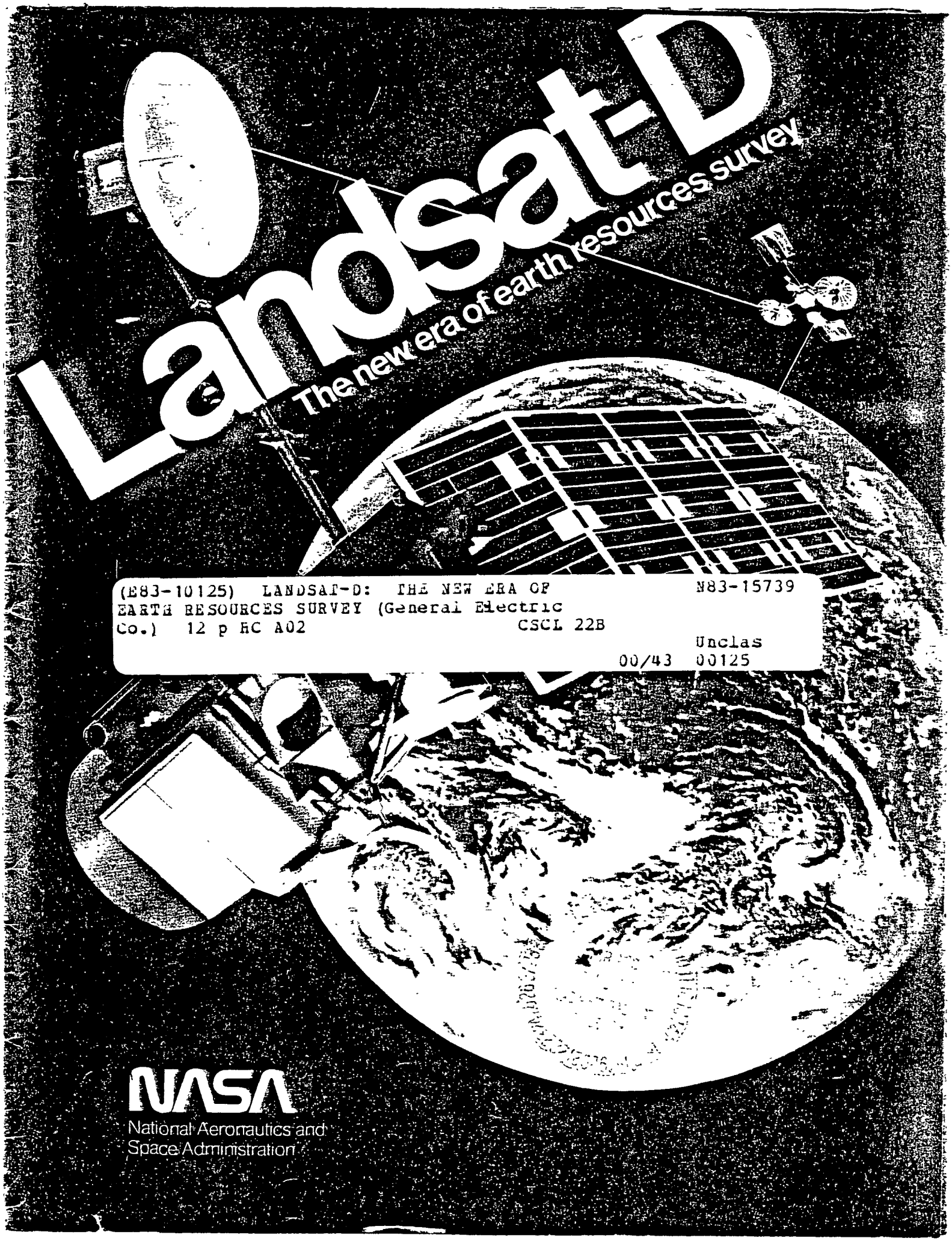
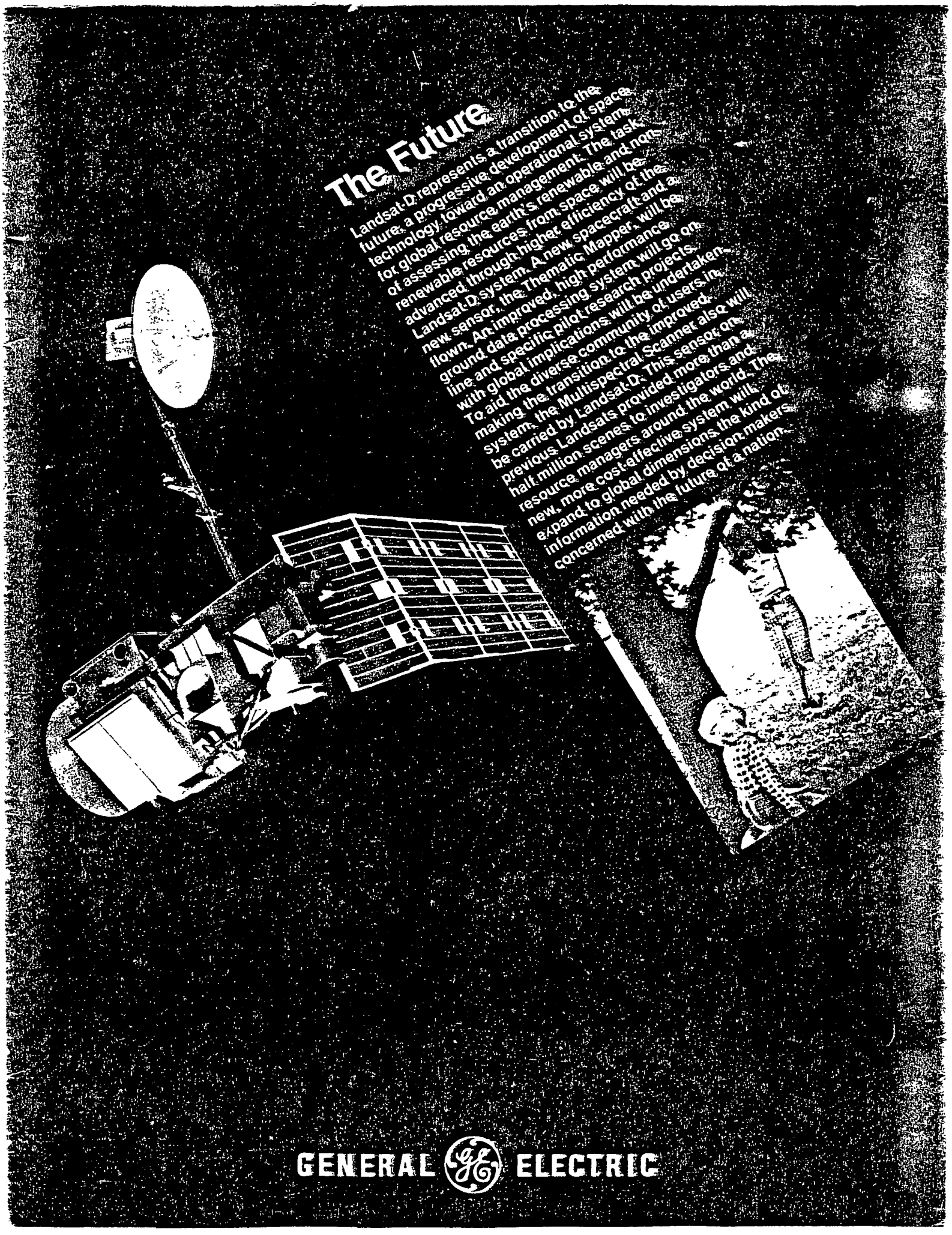
