

1. Classification <i>INPE-COM, 9/RRE</i>		2. Period <i>Nov. 77/April 78</i>	4. Distribution Criterion internal <input type="checkbox"/> external <input checked="" type="checkbox"/>
3. Key Words (selected by the author) <i>INPE LANDSAT SYSTEM</i>			
5. Report No. <i>INPE-1233-RRE/034</i>	6. Date <i>May, 1978</i>	7. Revised by	
8. Title and Sub-title <i>INPE-LANDSAT SYSTEM</i> <i>Results obtained from November 1977 up to April 1978</i>		9. Authorized by <i>N. Parada</i> <i>Nelson de Jesus Parada</i> <i>Director</i>	
10. Sector <i>DPR</i>	Code	11. No. of Copies	
12. Authorship <i>Márcio Nogueira Barbosa</i> <i>Sérgio de Paula Pereira</i>		14. No. of Pages <i>21</i>	
13. Signature of first author <i>[Signature]</i>		15. Price	
16. Summary/Notes <i>The main objective of this report is to present the current status of the INPE/LANDSAT Facilities, and the results obtained during the period of November 1977, up to April 1978.</i>			
17. Remarks <i>Prepared for the LANDSAT Ground Station Operations Working Ground Meeting - Sweden - May, 1978.</i>			

SECTION I

SYSTEM STATUS BY THE END OF 1977

1.1 - General Achievements

During 1977 the Brazilian Institute for Space Research was capable of maintaining, as foreseen, the positive growing number of users as well as the progression of number of the products delivered to external users. This, in result, has firmly consolidated the acceptance and the potential utilization of the LANDSAT imagery in the field of remote sensing of natural resources in South America. In parallel, in spite of having faced yet some technical and logistical problems, several accomplishments were possible under both a technical and an operation point of view. Many reasons have contributed to attain the significant growth and improvement of the system output: financial support from Government Agencies; interchange with NAPL (Canada) and NASA which provided valuable assistance on subjects related to their technical experience, internal supports from other INPE Departments (in special the Department of Meteorology) and, evidently, the progressive upgrading of the technical skill of the staff directly involved on the image production.

1.2 - Image Production Department

1.2.1 - Organizational Structure

- The structure of the Image Production Department (formerly Image Production Center) was revised to make it more effective concerning the operational aspects. Three Divisions were formed responsible for the data acquisition, data processing and data distribution, respectively. Both the Photo Lab and Electronic Lab are now under the same "Processing Division" which controls as well the activities of Quality Control & Engineering Maintenance. See Figure 1 on next page.

