
|    9 DT   18.2¬/2,18¬/40.0¬/¬C.  <G>REEN\
|   10 EPP  ¬/QUIZ3 -O10\
|   11 NX   \
|   12 DT   28.0¬/2.28¬/40.0¬/<T>RY AGAIN!!!\
|   13 BR   RE\
|   14 WAP  2,12,40.0¬/WO\
|   15 DT   28.0¬/2.28¬/40.0¬/EHI <B>LUE IS THE 'NATURAL' COLOR\
|   16 DT   12.0¬/2,12¬/40.0¬/\
|   17 WAP  2,18,40.0¬/W1\
|   18 DT   28.0¬/2.28¬/40.0¬/<N>OPEI THAT IS NOT CORRECT\
|   19 DT   18.0¬/2.18¬/40.0¬/\
|   20 CAP  2,15,40.0¬/C2\
|   21 DT   28.0¬/2.28¬/40.0¬/<G>REAT START!!!\
|   22 UN   U3\
|   23 DT   28.0¬/2.28¬/40.0¬/<C>ONCENTRATE.\
|   24 BR   RE\
|   25 PRR  \
|   26 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
|   27 DE   0¬/32\
|   28 DT   5.2¬/2,5¬/40.0¬/2. <T>HE COLOR <RED >ON A COMPOSITE FALSE \
|   29 DT   7,2¬/2,7¬/40.0¬/COLOR IMAGE - INDICATES:\
|   30 DT   10.2¬/2,10¬/40.0¬/¬A.  <S>TRESSED VEGETATION\
|   31 DT   14.2¬/2,14¬/40.0¬/¬B.  <R>ED SOILS\
|   32 DT   18.2¬/2,18¬/40.0¬/¬C.  <H>EALTHY VEGETATION\
|   33 EPP  ¬/QUIZ3 -O33\
|   34 NX   \
|   35 DT   28.0¬/2.28¬/40.0¬/<U>SE THE LIGHT PEN AND TRY HARDER.\
|   36 BR   RE\
|   37 CAP  2,18,40.0¬/CO\
|   38 DT   28.0¬/2.28¬/40.0¬/<Y>ES! <I>T REPRESENTS HEALTHY VEGETATION.\
|   39 WAP  2,10,40.0¬/W1\
|   40 DT   28.0¬/2.28¬/40.0¬/<C>LUE! <L>OTS OF CHLOROPHYL!!!!\
|   41 DT   10.0¬/2,10¬/40.0¬/\
|   42 WAP  2,14,40.0¬/W2\
```

```
QUIZ3
    43 DT   28,0¬/2,28¬/40,0¬/<C>ONDITION OF PLANTS IN BIOLOGICAL GARDEND
    44 DT   14,0¬/2,14¬/40,0¬/\
    45 UN   U3\
    46 DT   28,0¬/2,28¬/40,0¬/<Y>OU'RE LOOKING AT A FALSE COLOR IMAGE\
    47 UN   U4\
    48 DT   28,0¬/2,28¬/40,0¬/<P>OINT TO ¬C\
    49 PRR
    50 EPI  30,39¬/2,30¬/1,39¬/¬1¬/ZZ\

SEG4B
     1 PRR
     2 DE   0¬/32\
     3 DT   1,4¬/2,1¬/40,0¬/<APPLICATIONS OF REMOTE SENSING>\
     4 DL   3,4¬/30\
     5 DTI  4,0¬/2,4¬/40,0¬/<F>IVE AREAS WHERE REMOTE SENSING IS BEING\
     6 DTI  6,0¬/2,6¬/40,0¬/APPLIED IN <C>ANADA ARE:\
     7 DT   8,2¬/2,8¬/40,0¬/1.   <A>GRICULTURE   4.  <H>YDROLOGY \
     8 DT   10,2¬/2,10¬/40,0¬/2.   <G>EOLOGY       5.  <M>ETEOROLOGY\
     9 DT   12,2¬/2,12¬/40,0¬/3.   <F>ORESTRY. \
    10 DT   17,0¬/2,17¬/40,0¬/<F>OR EXAMPLE, IN ¬F¬O¬R¬E¬S¬T¬R¬Y, <R>EMOT
            E \
    11 DT   19,0¬/2,19¬/40,0¬/<S>ENSING IS ABLE TO TELL FORESTERS \
    12 DT   21,0¬/2,21¬/40,0¬/ABOUT THE TYPE AND EXTENT OF DAMAGE \
    13 DT   23,0¬/2,23¬/40,0¬/TO TREES BEING DONE TO THEM BY DISEASE, \
    14 DT   25,0¬/2,25¬/40,0¬/AND BY POLLUTION.\
    15 EPI  30,39¬/2,30¬/1,39¬/¬1¬/ZZ\
    16 PRR

SEG4C
     1 DE   0¬/32\
     2 DT   0,0¬/2,0¬/40,0¬/<P>OINT TO THE WORD OR WORDS WHICH ARE \
     3 DT   2,0¬/2,2¬/40,0¬/APPLICATIONS OF <R>EMOTE <S>ENSING. \
     4 DT   6,0¬/2,6¬/40,0¬/A.   <A>GRICULTURE\
     5 DT   10,0¬/2,10¬/40,0¬/B.   <H>YDROLOGY\
     6 DT   14,0¬/2,14¬/40,0¬/C.   <G>EOLOGY\
     7 DT   20,0¬/2,20¬/40,0¬/D.   <F>ORESTRY\
     8 DT   24,0¬/2,24¬/49,0¬/E.   <A>LL OF THE ABOVE.\
     9 DT   27,0¬/2,27¬/40,0¬/F.   <N>ONE OF THE ABOVE.\
    10 EPP  ¬/SEG4C -010\
    11 NX
    12 DT   29,0¬/2,29¬/40,0¬/<P>LEASE <H>URRY!\
    13 DT   29,0¬/2,29¬/40,0¬/<T>RY AGAIN!\
    14 CAP  2,24,40,0¬/CO\
    15 DT   29,0¬/2,29¬/40,0¬/<T>HAT'S CORRECT ! <A>LL ARE APPLICATIONS.\
    16 WAP  2,6,40,0¬/W1\
    17 DT   29,0¬/2,29¬/40,0¬/<Y>ES - BUT THERE ARE OTHERS\
    18 WAP  2,10,40,0¬/W2\
    19 DT   29,0¬/2,29¬/40,0¬/<Y>ES - <B>UT THERE ARE SOME MORE\,
    20 WAP  2,14,40,0¬/W3\
    21 DT   29,0¬/2,29¬/40,0¬/<Y>ES - <B>UT THERE ARE OTHERS\
    22 WAP  2,20,40,0¬/W4\
    23 WAP  2,6,40,0¬/W5\
    24 CAP  2,22,40,0¬/C6\
    25 DT   29,0¬/2,29¬/40,0¬/<R>IGHT ON! THEY ARE ALL APPLICATIONS \
```

```
SEG4C
  ┤  26 WAP  2,24,40.0¬/W7\
  ┤  27 DT   29,0¬/2,29¬/40.0¬/<B>OO <H>ISS111 <T>O <Y>OU\
  ┤  28 UN   U8\
  ┤  29 DT   29,0¬/2,29¬/40.0¬/<Y, JUR GUESSING <T>RY<A>GAIN\
  ┤  30 NO   COPY¬/DRWMEV-2¬,DRWMEV-17¬,SDRAW-5\
  ┤  31 CM   DRWMEV¬/0¬,0\
  ┤  47 NO   EM\
  ┤  48 BR   RE\
  ┤  49 PRR  \
  ┤  50 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\