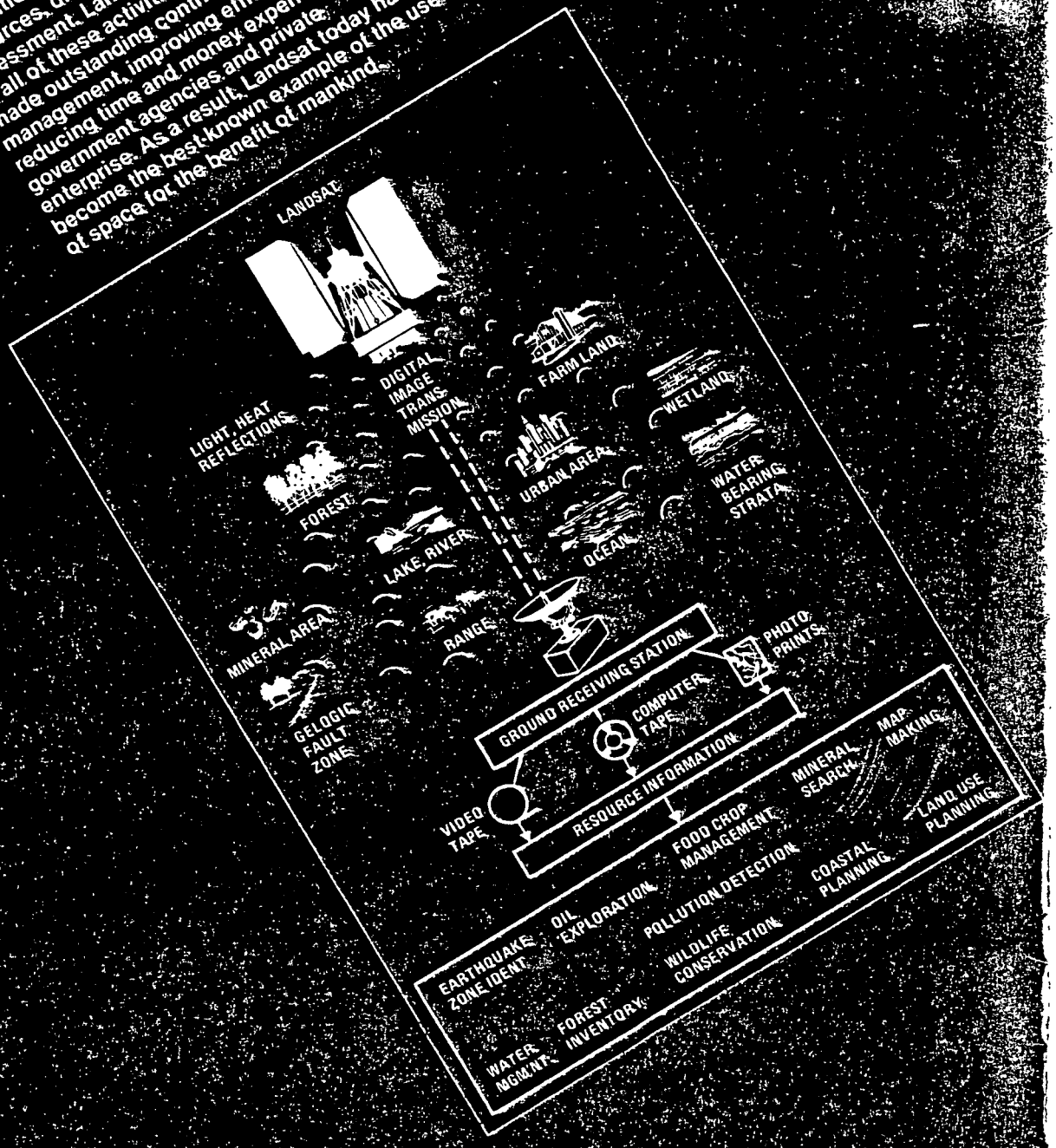