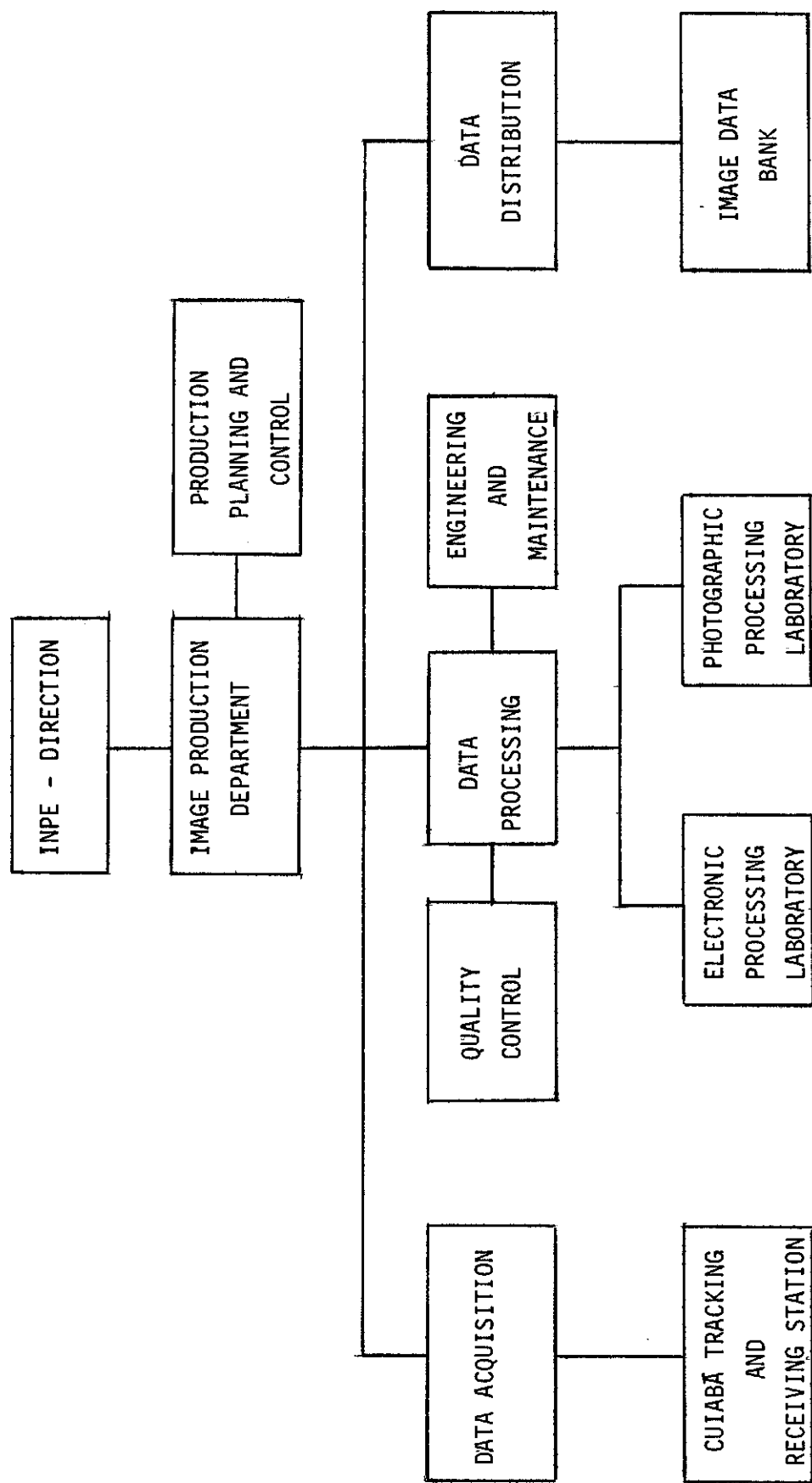


Fig. 1 - The structure of the Image Production Department

- The procedures for the Planning & Production Control, tied directly to the Department, were reworked to attain an optimization in the utilization of the processing equipment capacity, consumable and operators labor.
- The Microfilming Sector is now being controlled by the Distribution Division once that is involved with aspects that are in a special way, user oriented.

1.2.2 - Annual Operating Funds

The year of 1977 also characterized by a considerable decrease on the amount spent with the consumption of spares and consumables, comparatively with 1976, in spite of an increase greater than 50% on the delivered output products to users. Undeniably this resultated from improved production operational procedures, faster feedback from the quality control sections and optimization of the machines and material. See table below as a reference

TABLE 1

ANNUAL OPERATING FUNDS

FUNDING CATEGORIES	SPENT DURING 1976	SPENT DURING 1977
Spare parts/ consumables	416 Kdollars	229 Kdollars
Salaries	460 Kdollars	489 Kdollars
Equipments	158 Kdollars	94 Kdollars
Furniture/Tools	27 Kdollars	31 Kdollars
Building	-	181 Kdollars
Other expenses (Services)	75 Kdollars	88 Kdollars
	1.136 Kdollars	1.112 Kdollars

* Not included the payment concerning the use of satellite

1.3 - Cuiabá Tracking and Receiving Station

- Approximately 650 new orbits were recorded during the year of 1977.
- The quality of the recorded data during 1977 was generally better and more stable than the former years.
- It was possible to maintain in stock sufficient number of Ampex head assemblies and a larger amount of replacement parts for the overall station.
- It is now possible to record satellite passes directly over the Station without loss of data, at the zenith, after modifications in the tracking system.
- The Production of Quick-Look imagery, resumed by the end of February/1977 was normal up November/1977 when had to be stopped to allow development of the work necessary to modify the present system to include capabilities such as annotation and gray scale on the sides of the images, corrections for sensor mismatch and earth rotation, and scene framing synchronization with RBV shutter times. The annotation includes information of scene identification and scene location necessary to upgrade the former quick-look imagery into a fast delivery-low cost product to user. After done the modification the quick-look experienced a temporary phase where some difficulties were found when it was attempted to exercise the new configurations (new camera, other film emulsion, different settings for current focus, etc....).
- An unexpected tape recorder capstan anomaly has occurred during just a few passes in December/1977 resulting in an output signal amplitude oscillation that although tolerable for film processing was prohibitive for CCT production

(specially because play back speed is one fourth of recording speed). The problem was corrected and nominal quality data recording was took up again.