SEG5
  ┤   1 PRR  \
  ┤   2 DE   0¬/32\
  ┤   3 DT   4.0¬/2,4¬/40.0¬/<LANDSAT IMAGERY INTERPRETATION >\
  ┤   4 DT   7.0¬/2,7¬/40.0¬/<F>OR THIS SEGMENT, YOU WILL REQUIRE THE \
  ┤   5 DT   9.0¬/2,9¬/40.0¬/FOLLOWING ITEMS:\
  ┤   6 DT   13,4¬/2,13¬/40.0¬/1.  <C A I L>ANDSAT <C>URRICULUM <K>IT\
  ┤   7 DT   16,4¬/2,16¬/40.0¬/2.  <M>AGNIFYING GLASS\
  ┤   8 DT   19,4¬/2,19¬/40.0¬/3.  <P>ATIENCE\
  ┤   9 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
  ┤  10 DE   0¬/32\
  ┤  11 NO   COPY¬/DRWBCX-2¬,DRWBCX-23¬,SDRAW-6\
  ┤  12 CM   DRWBCX¬/0¬,0\
  ┤  34 NO   EM\
  ┤  35 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
  ┤  36 DE   0¬/32\
  ┤  37 DTI  3.2¬/2,3¬/40.0¬/<T>HE <C A I >CURRICULUM KIT CONTAINS THE \
  ┤  38 DT   5.0¬/2,5¬/40.0¬/FOLLOWING ITEMS:\
  ┤  39 DT   8,4¬/2,8¬/40.0¬/1.  <A >COMPOSITE FALSE COLOR IMAGE OF \
  ┤  40 DT   10,4¬/2,10¬/40.0¬/  <W>INNIPEG (<A>UGUST 1976)\
  ┤  41 DT   14,4¬/2,14¬/40.0¬/2.  <A >COMPOSITE FALSE COLOR IMAGE OF \
  ┤  42 DTI  16,8¬/2,16¬/40.0¬/<W>INNIPEG (<D>ECEMBER 1975).\
  ┤  43 DT   20,4¬/2,20¬/40.0¬/3.  <A >ROAD MAP OF <W>INNIPEG \
  ┤  44 DT   24,4¬/2,24¬/40.0¬/4.  <A >TRANSPARENT <G>RID\
  ┤  45 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
  ┤  46 DE   0¬/32\
  ┤  47 DTI  0.2¬/2,2¬/38,2¬/<W>OULD YOU PLEASE OPEN YOUR CURRICULUM \
  ┤  48 DTI  2.0¬/2,2¬/40.0¬/KIT TO PAGE TWO AND PLACE THE TRANS-\
  ┤  49 DT   4.0¬/2,4¬/40.0¬/PARENT <G>RID ON THE <W>INNIPEG (<A>UGUST)\
  ┤  50 DT   6.0¬/2,6¬/40.0¬/MAP.\
  ┤  51 DTI  9.2¬/2,9¬/38,2¬/<B>E SURE THAT THE <G>RID IS ALINED \
  ┤  52 DT   11.0¬/2,11¬/40.0¬/CORRECTLY.  <N>UMBER 1 SHOULD APPEAR IN \
  ┤  53 DT   13,0¬/2,13¬/40.0¬/THE UPPER LEFT HAND CORNER.\
  ┤  54 DTI  16.2¬/2,16¬/38,2¬/<L>ATER, YOU WILL BE ASKED TO MOVE THE \
  ┤  55 DT   18.0¬/2,18¬/40.0¬/GRID TO THE <W>INNIPEG (<D>ECEMBER) IMAGE \
  ┤  56 DT   20.0¬/2,20¬/40.0¬/FOLLOWING THE SAME PROCEDURE OUTLINED \
  ┤  57 DT   22.0¬/2,22¬/40.0¬/ABOVE.\
  ┤  58 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
  ┤  59 DE   0¬/32\
  ┤  60 DT   0.4¬/2,0¬/40.0¬/<LANDSAT IMAGERY INTERPRETATION >\
  ┤  61 DT   3.0¬/2,3¬/40.0¬/<Y>OU WILL BE ASKED A SERIES OF QUESTIONS\
  ┤  62 DT   5.0¬/2,5¬/40.0¬/TO WHICH YOU MAY RESPOND USING THE \
  ┤  63 DT   7.0¬/2,7¬/40.0¬/KEYBOARD OR LIGHTPEN RESPECTIVELY.\
```

```
SEG5
     64 DT   10,0¬/2,10¬/40,0¬/<P>LEASE PAY CLOSE ATTENTION TO WHAT IS \
     65 DT   12,0¬/2,12¬/40,0¬/BEING ASKED, AND THINK THROUGH YOUR \
     66 DT   14,0¬/2,14¬/40,0¬/ANSWER CAREFULLY BEFORE REPLYING.\
     67 DT   17,0¬/2,17¬/40,0¬/<S>HOULD YOU NEED ASSISTANCE, YOU WILL\
     68 DT   19,0¬/2,19¬/40,0¬/RECEIVE SOME REMEDIAL INSTRUCTION OR\
     69 DT   21,0¬/2,21¬/40,0¬/IF YOU ARE STILL BAFFLED, YOU CAN REFER \
     70 DT   23,0¬/2,23¬/40,0¬/TO THE <W>INNIPEG ROAD MAP. \
     71 EPI  30,39¬/2,39¬/1,39¬/¬/1¬/ZZ\
     72 DE   0¬/32\
     73 DTI  11,11¬/2,11¬/40,0¬/<BONNE CHANCE>!!!\
     74 DT   15,11¬/2,15¬/40,0¬/<GOOD LUCK>!!!\
     75 EPI  30,39¬/2,30¬/1,35¬/¬/1¬/ZZ\

QUIZ4
      1 PRR  \
      2 DE   0¬/32\
      3 DT   2,0¬/2,2¬/20,0¬/<L>ETS START WITH AN EASY QUESTION TO \
      4 DT   4,0¬/2,4¬/40,0¬/GET YOU ORIENTED.\

      5 DT   8,12¬/2,8¬/40,0¬/<QUESTION NO>. \
      6 DT   14,0¬/2,14¬/40,0¬/<T>HE CITY OF <W>INNIPEG IS LOCATED WITHIN \

      7 DT   16,0¬/2,16¬/40,0¬/WHAT GRID NUMBER ON THE IMAGE? \
      8 DT   19,0¬/2,19¬/40,0¬/<U>SE A ONE OR TWO DIGIT NUMBER ¬O¬L¬Y IN \

      9 DT   21,0¬/2,21¬/40,0¬/YOUR ANSWER. \
     10 LD   <G>RID.8 1 2 3 4 5 6 7 9 12 ¬/B1\
     11 EP   24,2¬/2,24¬/40,0¬/600¬/99¬/QUIZ4¬ -011\
     12 NX   \
     13 DE   0¬/32\
     14 NO   COPY¬/DRWATP-2¬,DRWATP-45¬,SDRAW-4\
     15 CM   DRWATP¬/0¬,0\
     53 NO   EM\
     54 DT   28,0¬/2,28¬/40,0¬/<C>OME ON! <I >SAID IT WAS EASY. \
     55 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
     56 BR   QUIZ4\
     57 FN2  COO¬/1,1\
     58 FN2  SQ¬/CO¬/(`2)\
     59 DT   28,0¬/2,28¬/40,0¬/<Y>OU'RE ON YOUR WAY!\
     60 FN2  SQ¬/W1¬/(3+4+5+6+7+8+9+10)\
     61 DT   28,0¬/2,28¬/40,0¬/<T>HE CITY HAS AN AQUA/BLUE COLOR. \
     G2 UN   U2\
     G3 DT   28,0¬/2,28¬/40,0¬/<S>CAN GRIDS G TO 10\
     G4 UN   U3\
     G5 DT   28,0¬/2,28¬/40,0¬/<T>YPE 8\
     G6 PRR  \
     G7 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\

QUIZ4A
      1 DE   0¬/32\
      2 DT   6,12¬/2,6¬/40,0¬/<QUESTION NO>. 2. \
      3 DT   12,0¬/2,12¬/40,0¬/<W>HAT DO THE STRAIGHT LINES ON THE ¬I¬M¬A¬
              G¬E \
      4 DT   14,0¬/2,14¬/40,0¬/COVERED BY <G>RIDS 1 AND 2 INDICATE?\
      5 LD   ROADS RAILWAYS RAILROADS HIGHWAYS ROAD RAILWAY BOUNDARIES¬/B1
```