NASA
National Aeronautics and Space Administration


The Future
Landsat-D represents a transition to the future, a progressive development of space technology toward an operational system for global resource management. The task of assessing the earth's renewable and non-renewable resources from space will be advanced through higher efficiency of the Landsat-D system. A new spacecraft and a new sensor, the Thematic Mapper, will be flown. An improved, high performance ground data processing system will go on line and specific pilot research projects with global implications will be undertaken. To aid the diverse community of users in making the transition to the improved system, the Multispectral Scanner also will be carried by Landsat-D. This sensor on previous Landsats provided more than a half million scenes to investigators and resource managers around the world. The new, more cost-effective system will expand to global dimensions the kind of information needed by decision makers concerned with the future of a nation.
GENERAL ELECTRIC

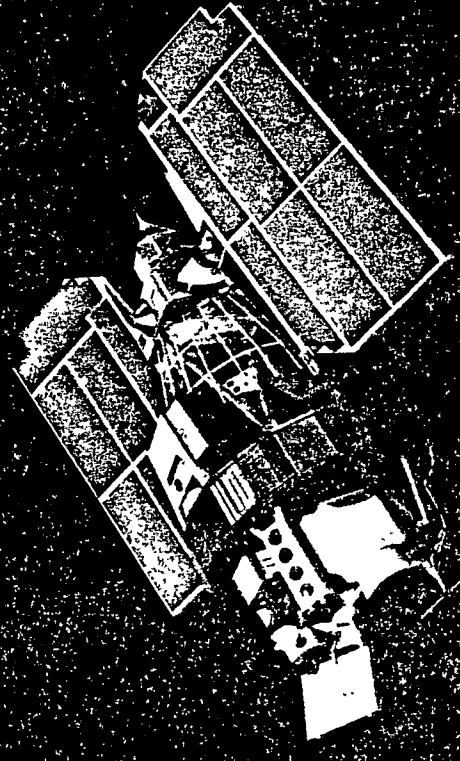
The Benefits

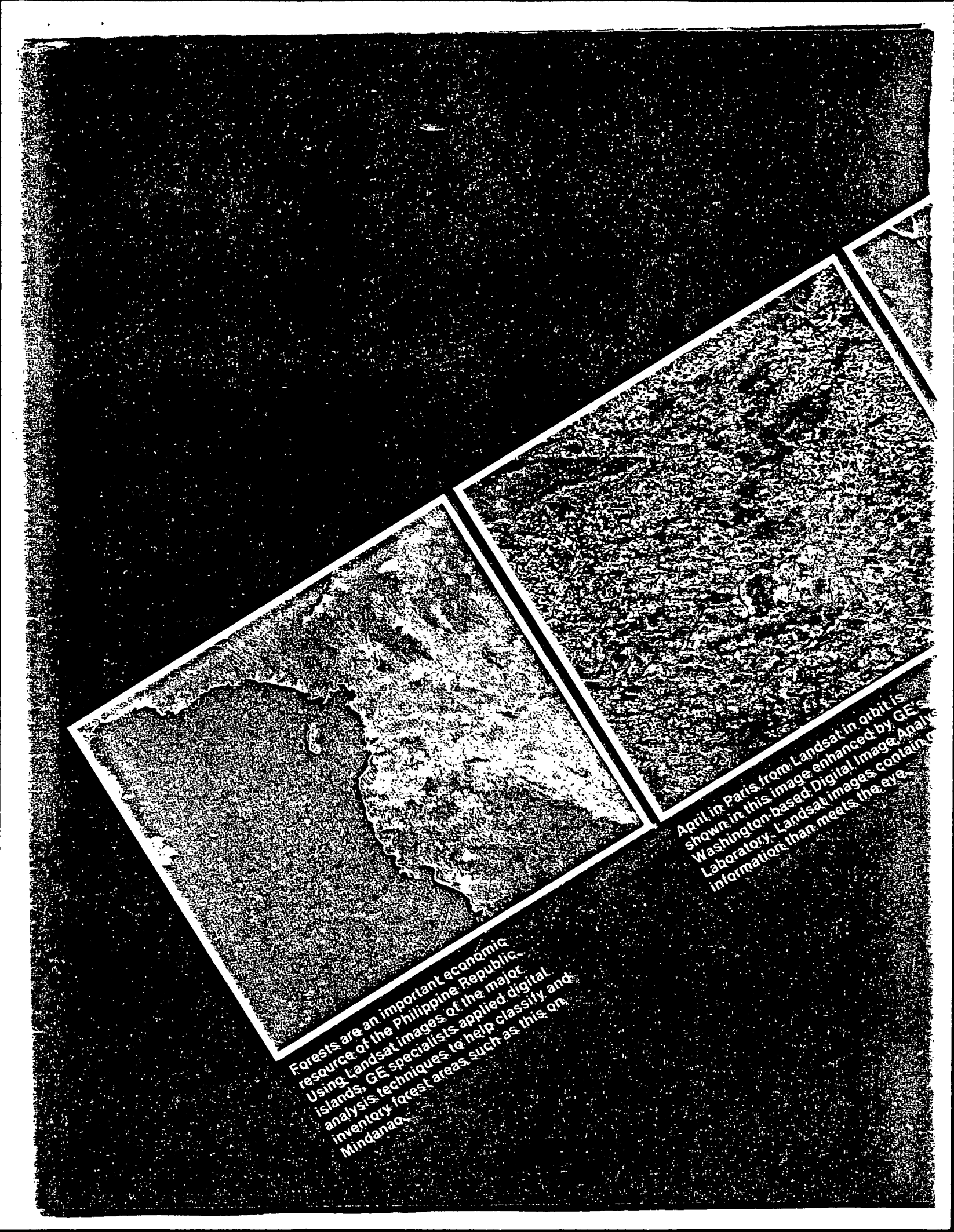
Multispectral resource data collected by Landsat spacecraft undergoes a transformation to become useful resource information. The data is processed by computers for analysis and can be displayed in an image format, each scene covering more than 13,000 sq. mi. The images contain information important for surveying soils, estimating crop acreage and yield, measuring timberlands, range lands and water resources; mineral and oil exploration, land use planning, health and environmental protection, population estimation, monitoring marine and coastal resources, disaster warning and assessment. Landsat data has been applied to all of these activities. The program has made outstanding contributions to resource management, improving efficiency and reducing time and money expenditures for government agencies and private enterprise. As a result, Landsat today has become the best-known example of the use of space for the benefit of mankind.



