

## SPACECRAFT IN TROUBLE

### LANDSAT 2

On 4 February 1982, Landsat 2 experienced excessive yaw motion, resulting in insufficient solar array power for battery charging and proper sub-system operations. Indications since then are that debris in the yaw wheel bearings prevent its rotation.

An effort to control yaw attitude using magnetics is under way with modest but inconsistent success. The pointing accuracy achieved has not been representative of the improvements which NASA aims for — however, the attitude errors and rates expected with magnetic control will exceed normal values with the yaw wheel, and at best are expected to vary significantly within an orbit. Whether they can be brought low enough to develop a new operating plan remains to be determined, and the effect on MSS image quality is yet to be assessed.

On 25 February, following a period of occasional outages since 4 February, Landsat 2 was withdrawn from operational service, although it will be scheduled within range of Alice Springs and within power limitations.

### LANDSAT 3

On 13 February 1982, Landsat 3 suffered the halting of ERTS Command Auxiliary Memory, and became uncommandable, although it was later recovered.

From 25 February, Landsat 3 will be scheduled to replace Landsat 2, although NASA are concerned about the health of its MSS instrument, and propose limiting schedules in an attempt to prolong its life until Landsat D can take over. This scheduling will be on a fair and equitable basis based on pro-rating the average number of scenes scheduled each 18 day cycle for each ground station.

Landsat 3 still exhibits continuous late line start (blanking out data in the western 30% of a scene), has potential end-of-scan pulse light source degradation problems, could suffer a future re-occurrence of multiplexer digitizing circuit failure and exhibits jitter in the mirror velocity/pseudopulse relationship (the pseudopulse being generated by the MSS multiplexer in the absence of line-start code) which restricts accurate data processing without an end-of-scan pulse.

## PLEASE CHECK FIRST!

In view of the foregoing, ALS cannot be certain of future satellite overpasses — users contemplating field operations should bear this in mind. ALS will endeavour to provide up-to-date information on satellite status, but in some instances may not know whether particular paths (or scenes) will be available until data has been received at Alice Springs.

## SPACECRAFT STATUS

Recent variations in spacecraft operational status (continued from August 1981 "Newsletter") have been:

5 Aug 1981	LANDSAT 3	Successful workarounds established for commanding spacecraft subsystems including MSS, RBV and wide band tape recorders.
2 Sept/30 Oct 1981	LANDSAT 2	31 Y-axis adjustment thruster burns were made during this period.
11 Dec 1981	LANDSAT 3	MSS scan monitor source switched from B to A. Data improved, but no change to line start anomaly.
23 Jan 1982	LANDSAT 2	Payload operation curtailed for 24 hours following low power condition resulting in communication/command loss.
27 Jan 1982	LANDSAT 3	Since switching to source A, line length problems have arisen causing processing difficulties. Shear effect requires further study to overcome problem with NASA MSS serial error correction.
2 Feb 1981	LANDSAT 2	Communications and commanding not established. Subsequently found to be due to excessive yaw motion restricting solar array power. Suspected yaw wheel stoppage or slowdown. Operation under low voltage with Redundant Rate Measuring Package on.
4 Feb 1982	LANDSAT 2	Normal operation resumed.
5 Feb 1982	LANDSAT 2	Yaw wheel stopped and restarted. Payload operation suspended for 24 hours.
8 Feb 1982	LANDSAT 2	Yaw wheel stuck again. Payload operations suspended until further notice.
13 Feb 1982	LANDSAT 3	ERTS Command Auxilliary Memory halted. Payload operations discontinued until further notice.

## **EXTENSIONS TO THE DATA PROCESSING FACILITY**

Extensions to the Canberra Data Processing Facility have commenced and will incorporate the installation of a new horizontal enlarger in the photo-lab. This will improve photo-lab capability, especially in the production of 1:100,000 and 1:50,000 products which have to be cropped slightly because of the limitations of the present enlarger. Additional accommodation also will become available to all other sections of the Station.