```
                \
 6 EP    20.2¬/40.0¬/40.0¬/600¬/99¬/QUIZ4A-006\
 7 NX    \
 8 DT    28.0¬/2. ¬/40.0¬/<L>OOK CLOSELY AT <G>RID 2 \
 9 BR    RE\
10 FN2   COD¬/1.\
11 FN2   SQ¬/CO¬/(1+2+3+4+5+6)\
12 DT    28.0¬/2.28 10.0¬/<Y>ES ROADS AND RAILROADS .\
13 FN2 SQ¬/W1¬/(7 3) \
14 DT    28.0¬/2.28¬/40.0¬/<T>HINK ABOUT TRANSPORTATION\
15 UN U2\
16 DT    28.0¬/2.28 /40.0¬/<H>INT! <A >TRANSPORTATION CULTURAL FEATURE

17 UN    U3\
18 DT    28.0¬/2.2 /40.0¬/<T>YPE ROAD OR RAILROADS\
19 PRR   \
20 DE    0¬/32\
21 NO    COPY¬/DRWOBG-2¬,DRWOBG-19¬,SDRAW-1\
22 CM    DRWOBG¬/0¬,0\
40 NO    EM\
41 FN    XP¬/4¬/16¬/¬¬/<WOW>!\
42 EPI   30,39¬/2,30 1,39¬/¬/1¬/ZZ\
```

QUIZ4B
```
 1 DE    0¬/32\
 2 DE    0¬/32\
 3 DT    4,12¬/2,4¬/40.0¬/<QUESTION NO>. 3\
 4 DL    6,12¬/14\
 5 DT    10.0¬/2,10¬/40.0¬/<W>HAT DOES THE LARGE BLACK AREA IN \
 6 DT    12.0¬/2,12¬/40.0¬/<G>RID 3 INDICATE?\
 7 DTI   16.0¬/2,16¬/40.0¬/<P>LEASE USE A ¬O¬N¬E WORD ANSWER.\
 8 LD    WATER LAKE SWAMP LAKE <W>INNIPEG LAKE <M>ANITOBA¬/B1\
 9 EP    19,2¬/2,19¬/40.0¬/600¬/99¬/QUIZ4B-009\
10 NX    \
11 DT    28,0¬/2.28¬/40.0¬/<T>HINK IN TERMS OF COMPOSITE FALSE COLORS\
12 BR    RE\
13 FN2   COD¬/1,1\
14 FN2   SQ¬/CO¬/(1+2)\
15 DT    28,0¬/2.28¬/40.0¬/<G>REAT! <Y>OUR'RE DOING JUST FINE.\
16 FN2   SQ¬/W1¬/(3+4+5+6+7)\
17 DT    28,0¬/2.28¬/40.0¬/<H>AVE A PEAK AT THE ROAD MAP!\
18 UN    U2\
19 DT    28.0¬/2.28¬/40.0¬/<W>ATER APPEARS BLACK OR BLUE \
20 UN    U3\
21 DT    28.0¬/2.28¬/40.0¬/TYPE WATER\
22 PRR   \
23 DE    0¬/32\
24 NO    COPY¬/DRWAEL-2¬,DRWAEL-11¬,SDRAW-3\
25 NO    DRWAEL¬/0¬,0\
35 NO    EM\
36 EPI   30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

QUIZ4C
```
 1 DE    0¬/32\
 2 DT    10.12¬/2,10¬/40.0¬/<QUESTION NO>. 5\
 3 DL    12.12¬/14\
```

93

(OMEGA COO)   PAGE: 25

QUIZ4C

```
 4 DT   16.0¬/2,16¬/40.0¬/<W>HAT ARE THE LITTLE RECTANGLES AROUND\
 5 DT   18.0¬/2,18¬/40.0¬/THE CITY OF <W>INNIPEG?\
 6 DT   20.0¬/2,20¬/40.0¬/<P>LEASE USE A ¬O¬N¬E WORD ANSWER. \
 7 LD   FARM FIELD CROPS FARM LAND PLOTS¬/B1\
 8 EP   24.2¬/2,24¬/40.0¬/600¬/99¬/QUIZ4C-008\
 9 NX   \
10 DT   28.0¬/2,28¬/40.0¬/<T>HINK ABOUT WHERE PRODUCE IS GROWN. \
11 BR   RE\
12 FN2  COD¬/1,1\
13 FN2  SQ¬/CO¬/(1+2+3+(4.5))\
14 DT   28.0¬/2,28¬/40.0¬/<B>INGO1 <F>ARMLAND WITH ALL TYPES OF CROPS
15 FN2  SQ¬/W1¬/(6)\
16 DT   28.0¬/2,28¬/40.0¬/¬/<H>INT1 <C>ROPS ARE GROWN ON?\
17 UN   U2\
18 DT   28.0¬/2,28¬/40.0¬/<H>INT1 <W>HERE VEGETABLES ARE GROWN. \
19 UN   U3\
20 DT   28.0¬/2,28¬/40.0¬/<T>YPE FARMLAND\
21 PRR  \
22 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

QUIZ4D

```
 1 PRR  \
 2 DE   0¬/32\
 3 DT   6,12¬/2,6¬/40.0¬/<QUESTION NO>. 6\
 4 DL   8,12¬/14\
 5 DT   12.0¬/2,12¬/40.0¬/<W>HAT DOES THE REDNESS IN THE SOUTH ENDS \
 6 DT   14.0¬/2,14¬/40.0¬/OF <L>AKES <M>ANITOBA AND <W>INNIPEG \
 7 DT   16.0¬/2,16¬/40.0¬/INDICATE?\
 8 LD   MARSH MARSHES MARSHLAND-VEGETATION WEEDS SWAMP¬/B1\
 9 EP   20.2¬/2,20¬/40.0¬/600¬/99¬/QUIZ4D-009\
10 NX   \
11 DT   28.0¬/2,28¬/40.0¬/<L>OOK AT <G>RIDS 1 AND 3\
12 BR   RE\
13 FN2  COD¬/1,1\
14 FN2  SQ¬/CO¬/(1+2+3+4)\
15 DT   28.0¬/2,28¬/40.0¬/<Y>ES <M>ARSHES OR MARSHLAND\
16 FN2  SQ¬/W1¬/(4+5+6)\
17 DT   28.0¬/2,28¬/40.0¬/<H>INT1 <R>ED INDICATES A TYPE OF VEGETATIO
        N\
18 UN   U2\
19 DT   28.0¬/2,28¬/40.0¬/<Y>OU NORMALLY FIND THIS NEAR A LAKES END\
20 UN   U3\
21 DT   28.0¬/2,28¬/40.0¬/TYPE MARSHLAND\
22 PRR  \
23 DE   0¬/32\
24 NO   COPY¬/DRW2DG-2¬,DRW2DG-19¬,SDRAW-1\
25 CM   DRW2DG¬/0¬,0\
43 NO   EM\
44 FN   XP¬/2¬/16¬/3¬/<RIGHT ON TARGET>1\
45 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
46 DE   0¬/32\
```

QUIZ4E

```
 1 DE   0¬/32\
```

QUIZ4E

```
2 DT   8,14¬/2,8¬/40,0¬/<QUESTION NO>. 8\
3 DL   10,14¬/14\
4 DT   14,0¬/2,14¬/40,0¬/<W>HAT DO THE PATCHES OF WHITE ALONG \
5 DT   16,0¬/2,16¬/40,0¬/THE <W>INNIPEG <R>IVER INDICATE?\
6 LD   FOREST CLEARING CUT FOREST LUMBERING WOOD CUTTING CLEARED LAN
       D BARE SOIL NO CROP SUMER FALOW¬/B1\
7 EP   22,2¬/2,22¬/40,0¬/600¬/99¬/QUIZ4E-007\
8 NX
9 DT   28,0¬/2,28¬/40,0¬/<L>OOK AGAIN!\
10 FN2  COD¬/1,1\
11 FN2  SQ¬/CO¬/(1.2)+(3.4)+5(6.7)+(8.9)+(10.11))\
12 DT   28,0¬/2,28¬/40,0¬/<Y>ES! <E>VIDENCE OF FOREST CLEARING.\
13 FN2  SQ¬/W1¬/(12.13)+(14.15)\
14 DT   28,0¬/2,28¬/40,0¬/<H>OUSES ARE A BYPRODUCT OF THIS INDUSTRY!\
15 UN   U2\
16 DT   28,0¬/2,28¬/40,0¬/<H>OUSES ARE A BYPRODUCT OF THIS INDUSTRY!\
17 UN   U3\
18 DT   28,0¬/2,28¬/40,0¬/<T>YPE FOREST CLEARING \
19 PRR
20 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