The Program

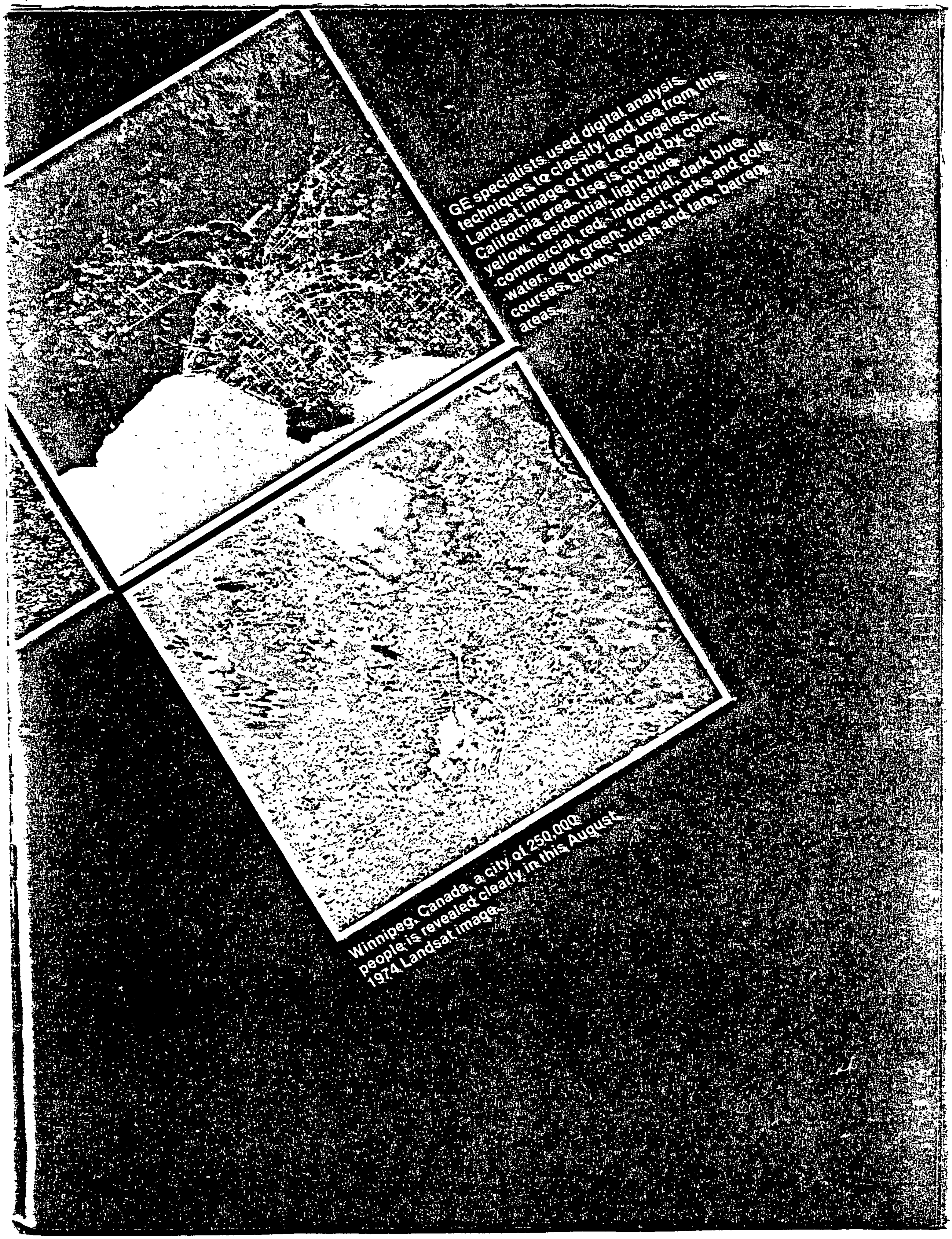
The Landsat program began in the 1960's with a concept to survey the earth's resources from a platform in space. A research effort was begun to develop remote sensing instruments and a proven satellite to test the feasibility of the concept was selected. The first Landsat was orbited in 1972 and was equipped with two experimental sensors that scanned the earth's surface from an altitude of 570 miles. These sensors produced multispectral data on water, soil, vegetation and minerals, for analysis by 200 scientific investigators in the U.S. and 100 in 30 other countries. By 1974, the Landsat program had generated more interest and application over a wider range of scientific disciplines than any other space program. Within six years, Landsats 2 and 3 were orbited, more than 100 nations were applying the experimental sensor data to resource management, and Canada, Italy and Brazil were receiving the data at their own ground stations.