- On December 25th 1977, the entire station severely suffered from being directly struck by a thunderbolt. A large number of equipments were seriously damaged.

To face this situation, the Engineering and Maintenance technical staff from the Cachoeira Paulista's Laboratories moved immediately to Cuiabá Station joining their maintenance people in a great effort, attempting to bring the station back into operation. Great difficulties were encountered, aggravated yet by the damage that the lighting cause to the communication lines between the Station and the Cachoeira Paulista or São José dos Campos Centers.

The equipments below, now back in operation, were submitted to an extensive corrective maintenance (replacement of several faulty modules cards and components):

- 1) Feed assembly
- 2) Antenna pedestal
- 3) Parametric amplifier controller
- 4) Scan code generator
- 5) Tracking converter
- 6) Servo control unit
- 7) PSK demodulator
- 8) MSS amplifier
- 9) MSS bit synchronizer
- 10) Demultiplexer
- 11) MSS tape recorder

Other ones like the S-Band Test Generator, the Antenna Tape Programmer and also some of the mentioned above (antenna pedestal, tracking converter, MSS amplifier and demultiplex) had had their circuitry modified due to the lack on stock of some of the failed components.

Finally, after all this great number of changes and replacements, critical modules ended up requiring complete new set of adjustments to compensate for untuned spares and unavoidable circuitry modifications. The head assembly, the Drive Amplifier, the Servo Control Unit, the Bit Synchronizer for PCM Data, the MSS Receiver, the Bit synchronizer for MSS data and the S-Band Test Generator were the ones where lot of new operational adjustments had to be performed.

The system also lost the "auto-track" mode of operation due to the collapse of the module "*monoscan converter*" not available on the stock. This, besides being a long delivery item, can only be manufactured under special request. We are relying on having this item on site within the next sixty days. Meanwhile the station is performing under the "programmed track" mode of operation, using a perforated paper tape.

The "programmed track" mode of operation was never exercised in the past under a normal operational basis. Thus, some initial problems (accuracy of the perforated data, satellite tracking start up frequency of tape generation, uncorrections on tape code) will have to be overcome to allow attainment of successful track on consecutive paths. Due to some present limitations of the program that generates the perforated tapes from orbital elements, it is being noticed some residual errors on the system causing the acquisition of noise data at low antenna elevation angles. The situation was aggravated by the fact that the equipment responsible for tape punching is performing some times unreliably due to the heavy usage. Anyway, all the efforts were being drawn forwards to achieve, as so reliable as

possible, a back up system for programming the antenna track. The Feed Assembly system became operational only within certain limits due to a present instability on temperature and gain. The temperature related problems are likely associated with a "weatherproof" connector that also suffered a partial damage. The parametric amplifier now in use was the one available on stock when lightning occurred. After having it installed it was noticed the presence of a large misalignments difficult to be all eliminated in a short time.

Concerning the Quick-Look Monitor it was not possible to put it back into operation due to a generalized failure of its power supplies. Our stock did not have enough provisions to account for all the breakdowns and the manufacturer was contacted through an urgent request to expedite procurement of the spares. According to one of the contacts we had been informed that one of the faulty cards was no longer manufactured, but a new card will be provided which will require some modification in the present system. This is the reason we are only expecting to have the complete set of spares for the QLM on site by the end of April/1978.

Decision was made to expand the present station grounding system into a much larger one with new power arrester subsystem, trying to decrease to a minimum the possibility of occurrence of such mistrap.

The great difficulties being faced to achieve a definite and unquestioned lightning arrester protection system around the station are caused by the considerably high ground resistance of surrounding terrain.

The faulty feed assembly and parametric amplifier were returned to the manufacturer for repair. Plans are to have then back on site within ninety days.