QUIZ4F

```
1 DE   0¬/32\
2 DT   0,12¬/2,0¬/40,0¬/<QUESTION NO>. 9\
3 DL   2,12¬/14\
4 DT   6,0¬/2,6¬/40,0¬/<L>ANDLOTS ALONG THE <R>ED AND <A>SSINIBOINE
5 DT   8,0¬/2,8¬/40,0¬/<R>IVERS ARE LAID OUT IN PARALLEL \
6 DT   10,0¬/2,10¬/40,0¬/RECTANGLES FRONTING ON THE <R>IVERS. \
7 DT   18,2¬/2,18¬/40,0¬/¬T\
8 DT   23,2¬/2,23¬/40,0¬/¬F\
9 EPP  ¬/QUIZ4F-009\
10 NX
11 DT   28,0¬/2,28¬/40,0¬/<P>LEASE WORK FASTER\
12 DT   26,0¬/2,26¬/40,0¬/<T>RY AGAIN!\
13 BR   RE\
14 CAP  4,18.3,0¬/CO\
15 DTI  28,0¬/2,28¬/40,0¬/<Y>ES! <P>ARALLEL RECTANGLES.\
16 WAP  4,23.3,0¬/W1\
17 DT   28,0¬/2,28¬/40,0¬/<T>HINK OF THE SEIGNEURAL SYSTEM\
18 UN   U2\
19 DTI  28,0¬/2,28¬/40,0¬/<C>LUE! <F>RENCH LONG LOT SYSTEM!\
20 UN   U3\
21 DT   28,0¬/2,28¬/40,0¬/<P>OINT TO *¬T \
22 BR   RE\
23 PRR
24 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

QUIZ4G

```
1 DE   0¬/32\
2 DT   12,12¬/2,12¬/40,0¬/<QUESTION NO>. 10\
3 DL   14,12¬/14\
4 DT   16,0¬/2,16¬/40,0¬/<I>N <G>RID 7 YOU CAN SEE SOME BLACK \
5 DT   18,0¬/2,18¬/40,0¬/RECTANGLES. <W>HAT ARE THEY EVIDENCE OF?\
6 LD   FALLOW BARE SOIL NO CROPS SUMMER FALLOW¬/B1\
```

(OMEGA OOO)   PAGE: 27

QUIZ4G
| 7 EPI 24.2¬/2.24¬/40.0¬/600¬/99¬/QUIZ4G-007\
| 8 NX
| 9 DT 28.0¬/2.28¬/40.0¬/<Y>OU RAN OUT OF TIME\
| 10 FN2 COD¬/1.1\
| 11 FN2 SQ¬/CO¬/(1+(2.3)+(4.5)+(6.7))¬/B1\
| 12 DT 28.0¬/2.28¬/40.0¬/<Y>ESI BARE SOIL OR SUMMER FALLOW\
| 13 FN2 SQ¬/W1¬/(8+9)\
| 14 DT 28.0¬/2.28¬/40.0¬/<B>LACK RECTANGLES INDICATE NO CROPS\
| 15 UN U2\
| 16 DT 28.0¬/2.28¬/40.0¬/<B>LACK RECTANGLES%%%%%%%%%%%   %_ CA
NNDT INDICATE WATER.\
| 17 UN U3\
| 18 DT 28.0¬/2.28¬/40.0¬/<T>YPE BARE SOIL\
| 19 PRR
| 20 EPI 30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\

SEG6
| 1 PRR
| 2 DE 0¬/32\
| 3 DE 0¬/32\
| 4 DT 0.2¬/2.0¬/40.0¬/<N>OW THAT YOU HAVE HAD A CHANCE TO LOOK\
| 5 DT 2.0¬/2.2¬/40.0¬/AT THE <W>INNIPEG IMAGE, HERE ARE SOME\
| 6 DT 4.0¬/2.4¬/40.0¬/ADDITIONAL THINGS YOU CAN LOOK FOR.\
| 7 DTI 9.2¬/2.9¬/40.0¬/<A>S YOU CAN SEE, THE CITY IS ALMOST\
| 8 DTI 11.0¬/2.11¬/40.0¬/CENTERED AT THE RIVER JUNCTIONS. <T>HE\
| 9 DTI 13.0¬/2.13¬/40.0¬/COLORS IN THE FIELDS AROUND THE CITY\
| 10 DTI 15.0¬/2.15¬/40.0¬/INDICATE THE FOLLOWING:\
| 11 DT 19.2¬/2.19¬/40.0¬/<R>ED - <F>ULL STANDING CROPS. <G>REEN\
| 12 DT 21.2¬/2.21¬/40.0¬/CHLOROPHYL SHOWS AS RED IN THESE IMAGES.\
| 13 DT 23.2¬/2.23¬/40.0¬/<Y>ELLOW - INDICATES MATURED CROPS READY\
| 14 DT 25.2¬/2.25¬/40.0¬/FOR HARVESING, AND PALE RED INDICATES\
| 15 DT 27.2¬/2.27¬/40.0¬/THE HARVEST IS UNDER WAY.\
| 16 EPI 30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
| 17 DE 0¬/32\
| 18 DT 0.0¬/2.0¬/40.0¬/<W>HITE PATCHES THAT APPEAR LARGER THAN\
| 19 DT 2.0¬/2.2¬/40.0¬/OTHER FIELDS, APPROXIMATELY 1.6MM.\
| 20 DT 4.0¬/2.4¬/40.0¬/ARE THE SIZE OF A SECTION OF LAND.\
| 21 DT 6.0¬/2.6¬/40.0¬/AND ARE PASTURES.\
| 22 DT 9.0¬/2.9¬/40.0¬/<T>HE BLUISH - BLACK PORTIONS OF THE\
| 23 DT 11.0¬/2.11¬/40.0¬/IMAGE ARE WATER. <T>HE BLUE INDICATES\
| 24 DT 13.0¬/2.13¬/40.0¬/PARTICLES IN THE WATER WHICH CAN RANGE\
| 25 DT 15.0¬/2.15¬/40.0¬/FROM SEDIMENTATION TO FORMS OF WATER\
| 26 DT 17.0¬/2.17¬/40.0¬/POLLUTION.\
| 27 EPI 30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\

BRAN3
| 1 PRR
| 2 DE 0¬/32\
| 3 DT 0.0¬/2.0¬/40.0¬/<I>T TAKES A LITTLE PRACTICE BEFORE YOU\
| 4 DT 3.0¬/2.3¬/40.0¬/CAN READILY PICK OUT KEY FEATURES ON A\
| 5 DT 6.0¬/2.6¬/40.0¬/<L>ANDSAT IMAGE. <S>OMETIMES A LITTLE\
| 6 DT 9.0¬/2.9¬/40.0¬/IS NEEDED. <B>Y IDENTIFYING KEY FEATURES\
| 7 DT 12.0¬/2.12¬/40.0¬/ON EACH IMAGE THAT YOU CAN LOOK FOR, WE\
| 8 DT 16.0¬/2.16¬/40.0¬/HOPE IT MAKES THE TASK OF INTERPRET-\
| 9 DT 19.0¬/2.19¬/40.0¬/ATION EASIER. <I>N ORDER TO BRING THIS\

```
BRAN3
----- 10 DT   22.0¬/2,22¬/40.0¬/POINT HOME,HOW ABOUT ANOTHER OF OUR \
----- 11 DT   25.0¬/2,25¬/40.0¬/OPTIONS?\
----- 12 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
----- 13 DE   0¬/32\
----- 14 DT   4.0¬/2,4¬/40.0¬/<P>LEASE POINT TO YOUR CHOICE WITH THE \
----- 15 DT   7.0¬/2,7¬/40.0¬/LIGHTPEN.\
----- 16 DT   16.3¬/2,16¬/40.0¬/¬A <R>EPEAT THIS SECTION.\
----- 17 DT   24.3¬/2,24¬/40.0¬/¬B <I >WANT TO CONTINUE.\
----- 18 EPP  ¬/BRAN3 -018\
----- 19 NX   \
----- 20 DT   28.0¬/2,28¬/40.( /<P>OINT TO ONE OF THE CHOICES\
----- 21 CAP  4,16,40,0¬/CO\
----- 22 BR   SEG6\
----- 23 CAP  4,24,40,0¬/C1\
----- 24 BR   QUIZ5\
----- 25 UN   U2\
----- 26 DT   28.0¬/2,28¬/40.0¬/<P>OINT TO ONE OF THE CHOICES. \