Because of building work in the clean room environment of the photo-lab, there will be no normal production of photo-image product for about two weeks.

Eight weeks is still quoted as guaranteed delivery for Priority Three (ordinary) production processing.

### **ORDER TURNAROUND**

During December 1981 most orders were delivered four weeks after their receipt at ALS. Eight weeks is still quoted as guaranteed delivery. Priority Two is quoted as two weeks and Priority One as one week.

Priority orders were often delivered within a couple of days of receipt; their actual turnaround depends on the queue at the time of ordering — however the Priority system is beginning to work as hoped, to produce near "real time" data for users.

### **LANDSAT D**

LANDSAT D is now scheduled for launch early third quarter 1982, according to latest NASA information, and will carry both MSS and Thematic Mapper instruments. LANDSAT D' will be ready for launch in 1985 or upon earlier failure of Landsat D, and will also include both instruments.

LANDSAT D MSS data is expected to be available from the satellite on an operational basis 30-45 days after launch.

Thematic Mapper (TM) data should be available to non-US ground stations in the third quarter of 1983, following characterization of geometric performance (including jitter) and the development of the necessary correction algorithms to produce geometrically precise data.

ALS must modify some equipment to receive and process Landsat D MSS imagery and install additional equipment to receive and process TM imagery. These modifications and equipment are dependent upon the 1982/83 Budget.

Allowing for realistic procurement times — assuming that funds are made available — Landsat D MSS data could reasonably be expected to be available from ALS in about December 1982, with TM data becoming available early in 1984.

NASA has yet to develop specific plans to transmit sensor data to non-US ground stations; however it is expected that full coverage of MSS data will be available (537 scenes per day of which 200 will be US scenes and 337 foreign). NASA has allocated 150 TM scenes per day to non-US ground stations.

Spacecraft power is the limiting factor, although NASA is not considering a trade-off of MSS for TM acquisition at this time. Overlap of ground station range circles will not increase Landsat D TM daily acquisitions although overlapping ground stations may receive the same data.

TM scenes will be allocated to each ground station on a pro-rated basis (i.e. an average of 13 scenes per day for 11 non-US ground stations) with adjustments for additional ground stations or two-spacecraft operation (Landsat D and D'). Some local daily variations should be expected as a result of spacecraft/mission operational constraints from time to time.