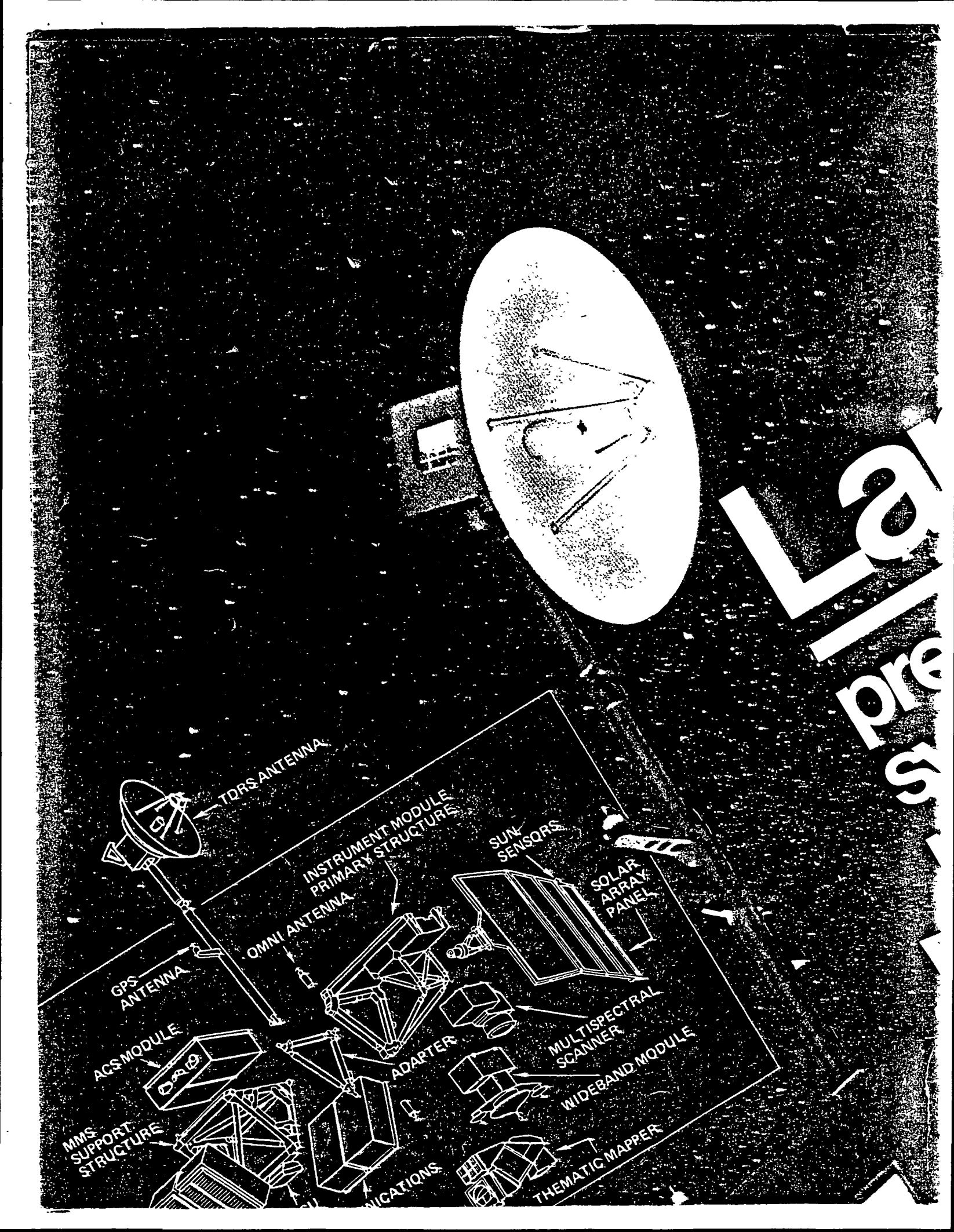
Forests are an important economic resource of the Philippine Republic. Using Landsat images of the major islands, GE specialists applied digital analysis techniques to help classify and inventory forest areas such as this on Mindanao.

April in Paris from Landsat in orbit is shown in this image enhanced by GE's Washington-based Digital Image Analysis Laboratory. Landsat images contain more information than meets the eye.



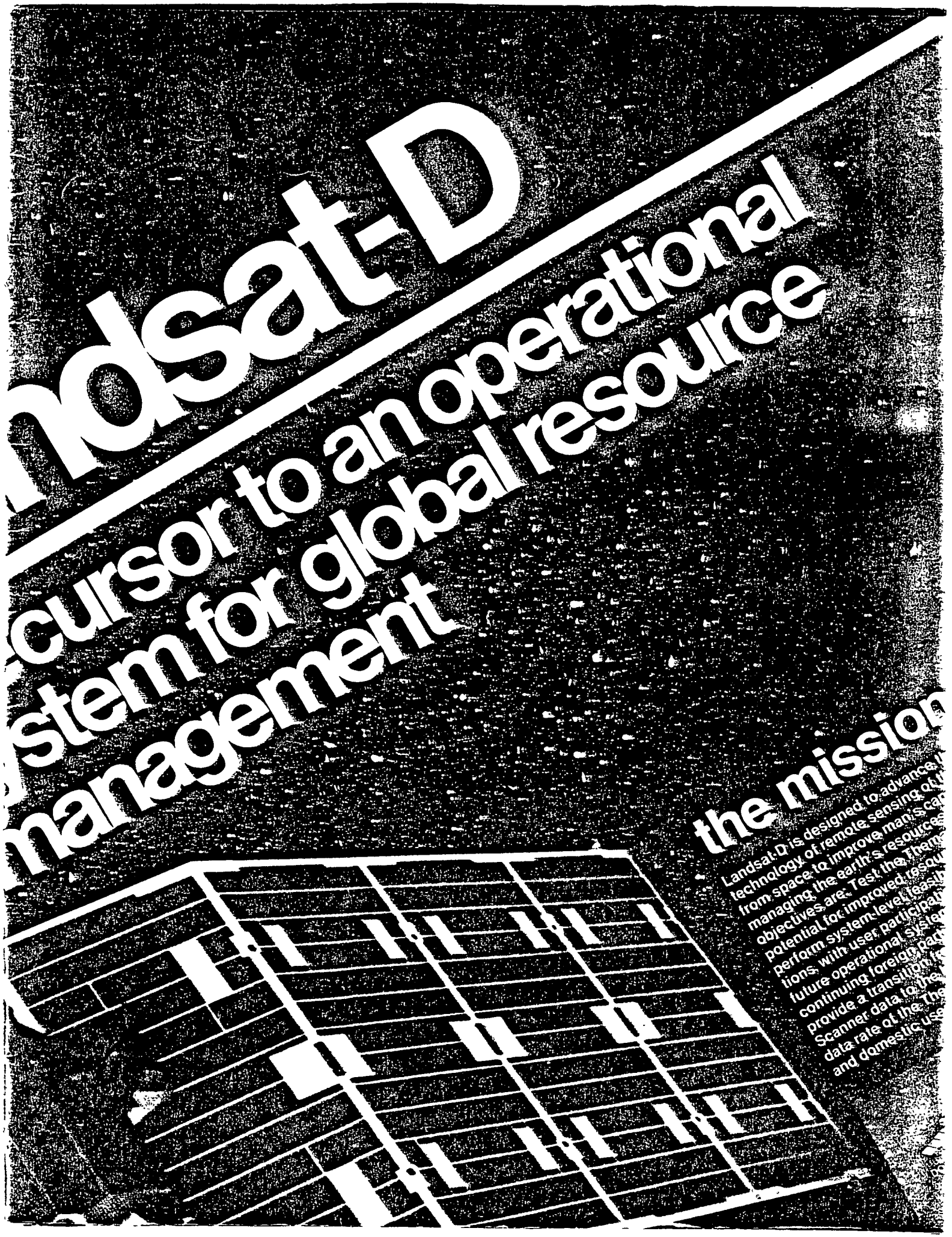
GE specialists used digital analysis techniques to classify land use from this Landsat image of the Los Angeles, California area. Use is coded by color: yellow - residential, light blue - commercial, red - industrial, dark blue - water, dark green - forest, parks and golf courses, brown - brush and tan - barren areas.