QUIZ5
-----  1 DE   0¬/32\
-----  2 DT   0.0¬/2,0¬/40.0¬/<PLEASE PLACE THE TRANSPARENT GRID ON >\
-----  3 DT   2.0¬/2,2¬/40.0¬/<PAGE >3 (<THE WINNIPEG DECEMBER>) <MAP>\
-----  4 DT   4.0¬/2,4¬/40.0¬/<N>UMBER 1 SHOULD APPEAR IN THE TOP LEFT \
-----  5 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
-----  6 DE   0¬/32\
-----  7 DT   8.0¬/2,8¬/40.0¬/<W>HEN A MAJOR PORTION OF A <L>ANDSAT \
-----  8 DT   11.0¬/2,11¬/40.0¬/BAND 8 INFRA-RED FALSE COLOR IMAGE \
-----  9 DT   14.0¬/2,14¬/40.0¬/IS DEVOID OF GREEN VEGETATION, IT CAN \
----- 10 DT   17.0¬/2,17¬/40.0¬/HAVE A BLUISH TINGE. <I>T IS NOTICEABLE \
----- 11 DT   20.0¬/2,20¬/40.0¬/ON THIS WINTER IMAGE.\
----- 12 EPI  30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
----- 13 DE   0¬/32\
----- 14 DT   10.12¬/2,10¬/40.0¬/<QUESTION NO>. 1 \
----- 15 DL   12.12/14\
----- 16 DT   16.0¬/2,16¬/40.0¬/<I>N WHAT DIRECTIONS%%%%%%%%%%          AR
              E THE <G>LACIAL \
----- 17 DT   18.0¬/2,18¬/40.0¬/STRIATIONS(ICE SCRATCHES)ORIENTED?\
----- 18 LD   NORTH SOUTH N S NORTH TO SOUTH EAST WEST E W¬/B1\
----- 19 EP   23.2¬/2,23¬/40.0¬/600¬/99¬/QUIZ5 -019\
----- 20 NX   U5\
----- 21 DT   28.0¬/2,28¬/40.0¬/<L>OOK AT <G>RID 2 GOING SOUTH\
----- 22 BR   RE\
----- 23 FN2  COD¬/1,1\
----- 24 FN2  SQ¬/C3¬/((1.2)+(3.4)+(5.6.7))\
----- 25 DT   28.0¬/2,28¬/40.0¬/<Y>ES! THEY RUN IN A NORTH SOUTH DIRECTION\
----- 26 FN2  SQ¬/W4¬/(8+9)\
----- 27 DTI  28.0¬/2,28¬/40.0¬/<L>OOK CLOSELY!\
----- 28 UN   U5\
----- 29 DT   28.0¬/2,28¬/40.0¬/<T>RY ANOTHER DIRECTION!!!!\
----- 30 UN   U6\
----- 31 DT   28.0¬/2,28¬/40.0¬/TYPE NORTH SOUTH\
----- 32 PRR  \
----- 33 DE   0¬/32\
----- 34 NO   COPY¬/DRWOTX-2¬,DRWOTX-23¬,SDRAW-1\
```

QUIZ5
```
35 CM  DRWOTX¬/0¬,0\
57 NO  EM\
58 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
59 PRR \
```

QUIZ5A
```
 1 DE  0¬/32\
 2 DT  6,12¬/2,6¬/40,0¬/<QUESTION NO>. 2\
 3 DL  8,12¬/14\
 4 DT  11,0¬/2,11¬/40,0¬/<N>AME ONE <G>RID THAT SHOWS EVIDENCE OF \
 5 DT  13,0¬/2,13¬/40,0¬/OPEN WATER AND FROZEN WATER.\
 6 LD  <G>RID 3 1 2 4 5 6 7 8 9 13¬/B1\
 7 EP  18,2¬/2,18¬/40,0¬/600¬/99¬/QUIZ5A-007\
 8 NX  \
 9 DTI 28,0¬/2,28¬/40,0¬/SLOW POKE! <T>RY AND RESPOND FASTER!\
10 FN2 COD¬/1,1\
11 FN2 SQ¬/CO¬/('2)\
12 DT  28,0¬/2,28¬/40,0¬/<Y>ES! <L>AKE <W>INNIPEG HAS BOTH.\
13 FN2 SQ¬/W1¬/(3+4+5+6+7+8+9+10+11)\
14 DTI 28,0¬/2,28¬/40,0¬/<L>OOK CLOSELY AT THE TWO BIG LAKES.\
15 UN  U2\
16 DT  28,0¬/2,28¬/40,0¬/WATER APPEARS BLACK\
17 UN  U3\
18 DT  28,0¬/2,28¬/40,0¬/<T>YPE 3\
19 PRR \
20 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

QUIZ5B
```
 1 DE  0¬/32\
 2 DT  8,12¬/2,8¬/40,0¬/<QUESTION NO>. 3\
 3 DL  10,12¬/14\
 4 DT  13,0¬/2,13¬/40,0¬/<G>RIDS 5 10 AND 15 APPEAR PREDOMINATELY \
 5 DT  15,0¬/2,15¬/40,0¬/<RED->IN COLOR.  <W>HAT IS THIS EVIDENCE OF \
 6 LD  CONIFER CONIFEROUS DECIDUOUS TREE VEGETATION¬/B1\
 7 EP  24,2¬/2,24¬/40,0¬/600¬/99¬/QUIZ5B-007\
 8 NX  \
 9 DT  28,0¬/2,28¬/40,0¬/<H>URRAY PLEASE!\
10 BR  RE\
11 FN2 COD¬/1,1\
12 FN2 SQ¬/CO¬/(1+2+3+4+(2.4)+(3.4))\
13 DT  28,0¬/2,28¬/40,0¬/<E>XACTLY CONIFERS AND DECIDUOUS TREES.\
14 FN2 SQ¬/W1¬/(5)\
15 DTI 28,0¬/2,28¬/40,0¬/<I >AM LOOKING FOR A TYPE OF TREE\
16 UN  U2\
17 DT  28,0¬/2,28¬/40,0¬/<T>HERE ARE TWO MAIN TYPES OF TREES\
18 UN  U3\
19 DTI 28,0¬/2,28¬/40,0¬/<T>YPE CONIFERS\
20 PRR \
21 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

QUIZ5C
```
 1 DE  0¬/32\
 2 DT  4,12¬/2,4¬/40,0¬/<QUESTION NO>. 4\
 3 DL  6,12¬/14\
 4 DT  10,0¬/2,10¬/40,0¬/<T>HIS <L>ANDSAT INFRARED FALSE COLOR IMAGE
```

```
   5 DT    12.0¬/2.12¬/40.0¬/HAS A BLUISH TINGE BECAUSE IT IS \
   6 DT    14.0¬/2.14¬/40.0¬/PARTIALLY DEVOID OF VEGETATION. \
   7 DT    16.0¬/2.16¬/40.0¬/POINT TO ¬T OR ¬F \
   8 DTI   20.2¬/2.20¬/40.0¬/¬T\
   9 DT    24.2¬/2.24¬/40.0¬/¬F\
  10 EPP   ¬/QUIZ5C-O10\
  11 NX    \
  12 DTI   28.0¬/2.28¬/40.0¬/<Y>OU TIMED OUT\
  13 BR    RE\
  14 CAP   4.18.40.0¬/CO\
  15 DT    28.0¬/2.28¬/40.0¬/<Y>ESI <T>HERE IS ALMOST NO VEGETATION. \
  16 PAE   \
  17 WAP   24.2.40.0¬/W1\
  18 DT    28.0¬/2.28¬/40.0¬/<H>INTI <L>OOK FOR LOSS OF CHLOROPHYL. \
  19 UN    U2\
  20 DT    28.0¬/2.28¬/40.0¬/<P>OINT TO ¬T OR ¬F\
  21 EPI   30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\