### **ALS MICRODATA CATALOGUE**

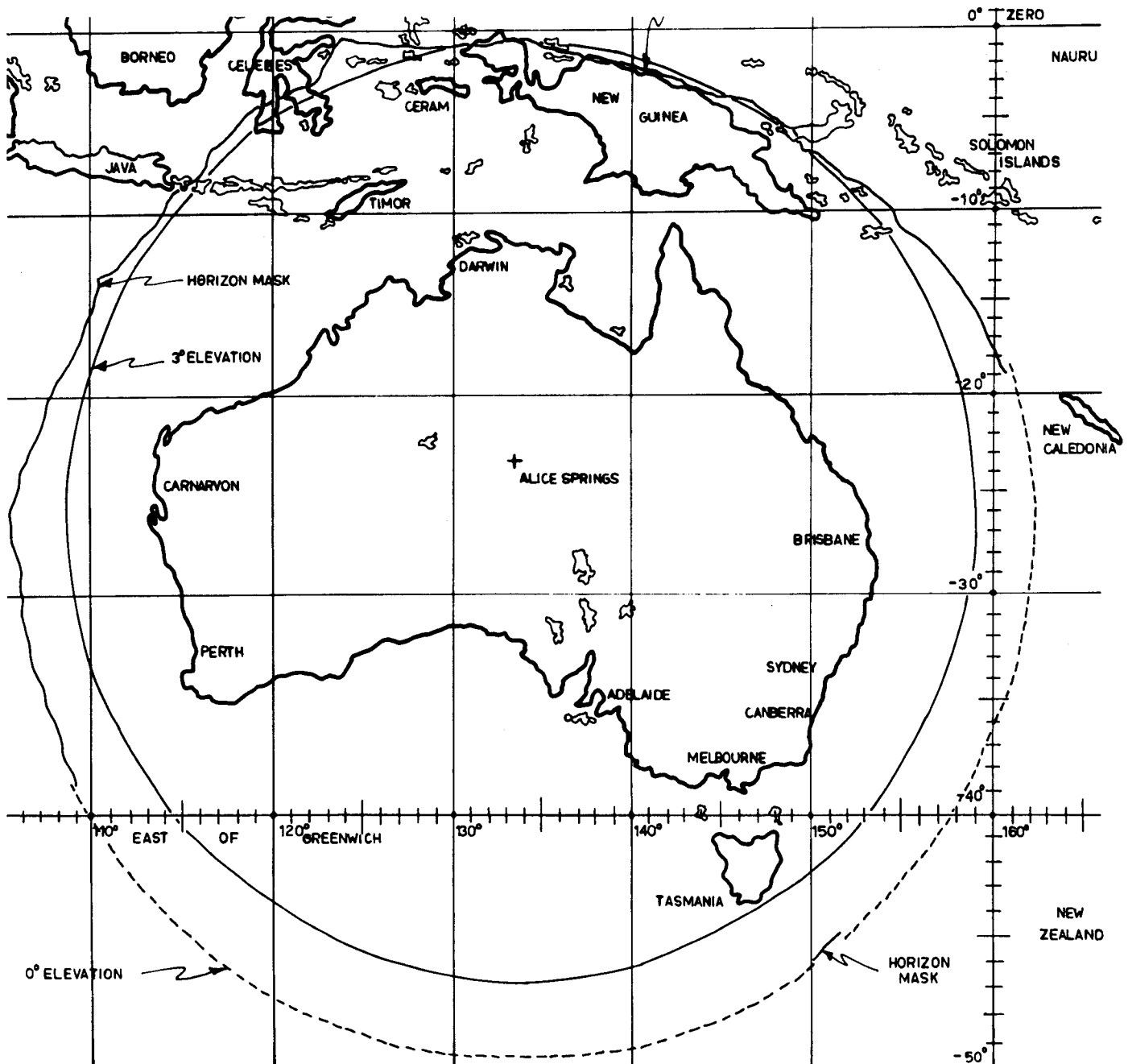
ALS microform catalogue subscriptions have always included a charge for the microdata catalogue, which will list all acquisitions for each path/row chronologically.

This catalogue is in the final stages of production and will become available early in 1982, when it will be issued to catalogue subscribers.

Information will consist of path/row, date, cloud cover assessment in 10% increments and image quality notes together with spacecraft number. Image quality will refer to late line start, high gain mode (if applied to Bands 4 and 5) and "good-fair-poor" gradings for noise and line drop-outs.

Also present will be listings of master photographic images in ALS archives. In the long term, users who order these products will tend to reduce turnaround times — of course, any image may be ordered where the date is critical.

The microdata catalogue will be updated and re-issued monthly. This catalogue will be most convenient for choosing cloud free imagery when date is non-critical; it is not however, practical to show details of cloud covered areas in the micro-data catalogue.



**Landsat-D range circle simulation based on 705 km orbit altitude and horizon mask at Alice Springs, NT. The range circle is smaller than Landsat 2 or 3 because of lower altitude. Image coverage will remain at 185 x 185 km although Path inclination and cyclic pattern will differ from previous satellites.**

## ARE THE LATS. AND LONGS. WRONG?

Trying to fit bulk processed photographic imagery to conventional maps, or plot features on to them, users have complained that the latitude and longitude "ticks" in the photo margins are often misplaced.

In fact these lats. and longs. are calculated from predicted orbit parameters; the actual orbit drifts east-west and may shift noticeably before correction — or the time base may alter slightly, moving the

image north-south. In either event the lats. and longs. are calculated for the theoretical spacecraft nadir.

Bulk processed images, whilst produced at nominal standard map scales, may also require "fitting" to map detail because of minor variations in spacecraft altitude, attitude and enlargement factors.