Winnipeg, Canada, a city of 250,000 people is revealed clearly in this August 1974 Landsat image.


TDRS ANTENNA
INSTRUMENT MODULE PRIMARY STRUCTURE
SUN SENSORS
SOLAR ARRAY PANEL
OMNI ANTENNA
GPS ANTENNA
ACS MODULE
ADAPTER
MULTISPECTRAL SCANNER
WIDEBAND MODULE
MMS SUPPORT STRUCTURE
THEMATIC MAPPER

ndsat-D

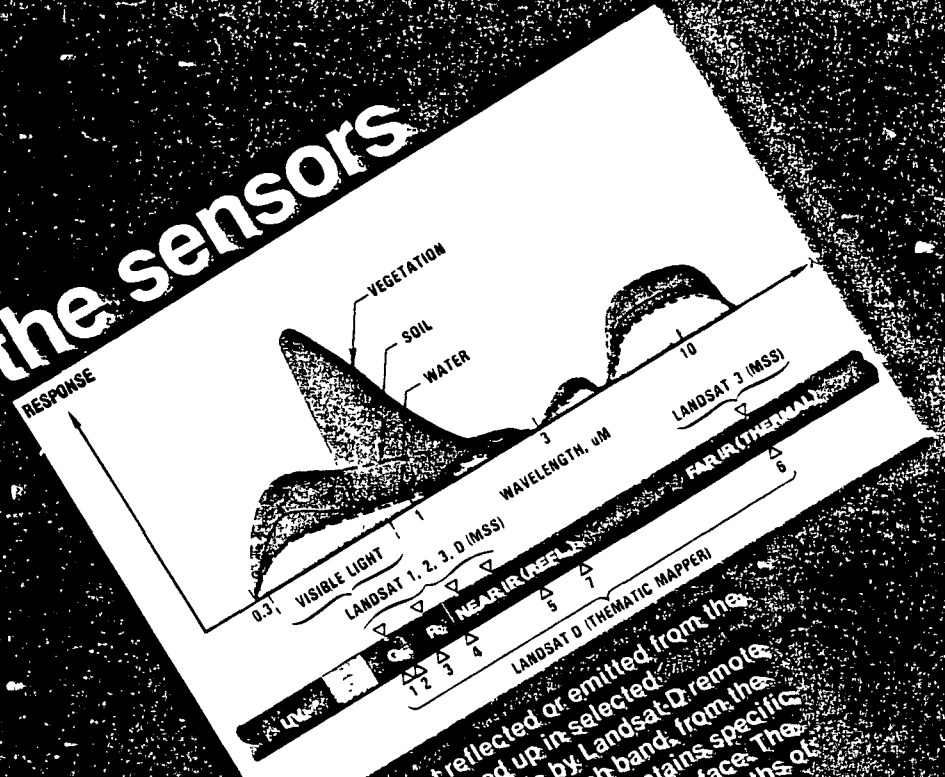
cursor to an operational stem for global resource management



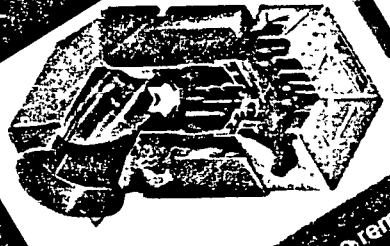
the mission

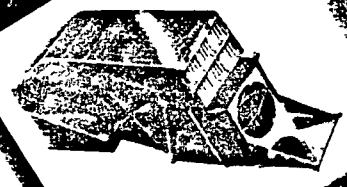
Landsat-D is designed to advance
technology of remote sensing of
from space to improve man's ca
managing the earth's resources
objectives are: Test the them
potential for improved resou
perform system-level leash
tions with user participa
future operational sys
continuing foreign par
provide a transition f
Scanner data to the
data rate of the The
and domestic use