SEG7
   1 DE    0¬/32\
   2 DT    0.2¬/2.0¬/40.0¬/<Y>OU PROBABLY HAVE NOTICED SIGNIFICANT \
   3 DTI   3.0¬/2.3¬/40.0¬/DIFFERENCES BETWEEN THE <W>INNIPEG \
   4 DTI   6.0¬/2.6¬/40.0¬/SUMMER AND WINTER IMAGES BEYOND WHAT \
   5 DTI   9.0¬/2.9¬/40.0¬/YOU HAVE BEEN QUIZZED ON. <I>F YOU HAVE, \
   6 DTI   12.0¬/2.12¬/40.0¬/YOU'RE ALREADY ON YOUR WAY·TO BECOMING\
   7 DTI   15.0¬/2.15¬/40.0¬/AN EXPERT IN <L>ANDSAT IMAGE INTERPRET-\
   8 DTI   18.0¬/2.18¬/40.0¬/ATION.\
   9 DTI   22.3¬/2.22¬/40.0¬/<H>ERE ARE SOME ADDITIONAL THINGS THAT \
  10 DT    25.0¬/2.25¬/40.0¬/YOU CAN EXAMINE ON THE <W>INNIPEG \
  11 DT    28.0¬/2.28¬/40.0¬/(<D>ECEMBER) IMAGE. \
  12 EPI   30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
  13 DE    0¬/32\
  14 DTI   6.2¬/2.6¬/40.0¬/1. <T>HE LAKE BED AND SHORES OF PLIEST-\
  15 DTI   9.0¬/2.9¬/40.0¬/OCENE AGE <L>AKE <A>GASSIZ IS NOTICEABLE. \
  16 DTI   12.0¬/2.12¬/40.0¬/<W>INNIPEG IS IN THE MIDDLE OF THIS \
  17 DTI   15.0¬/2.15¬/40.0¬/ANCIENT LAKE BED. \
  18 EPI   30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\
  19 PRR   \
  20 DE    0¬/32\
  21 DTI   0.0¬/2.0¬/40.0¬/2. <I>N THE SOUTH OF THE CITY OF <W>INNIPEG\
  22 DTI   3.3¬/2.3¬/37.3¬/THE DARK RED PATCHES ARE PARKLAND. \
  23 DTI   6.0¬/2.6¬/40.0¬/3. <G>LACIAL STRIATION IS VERY NOTICEABLE.. \
  24 DTI   9.0¬/2.9¬/40.0¬/4. <A >THIN SCRATCH-LIKE LINE RUNNING \
  25 DTI   12.3¬/2.12¬/37.3¬/FROM TOP TO BOTTOM NEAR THE CENTER OF \
  26 DTI   15.3¬/2.15¬/37.3¬/IMAGE IS A STATIC LINE. <S>TATIC LINES \
  27 DTI   18.2¬/2.18¬/38.2¬/ARE OCCASIONALLY PRODUCED IN THE \
  28 DTI   21.3¬/2.21¬/37.3¬/TRANSMISSION BETWEEN THE SATELLITE AND \
  29 DTI   24.3¬/2.24¬/37.3¬/THE RECEIVING STATION. \
  30 EPI   30.39¬/2.30¬/1.39¬/¬/1¬/ZZ\

BRAN4
   1 PRR   \
   2 DE    0¬/32\
   3 DT    0.0¬/2.0¬/40.0¬/<E>XAMINATION OF BOTH THE <W>INNIPEG \
   4 DT    3.0¬/2.3¬/40.0¬/SUMMER AND WINTER IMAGE,SHOULD HAVE \
```

```
BRAN4
----
  5 DT   6,0¬/2,6¬/40,0¬/BROUGHT HOME TO YOU THE FACT THAT \
  6 DT   9,0¬/2,9¬/40,0¬/MANY OF THE CHANGES THAT TAKE PLACE \
  7 DT   12,0¬/2,12¬/40,0¬/FROM SEASON TO SEASON CAN ACTUALLY BE \
  8 DT   16,0¬/2,16¬/40,0¬/DETECTED AND ALLOW FOR QUICK COMPARISON. \
  9 DT   20,0¬/2,20¬/40,0¬/A <I >WOULD LIKE TO REVIEW THIS SECTION. \

 10 DT   24,0¬/2,24¬/40,0¬/¬B  <P>UT THE NEXT SEGMENT ON THE SCREEN. \
 11 EPP  ¬/BRAN4 -O11\
 12 NX
 13 DT   28,0¬/2,28¬/40,0¬/<P>LEASE POINT TO ONE OF THE CHOICES. \
 14 CAP  4,20,40,0¬/CO\
 15 BR   SEG7\
 16 CAP  4,24,40,0¬/C1\
 17 BR   SEG8\
 18 UN   U2\
 19 DT   28,0¬/2,28¬/40,0¬/<P>OINT TO ONE OF THE CHOICES. \

SEG8
----
  1 PRR  ¬/32\
  2 DE   0¬/32\
  3 DT   0,3¬/2,0¬/40,0¬/<LANDSAT IMAGE ANALYSIS EQUIPMENT%%%%%%%%%%%%
         %%%%%%%%%%%%%%%%>

  4 DT   4,2¬/2,4¬/40,0¬/<T>O HELP YOU STRENGTHEN YOUR SKILLS IN \
  5 DT   7,0¬/2,7¬/40,0¬/<L>ANDSAT IMAGE INTERPRETATION, THE \
  6 DT   10,0¬/2,10¬/40,0¬/FOLLOWING IMAGE ANALYSIS EQUIPMENT IS \
  7 DT   13,0¬/2,13¬/40,0¬/AVAILABLE TO USERS ¬C¬O¬S¬T ¬F¬R¬E¬E AT THE \

  8 DT   16,0¬/2,16¬/40,0¬/<A>LBERTA <R>EMOTE <S>ENSING <C>ENTER, HERE \

  9 DT   19,0¬/2,19¬/40,0¬/IN <E>DMONTON. \
 10 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
 11 DE   0¬/32\
 12 DT   0,2¬/2,0¬/40,0¬/1. <T>RANSFERSCOPE - ENLARGES OR REDUCES \
 13 DT   3,3¬/2,3¬/40,0¬/IMAGES AND TRANSFERS DATA FROM IMAGE \
 14 DT   6,3¬/2,6¬/40,0¬/TO MAP, FROM MAP TO IMAGE, OR FROM \
 15 DT   9,3¬/2,9¬/40,0¬/IMAGE TO IMAGE. \
 16 DT   13,2¬/2,13¬/40,0¬/2. <L>ANDSAT <I>MAGERY <V>IEWER - <A >32<X

 17 DT   16,3¬/2,16¬/40,0¬/ENLARGMENT VIEWER TO ASSESS <L>ANDSAT \
 18 DT   19,3¬/2,19¬/40,0¬/IMAGERY FROM MICROFICHE RECEIVED FROM \
 19 DT   22,3¬/2,22¬/40,0¬/THE <P>RINCE <A>LBERT RECEIVING STATION. EP

 20 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\

SEG8A
----
  1 PRR  ¬/32\
  2 DE   0¬/32\
  3 DT   0,2¬/2,0¬/40,0¬/3. <M>ULTISPECTRAL <V>IEWER - <A >VIEWER/ \
  4 DT   3,3¬/2,3¬/40,0¬/PROJECTOR/RECORDER/TRACER WHICH \
  5 DT   6,3¬/2,6¬/40,0¬/FACILITIES THE INTERPRETATION AND \
  6 DT   9,3¬/2,9¬/40,0¬/COLOR PRINT REPRODUCTION OF MULTIBAND \
  7 DT   12,3¬/2,12¬/40,0¬/IMAGERY. \
  8 DT   16,2¬/2,16¬/40,0¬/4. <M>ICRODENSITOMETER - <A >32 COLOR \
  9 DT   19,3¬/2,19¬/40,0¬/DENSITY SLICER. <A >T V CAMERA POINTED \
 10 DT   22,3¬/2,22¬/40,0¬/AT THE VARIOUS GREY TONES AND BRIGHT- \
```

```
SEG8A
     11 DT    25.3¬/2.25¬/40.0¬/NESS LEVELS OF AN IMAGE ARE CONVERTED \
     12 DT    28.3¬/2,28¬/40,0¬/TO COLORS AND ARE DISPLAYED ON A <CRT>.\
     13 EPI   30.39¬/2,30¬/1,39¬/¬/1¬/ZZ\
     14 DE    0¬/32\
     15 DTI   0.0¬/2,0¬/40,0¬/5. <D>ATA <T>ERMINALS - <A>N ON¬LINE TERMINAL\