Exact gridding and scale will be available when the precision processing system becomes operational later in 1982, and images are rectified to ground control — bulk processed imagery will continue to show nominal geographicals only.

## PROCEEDINGS AVAILABLE

### "LANDSAT '79"

**The First Australasian Landsat Conference  
Macquarie University, NSW, May 22-25, 1979**

Just published. 667 pages with 50 technical papers covering Agriculture, Land Use, Forestry, Geology and Mineral Exploration, Mapping, Technique Development and Image Processing, and Water Resources.

Available from: "Landsat '79 Conference"  
PO Box 136  
NORTH RYDE NSW 2113  
AUSTRALIA

### "LANDSAT '81"

**The Second Australasian Remote Sensing  
Conference**

**ANU, Canberra, September 1-4, 1981**

50 copies remaining. 370 pages plus index and notes, containing 79 technical papers from Invited Speakers, and in the fields of Agriculture and Land Use, Data Collection Systems, Geographical Information Systems, Geology and Mineral Exploration, Image Processing Techniques, Marine and Meteorological Applications, Salinity Studies, and Wetland and Coastal Resources.

Available from: The Treasurer  
Landsat '81 Organizing C'ttee  
PO Box 28  
BELCONNEN ACT 2616  
AUSTRALIA

The price of either journal, including packing and postage for each copy is:

- \$21.00 within Australia.
- \$22.00 Overseas Surface Mail.
- \$27.00 "Surface Air Lifted" to UK, USA, Canada, Italy, Netherlands, Greece, German Federal Republic.
- \$28.00 Airmail to New Zealand and Papua New Guinea.
- \$30.60 Airmail to SE Asia.
- \$33.40 Airmail to India, Japan, China.
- \$39.00 Airmail to USA, Canada and Middle East countries.
- \$42.00 Airmail to UK, Europe, South America and South Africa.

Please enclose the appropriate remittance in Australian currency with your order. Please order each title separately.

## WHAT BAND FOR CATALOGUE?

What MSS Band would **you** prefer for cloud assessment? Some say "go back to Band 5" because this Band more clearly shows cloud and haze cover; others say Band 6 gives better ground definition, and aids target identification — Band 6 is used at present.

## Please tell us!

ALS **urgently** wants your comments, so as to fix the catalogue Band once and for all — it is only practical to make the catalogue in a single Band. A final decision will be made in a month or so, in the light of comments (or lack of them) received.

Whatever Band is finally chosen will be used both in the micro-image catalogue and for Quick-look Prints.

## ATTENTION — USERS WITH ON-GOING MONITORING PROGRAMMES!

### HIGH GAIN MODE

ALS has received a number of requests for high gain mode data (see "Newsletters" April and August 1981). At turn-on and turn-off, adjoining normal gain scenes in the same Path are affected as Bands 4 and 5 are not simultaneously switched to high gain — there may be an hiatus of up to a second (14 scan lines) with one Band in high and one in normal gain. Destriping algorithms cannot cope with this situation, and the overlap area is therefore unusable. Restraints on non-standard framing, used to produce images close to the hiatus, may result in up to 580 scan lines (a quarter of a scene) being unavailable.

High gain is also enabled for a period — usually half a scene or more — before and after the target area.

High gain requests can therefore affect adjacent scenes in a Path which could be the site of on-going monitoring by another user.

If you have an on-going project using normal gain Landsat imagery in a particular area — please let ALS know **NOW** so that you don't lose data because of high gain requests.

## STANDING ORDERS

In the present spacecraft emergency there is likelihood that reductions in scenes acquired will be forced on ground stations to ensure equitable availability of imagery worldwide. ALS has some long leadtime standing orders and would appreciate regular updating of such requests.

We therefore appeal to long-term users to contact us **each month** with requests for standing orders, as ALS may need to alter monthly scheduling to accommodate some of them. Such requests, as for requests for special coverage or high gain mode, should reach ALS one week before the month required. Telex requests may be sent to AA61510 (LANSAT).