the sensors

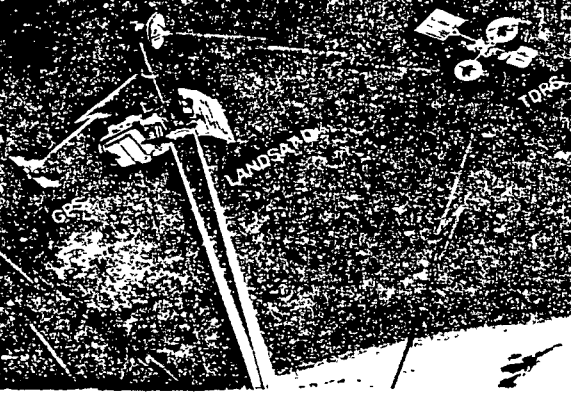


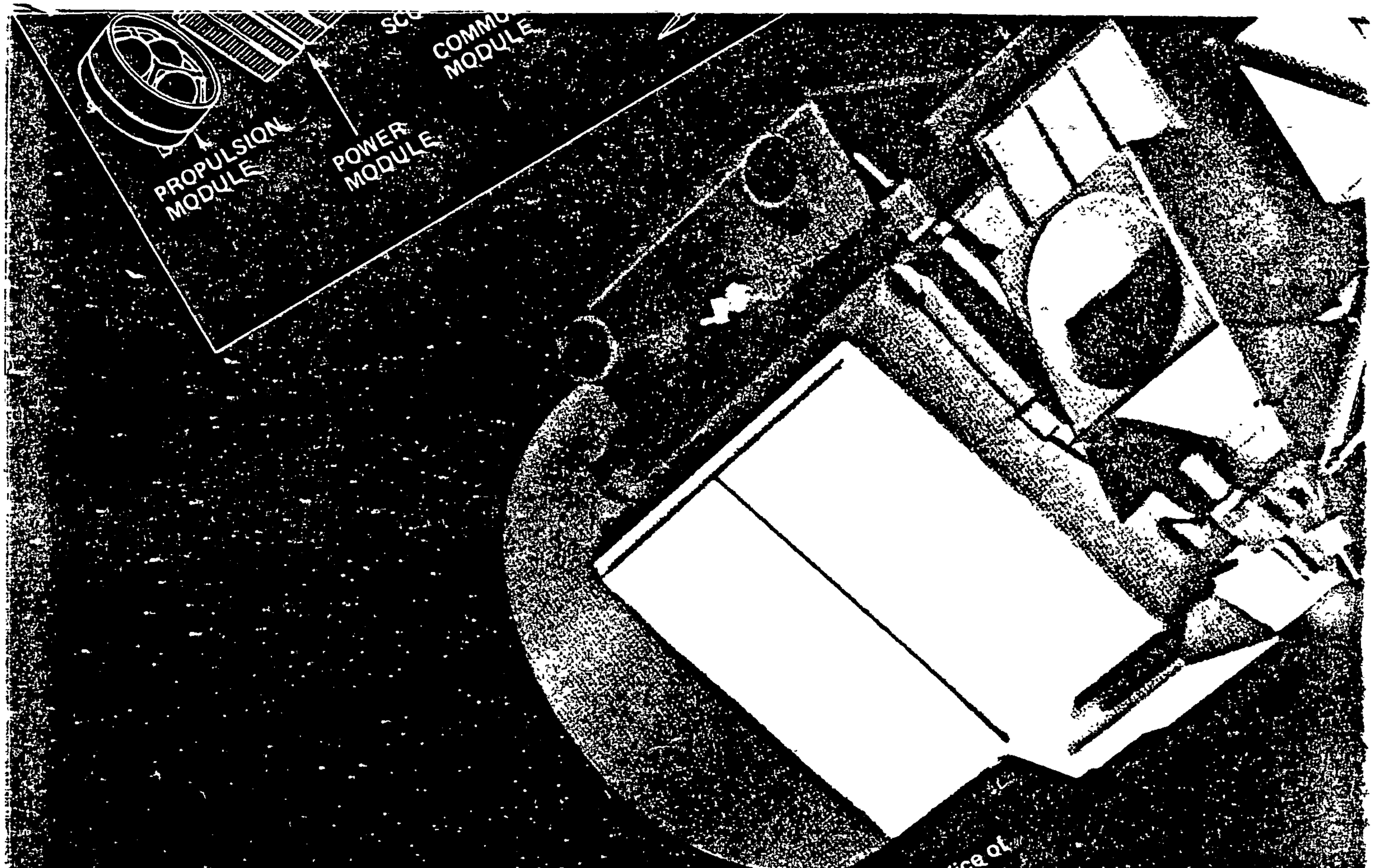
Light and heat reflected or emitted from the earth will be picked up in selected wavelengths or bands by Landsat-D remote sensing instruments. Each band, from the visible to the far infrared, contains specific information about the earth's surface. The sensors are "tuned" to the wavelengths of vegetation, soil, water and other surface materials to collect the spectral data each reflects.





Landsat-D will carry two remote sensing instruments: Thematic Mapper (TM), is a experimental sensor designed to scenes with 30-meter resolution. It channel radiometer. The Multi- (MSS), has four channels and is identical to the and 2. Landsat-D will te 800 scenes a round.