     16 DTI   3,1¬/2,3¬/40,0¬/LINKED TO THE <C>ANADA <C>ENTRE FOR <R>EMOTE\
     17 DTI   6,1¬/2,6¬/40,0¬/<S>ENSING IN <O>TTAWA WHICH ALLOWS USERS \
     18 DTI   9,1¬/2,9¬/40,0¬/AT ¬N¬0 ¬C¬0¬S¬T TO OBTAIN TECHNICAL \
     19 DTI   12,1¬/2,12¬/40,0¬/DOCUMENTS ON REMOTE SENSING AND DATA \
     20 DTI   15,1¬/2,15¬/40,0¬/ON SPECIFIC <L>ANDSAT SCENES. \
     21 EPI   30.39¬/?,30¬/1,39¬/¬/1\ZZ\
     22 DE    0¬/32\

BRAN5
      1 PRR   0¬/32\
      2 DE    0,0¬/2,0¬/40,0¬/<W>ELL THAT WAS CERTAINLY A BUNDLE OF \
      3 DT    3,0¬/2,3¬/40,0¬/TECHNICAL JARGON!! <H>OPE YOU \
      4 DT    6,0¬/2,6¬/40,0¬/REMEMBERED IT ALL.¬ <I >FORGOT!  <S>OCK IT TO ME AGAIN.\
      5 DT
      6 DT    16.3¬/2,16¬/40,0¬/¬N¬0
      7 DT    24.3¬/2.24¬/40.0¬/¬Y¬E¬S    <I >REMEMBER-<I >WOULD LIKE TO GO
                ON.\
      8 EPP   ¬/BRAN5 -008\
      9 NX    U2\
     10 DT    28.0¬/2,28¬/40,0¬/<P>OINT TO ONE OF THE CHOICES.\
     11 CAP   4,16,40,0¬/CO\
     12 BR    SEG8\
     13 CAP   4,24,40,0¬/C1\
     14 BR    QUIZ6\
     15 UN    U2\
     16 DT    28.0¬/2,28¬/40,0¬/<P>OINT TO ONE OF THE CHOICES.  \

QUIZ6
      1 PRR   0¬/32\
      2 DE    0,0¬/2,0¬/40,0¬/<W>HICH OF THE FOLLOWING ARE <E>XAMPLES OF\
      3 DTI   0.2¬/2,2¬/40,0¬/IMAGE ANALYSIS EQUIPMENT?\
      4 DTI   2.2¬/2,2¬/40,0¬/¬A <M>ICRODENSITOMETER\
      5 DT    8,2¬/2,8¬/40,0¬/¬A   <T>RANSFERSCOPE \
      6 DT    12.2¬/2,12¬/40,0¬/¬B   <M>ULTISPECTRAL VIEWER\
      7 DT    16.2¬/2,16¬/40,0¬/¬C   <L>ANDSAT IMAGE VIEWER\
      8 DT    20.2¬/2,20¬/40,0¬/¬D   <A>LL OF THE ABOVE\
      9 DT    24.2¬/2,24¬/40,0¬/¬E.  <N>ONE OF THE ABOVE\
     10 DT    28.2¬/2,28¬/40,0¬/¬F
     11 EPP   ¬/QUIZ6 -011\
     12 NX
     13 DTI   29.0¬/2,29¬/40,0¬/<Y>OU TOOK TOO LONG IN ANSWERING\
     14 DTI   31.0¬/2,31¬/40,0¬/<T>RY ONE MORE TIME\
     15 BR    RE\
     16 CAP   4,23,40,0¬/CO\
     17 DT    30.4¬/2,30¬/40,0¬/<C>ORRECT!\
     18 WAP   14.7,40.0¬/W1\
     19 DT    30.4¬/2,30¬/40,0¬/<Y>ES! BUT THAT'S ONLY ONE OF THEM\
```

QUIZ6
```
20 WAP  4,27,40.0¬/W2\
21 DT   30,4¬/2,30¬/40.0¬/<N>OI  <T>HAT'S NOT RIGHT.\
22 UN   U3\
23 DT   30,4¬/2,30¬/40.0¬/<P>OINT TO ONE OF THE CHOICES ON SCREEN.\
24 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
25 BR   SEG9\
26 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

SEG9
```
1  PRR  \
2  DE   0¬/32\
3  DTI  0.0¬/2,0¬/40.0¬/<THE CANADA CENTRE FOR REMOTE SENSING>\
4  DTI  4,2¬/2,4¬/38.2¬/<T>HE 'CCRS>' WAS ESTABLISHED IN 1972 TO\
5  DTI  6.0¬/2,6¬/40.0¬/FURTHER THE DEVELOPMENT AND USE OF \
6  DTI  8,0¬/2,8¬/40.0¬/<R>EMOTE <S>ENSING.\
7  DTI  10,2¬/2,10¬/38,2¬/<T>HE ACTIVITIES OF THE <CCRS >CAN BE \
8  DTI  12.0¬/2,12¬/40.0¬/DIVIDED INTO FOUR CATEGORIES:\
9  DT   17.0¬/2,17¬/40.0¬/1. <A>PPLICATIONS - UNDER WHICH NEW \
10 DT   19.3¬/2,19¬/40.0¬/USES FOR REMOTE SENSING ARE DEVELOPED.\
11 DT   23,0¬/2,23¬/40.0¬/2. <S>ATELLITE <O>PERATIONS - UNDER WHICH'\
12 DTI  25.3¬/2,25¬/40.0¬/SATELLITE DATA ARE RECEIVED,PROCESSED\
13 DT   27,3¬/2,27¬/37,3¬/AND DISTRIBUTED.\
14 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

SEG9A
```
1  PRR  \
2  DE   0¬/32\
3  DT   4,2¬/2,4¬/40.0¬/3. <R>ESEARCH AND <D>EVELOPMENT - UNDER \
4  DT   6.0¬/2,6¬/40.0¬/WHICH NEW DATA ANALYSIS METHODS \
5  DT   8,0¬/2,8¬/40.0¬/AND NEW SENSORS AND DATA ACQUISITION \
6  DT   10,0¬/2,10¬/40.0¬/SYSTEMS ARE DEVELOPED, AND \
7  DT   14,2¬/2,14¬/40.0¬/4. <U>SER <S>ERVICES - UNDER WHICH \
8  DT   16.0¬/2,16¬/40.0¬/FACILITIES AND TECHNICAL INFORMATION \
9  DT   18.0¬/2,18¬/40.0¬/IS MADE AVAILABLE TO THE USER ON A \
10 DT   20,0¬/2,20¬/40.0¬/ROUTINE BASIS. \
11 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
12 DE   0¬/32\
13 DT   0.0¬/2,0¬/40.0¬/<THE ALBERTA REMOTE SENSING CENTER >\
14 DT   2.0¬/2,2¬/40.0¬/OFFERS THE FOLLOWING FACILITIES ¬F¬R¬E¬E \
15 DT   4.0¬/2,4¬/40.0¬/OF CHARGE TO ANYONE IN THE PROVINCE:\
16 DT   8,2¬/2,8¬/40.0¬/1.  <I>NTERPRETATION EQUIPMENT\
17 DT   11,2¬/2,11¬/40.0¬/2.  <E>DUCATION AND ???? PROGRAMS\
18 DT   14,2¬/2,14¬/40.0¬/3.  <T>ECHNICAL ???? SERVICE \
19 DT   17,2¬/2,17¬/40.0¬/4.  <L>ANDSAT ORDER ??? \
20 DT   20,2¬/2,20¬/40.0¬/5.  <I>MAGERY LIBRARY \
21 DT   23,2¬/2,23¬/40.0¬/6.  <A>IRBORNE PROGRAM\
22 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
23 DE   0¬/32\
24 DT   4,4¬/2,4¬/40.0¬/<T>HE <A>LBERTA <R>EMOTE <S>ENSING <C>ENTER \
25 DTI  7.0¬/2,7¬/40,0¬/CLOSELY COOPERATES WITH AND USES THE \
26 DTI  10.0¬/2,10¬/40.0¬/FACILITIES OF THE <C>ANADA <C>ENTRE FOR \
27 DTI  13.0¬/2,13¬/40.0¬/<R>EMOTE <S>ENSING IN <O>TTAWA.  <T>HE <C>ENTER \
28 DTI  16.0¬/2,16¬/40.0¬/IS ALSO IN CLOSE CONTACT WITH REMOTE \
29 DTI  19.0¬/2,19¬/40.0¬/SENSING AGENCIES THROUGHOUT <N>ORTH \
```

SEG9A