## **MULTIPLE PHOTOGRAPHIC IMAGES**

A lower price structure has been determined for ALS photographic products where more than three copies of the same scene are ordered simultaneously.

The actual price varies with the size and quantity of the photographic product because of differences in fixed costs of materials and processing, thus no "across the board" lowering of prices applies. Customers should discuss their requirements with ALS User Services staff and obtain a quote for their particular requirements.

Priority processing is available for multiple copies, being double the standard multiple price for Priority 2 and treble for Priority 3.

## **NEWSLETTER FREQUENCY**

We are pleased that some "Newsletter" readers are so enthusiastic about the publication that they ask why they haven't had a copy for some time. The "Newsletter" is an "irregular" publication although we do aim to have three or four issues each year — 1981 encompassed three.

Contributions from Landsat users are also sought on any topic to do with Landsat including conference and seminar notices, abstracts, news of research projects or indeed of personalities in the profession (or art?).

## **INDONESIA NEWS**

(From national report, Indonesia to UNCPUOS)

As is the case with many countries, space-related activities in Indonesia are conducted by various departments and agencies, concurrent with their respective functions and interests. LAPAN, i.e. the National Institute for Aeronautics and Space, initiates, develops, promotes and co-ordinates aerospace activities to serve the national interests in general and the national development efforts in particular.

Space programmes in Indonesia generally deal with space applications, aerospace technology, aerospace sciences and aerospace studies. Being a developing country, with still limited capabilities in the field of space technology, the emphasis of the national efforts is directed to space application programmes, i.e. remote sensing, meteorology and communications.

## **Ground Station Planned**

LANDSAT imagery is being utilized for the purpose of inventory of earth resources, the evaluation of transmigration cities, soil survey, updating of base maps and thematic maps, geological surveys and mineral deposit reconnoitering.

To support these efforts and to enable the extension of remote sensing application to other fields, LAPAN is currently building a LANDSAT ground station near Jakarta which, in the first phase, will have the capability of receiving and recording data from the satellite.

Meanwhile, experiments with remote sensing from aircraft are carried out to make, among others, surveys for land use, hot water pollution, fresh water springs, and plankton concentration in coastal areas.

An aerial study of archaeological sites in East Java using a thermal scanner is also being done.

A Memorandum of Understanding has been signed by Indonesia; further information may be obtained from:

Dr Sunaryo  
Indonesian National Institute for  
Aeronautics and Space (LAPAN)  
PO Box 3048  
JAKARTA  
INDONESIA

## **TAPE v PHOTOGRAPHIC SCAN LINE CONTENT**

Different Landsat image formats contain different numbers of scan lines and do not have identical north and south boundaries.

Photographic images (including CCT "companion" images but not quick look prints) contain 2340 scan lines; 1600 bpi BIL tapes contain 2286 lines, 800 bpi BIL tapes contain 2340 lines; both 1600 bpi and 800 bpi BSQ tapes contain 2400 scan lines of data.

Nominal scene centres — the Worldwide Reference System Rows — are 25 seconds of time apart, equivalent to approximately 2043 scan lines, thus all product formats provide overlap. All images are nominally centred on the same scan line, hence users working at tape and image extremities may find variations in the data displayed at those extremities.

Users requiring both tape and image data near scene boundaries may therefore wish to specify non-standard framing to ensure that all data appears in both formats. There is no additional charge for non-standard CCT image framing.

ALS Newsletter

# THE ALS NEWSLETTER

March 1982

Published to present information of interest to the user community regarding ALS products, systems, and related remote sensing developments.

There is no subscription charge; individuals and organisations wishing to receive the "Newsletter" should contact the Promotion Officer at our ACT address, to whom comments, corrections, brief contributions and other enquiries should be directed.

**AUSTRALIAN LANDSAT STATION**

**"NEWSLETTER"**

**P.O. BOX 28 BELCONNEN A.C.T. 2616**