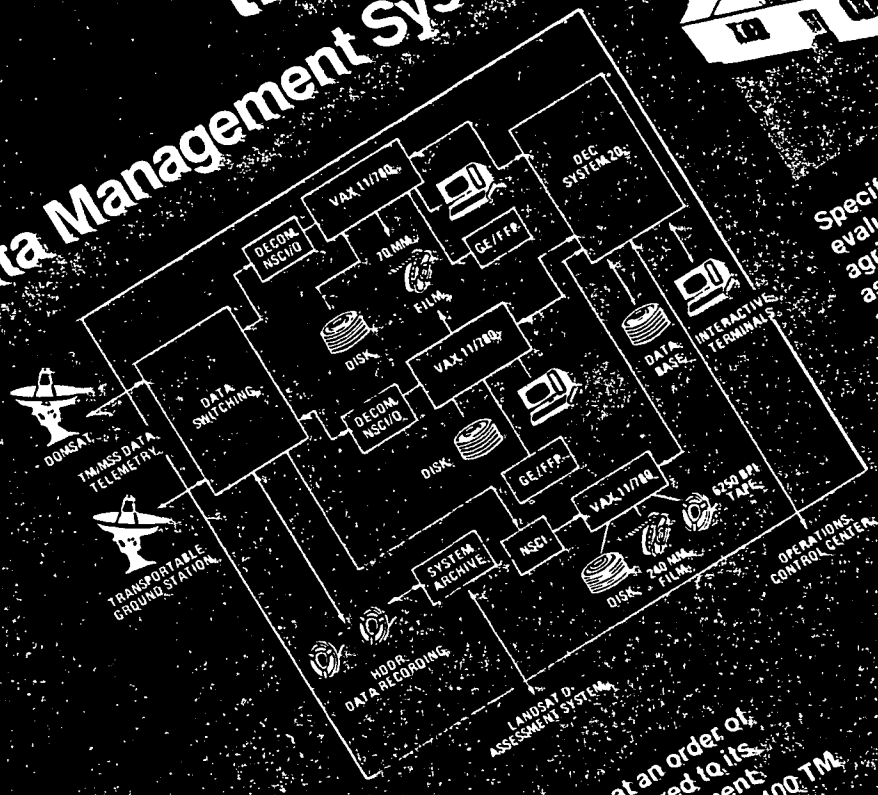


Landsat is a program of NASA's Office of Space and Terrestrial Applications, managed by the NASA Goddard Space Flight Center. The General Electric Company Space Division is the mission contractor and as such is responsible for Landsat-D spacecraft design, integration and test, the Data Management System, Landsat Assessment System and Operations Control Center.

the ground segment

Data Management System

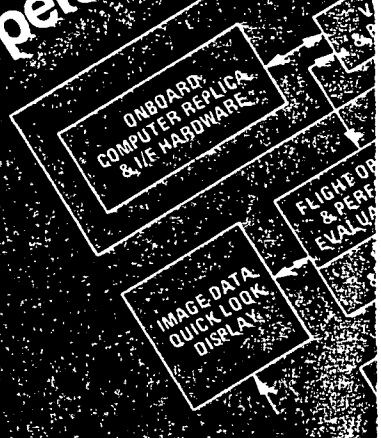
Landsat-D Assessment System



Specific research projects center on evaluation of Thematic Mapper data for agriculture, land use, environmental assessment, oil exploration, and other applications. The LAS provides investigators with the processing equipment and associated software programs to analyze TM data. This equipment includes computers, interactive display and analysis consoles and a variety of output devices.

Landsat-D generates data at an order of magnitude higher rate compared to its predecessors. The Data Management System (DMS) is designed to accept 100 TM scenes and 200 MSS scenes per day, perform geometric and radiometric corrections and deliver all products within 48 hours of receipt. The DMS is fully automated to display, record, process and store image data.

Operations Contro



... provide... is a seven... spectral Scann... 80-meter resolutio... sensors on Landsats, ... have the capacity to gene... day (550 MSS, 250 TM) for all g... stations, compared to 190 MSS sc... from Landsats 1, 2 or 3. Each scene covers 13,225 sq. miles.

the flight segment

Landsat-D will be launched into a sun-synchronous, polar orbit approximately 700 km (435 statute miles) high by a Delta 3910 vehicle. Spacecraft attitude control will keep the Thematic Mapper and Multi-spectral Scanner continuously pointing toward the earth throughout each orbit. Spacecraft position in orbit will be determined using the Global Positioning System. Sensors will be programmed from the ground, based on users' data requests. Data from both sensors will be transmitted from Landsat-D via a Ku-band link to a Tracking and Data Relay Satellite (TDRS) in a geostationary orbit, and then from TDRS to the NASA White Sands, N.M. ground station. The data will then be relayed from White Sands via domestic communications satellite to the Goddard Space Flight Center, Greenbelt, Md. Data will also be transmitted directly from the satellite at X-band for TM and MSS data and S-band for MSS data to Goddard and foreign ground stations.

Flight Segment Specifications

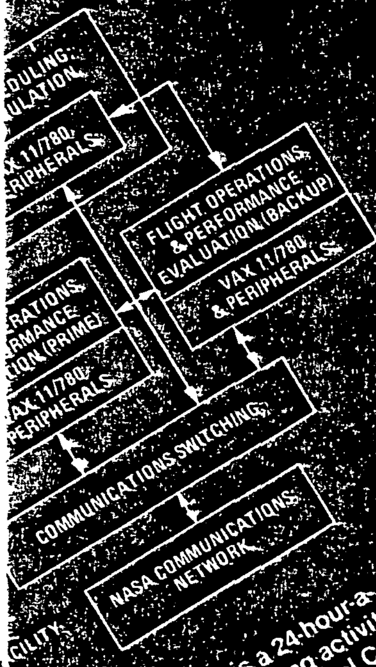
Structure
Length — 14 ft. (4 m.)
Width — 7 ft. (2 m.)

Spacecraft
Weight — 3800 lbs. (1725 Kg.)

Solar Array
Area — 147.4 ft² (13.6 m²)
Power — 2 kw (25°C) BOL

High Gain Antenna
Diameter — 6 ft. (1.8 m)
Mast height — 12.5 ft. (3.7 m)

...n Center



...gement of Landsat-D is a 24-hour-a-seven-day-a-week continuing activity ...formed at the Operations Control Center (OCC). Daily operation is scheduled according to user product and coverage requests, instrument and spacecraft status, communications network availability and environmental conditions.