```
30 DTI  22.0¬/2,22¬/40.0¬/<A>MERICA. \
31 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
32 DE   0¬/32\
33 DT   6,2¬/2,6¬/40.0¬/<T>HE <A>LBERTA <C>ENTER FOR <R>EMOTE <S>ENSI
        NG \
34 DTI  9,0¬/2,9¬/40,0¬/IS LOCATED AT :\
35 DT   14,0¬/2,14¬/40.0¬/9820 106TH <S>TREET,\
36 DTI  17,0¬/2,17¬/40.0¬/<E>DMONTON, <A>LBERTA,\
37 DTI  20,0¬/2,20¬/40.0¬/<T>ELEPHONE (403) 427-2381\
38 DTI  23,0¬/2,23¬/40.0¬/<C>ONTACT <M>R. <C>AL <B>RICKER.\
39 DTI  26.0¬/2,26¬/40.0¬/<C>OORDINATOR.\
40 EPI  30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

BRANG

```
1 DE   0¬/32\
2 DT   0.0¬/2,0¬/40.0¬/<N>OW THAT WE HAVE COVERED THE VARIOUS \
3 DT   3,0¬/2,3¬/40.0¬/<R>EMOTE <S>ENSING AGENCIES.WOULD YOU LIKE \
4 DT   "6.0¬/2,6¬/40.0¬/A MINI%%%%   REVIEW? \
5 DT   16.3¬/2,16¬/40.0¬/¬Y¬E¬S   <G>IVE ME THE MINI REVIEW. \
6 DT   24.3¬/2,24¬/40.0¬/¬N¬0   <L>ET ME CONTINUE.\
7 EPP  ¬/BRANG -007\
8 NX   \
9 DT   28,0¬/2,28¬/40.0¬/<P>OINT TO ONE OF THE CHOICES.\
10 CAP 4,16.40,0¬/CO\
11 BR  SEG9\
12 CAP 4,24,40.0¬/C1\
13 BR  SOURCE\
14 UN  U2\
15 DT  28.0¬/2,28¬/40.0¬/<P>OINT TO ONE OF THE CHOICES.\
```

SOURCE

```
1 PRR  \
2 DE   0¬/32\
3 DT   0.0¬/2,0¬/40.0¬/<I>NTERESTED IN GETTING FURTHER \
4 DT   3.0¬/2,3¬/40.0¬/INFORMATION ABOUT <R>EMOTE <S>ENSING? \
5 DT   6.0¬/2,6¬/40.0¬/<T>HE FOLLOWING INDIVIDUALS AT THE \
6 DT   9,0¬/2,9¬/40,0¬/<U>NIVERSITY OF <A>LBERTA CAN BE CONTACTED.\
7 DT   12,2¬/2,12¬/40,0¬/<D>R. <J>OSEPH <K>IRMAN\
8 DT   14,2¬/2,14¬/40,0¬/<P>ROFESSOR OF <E>DUCATION\
9 DT   16,2¬/2,16¬/40,0¬/<D>EPT. OF <E>LEMENTARY <E>DUCATION\
10 DT  21,2¬/2,21¬/40.0¬/<M>R. <L>EE <G>. <A>RMSTRONG\
11 DT  23,2¬/2,23¬/40.0¬/<G>RADUATE <S>TUDENT\
12 DT  25,2¬/2,25¬/40.0¬/<D>EPT. <O>F <E>LEMENTARY <E>DUCATION\
13 DT  27,2¬/2,27¬/40.0¬/<R>OOM 951A <E>DUCATION <S>OUTH\
14 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
```

<L>AST

```
1 DE   0¬/32\
2 NO   COPY¬/DRW2BM-2¬,DRW2BM-27¬,SDRAW-1\
3 CM   DRW2BM¬/0¬,0\
27 NO  EM\
28 EPI 30,39¬/2,30¬/1,39¬/¬/1¬/ZZ\
29 DE  0¬/32\
30 NO  COPY¬/DRW2CR-2¬,DRW2CR-39¬,SDRAW-1\
31 CM  DRW2CR¬/0¬,0\
58 NO  EM\
```

```
<L>AST
|    59 EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
|    60 DE   0¬/32\
|    61 DE   0¬/32\
|    62 FN   XP¬/2¬/16¬/2¬/<CONGRATULATIONS>\
|    63 EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
|    64 DE   0¬/32\
|    65 NO   COPY¬/DRWMDG-2¬,DRWMDG-55¬,SDRAW-4\
|    66 CM   DRWMCP¬/0¬,0\
|   116 DTI  28,25¬/2.28¬/15,25¬/<GREAT WORK>!!!\
|   117 EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
|   118 DE   0¬/32\
|   119 DT   6,0¬/2,6¬/40,0¬/<Y>OU HAVE JUST COMPLETED THE COURSE!!!\
|   120 DT   9,0¬/2,9¬/40,0¬/<B>EFORE YOU SIGN OFF, YOU WILL BE GIVEN \
|   121 DTI  12,0¬/2,12¬/40,0¬/THREE OPTIONS TO CHOOSE FROM. \
|   122 DTI  15,0¬/2,15¬/40,0¬/<T>HE OPTIONS WILL APPEAR ON THE NEXT \
|   123 DTI  18,0¬/2,18¬/40,0¬/SCREEN DISPLAY.  <P>LEASE USE THE \
|   124 DTI  21,0¬/2,21¬/40,0¬/LIGHT PEN TO POINT TO YOU PARTICULAR \
|   125 DTI  24,0¬/2,24¬/40,0¬/CHOICE. \
|   126 EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
|   127 DE   0¬/32\

<L>AST2
|     1 PRR  \
|     2 DE   0¬/32\
|     3 DTI  10,3¬/2,10¬/40,0¬/¬A.  <S>IGN OFF NOW AND TAKE AN IN-CLASS \
|     4 DTI  12,7¬/2,12¬/40,0¬/EXAMINATION.\
|     5 DTI  16,3¬/2,16¬/40,0¬/¬B.  <G>O BACK AND REVIEW THE SECTION ON \
|     6 DTI  18,7¬/2,18¬/40,0¬/<L>ANDSAT IMAGE INTERPRETATION,THEN \
                                    THEN       AND THEN \
|     7 DTI  20,7¬/2,20¬/40,0¬/TAKE THE IN-CLASS EXAMINATION.\
|     8 DTI  24,3¬/2,24¬/40,0¬/¬C.  <R>EVIEW THE ENTIRE COURSE BEFORE \
|     9 DTI  26,7¬/2,26¬/40,0¬/TAKING THE FINAL EXAMINATION.\
|    10 PRR  \
|    11 EPP  ¬/<L>AST2 -O11\
|    12 NX   \
|    13 DT   28,0¬/2.28¬/40,0¬/<P>LEASE POINT TO ONE OF THE,CHOICES.\
|    14 CAP  4,10,40.0¬/CO\
|    15 BR   FINIS\
|    16 CAP  4,16,40.0¬/C1\
|    17 BR   SEG5\
|    18 CAP  4,24,40.0¬/C2\
|    19 BR   UA2END\
|    20 UN   U3\
|    21 DT   30,0¬/2.30¬/40,0¬/<P>OINT TO ONE OF THE CHOICES.\

FINIS
|     1 PRR  \
|     2 DE   0¬/32\
|     3 NO   COPY¬/DRWAYZ-2¬,DRWAYZ-7¬,SDRAW-4\
|     4 CM   DRWAYZ¬/0¬,0\
|    10 NO   EM\
|    11 EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
|    12 DT   24,0¬/2,24¬/40,0¬/¬T¬H¬E ¬E¬N¬D\
|    13 EPI  30,39¬/2.30¬/1.39¬/¬/1¬/ZZ\
|    14 EN   \
```