1.4 - Electronic Processing Laboratory

During 1977 the production of the Electronic Lab was higher than the cumulative production of the former years. To the Data Bank it was delivered 481 new first generations besides 235 regenerated orbits. As happened in the last year, the regenerated orbits are to replace the old or present rejected original by newer ones, with improved quality and updated format. This total of 716 orbits results in *65 orbits/month* average, or 43 new orbits/month if only the new originals are to be considered. It must be mentioned that those figures were reached, despite the fact that the production had stopped for about two months due to problems associated with entirely defective SO-219 film emulsion batches provided to INPE by the manufacturer.

Every roll of these lots had in common such an ineffective conductive layer that all the imagery produced in EBIR using that emulsion happened to show the occurrence of drastic fog due to electrostatic discharge on the film. Large geometrical errors also resultated from the electric charge buildup on the film surface as it has recorded (taking into account that the SO-219 film is much slower than the NASA's EBIR film SO-438, much higher density currents are required to record on it). Thus, large geometric distortions are to be expected on a film where the conductive layer is absent or insufficient.

Kodak has expedited the exchange of the 250 defective SO-219 film rolls. 164 rolls were first sent to partially replace the lot. However only a small part of this shippment was possible to be used because the same emulsion problem repeated (through) in at least, 90% of the lot. The remaining 86 rolls were only received on January 1978.

- The Electronic Lab. also produced and delivered 145 MSS CCT scenes to the users.

- Concerning the RBV data, the operational software continued being revised with the purpose to implement on it the operational aspects already reached on the MSS line. As happened in the MSS mode, the RBV original software package will have to be extensively modified.
- At the beginning of December, 1977 the Electronic Lab. finally received the additional computer system expected to take care of all the support production activities as well to allow development and optimization of software package without interference with the main production line. This is one way we expected to have increased our production potential once that the mentioned support activities are spending a significative portion of the system operation lines.
- This system in a near future will be capable to control the image production, to generate the catalogs and will be dedicated to assist our users through a terminal network. Unfortunately the majority of the new operational system software has its delivery delayed.
- In 1977 an important goal was reached in the Electronic Lab: all the required modifications of the present hardware to allow processing of LANDSAT C Thermal Band was designed and totally implemented at INPE Facilities. The software was also modified to account for the new data rates but *the necessary correction factors and constants will only be implemented after officially published by NASA*. Anyway the software changes will be done following the priority criteria below, this is:
 - 1st. - film processing, daily path
 - 2nd. - CCT processing, daily path
 - 3rd. - film processing, night path
 - 4th. - CCT processing, night path
 - 5th. - RBV processing, daily path.

We should mention the foreign manufacturers quoted the hardware modifications around US\$ 360,000.00 dollars while INPE staff spent less than US\$ 5,000,000 dollars including components and labor. A preliminary test for the performance of the new hardware and software was done at December 12th, 1977, when the LANDSAT C data from a Test Tape provided by NASA were run through the system with successful recording on film (no corrections were applied).

- From December 12th 1977 to December 22th 1977 Mr. S. Pereira, Chief Engineer of our Processing Division had an opportunity to be at Goddard Space Flight Center being in contact with the technical staff involved on LANDSAT operations. Technical aspects of NASA, NDPF and IPF Systems were discussed generating valuable information covering important characteristics that are similar on both NASA's and INPE's systems. Some of the important points brought up during the visit were:
 - . geometric accuracy of LANDSAT imagery (mathematics, actual source of errors, systematic errors, satellite attitude related problems);
 - . shading table for RBV data;
 - . format and annotation for RBV LANDSAT C sub-scenes;
 - . radiometric calibration (and de-stripping) procedures for bands 4, 5, 6 and 7 (model, cal sample characteristics, calibration tables);
 - . radiometric calibration model for LANDSAT C band 8;
 - . quality control procedures for 1st and 2nd generation (use of J codes, etc....);
- It was verified that the linear transmission x radiance transfer curve being normally used by NASA in its 1st Generation EBIR film would certainly produce much more contrasted images specially on band 5 over the Amazonian Region.

in Brasil than the ones presently being processed in the Electronic Lab, where there is linear relationship between radiance and density on the film. Thus there are plans in a near future to change our 1st generation standard to another one based on linear transmission versus voltage (radiance).

Some points related to the generation of BFET tapes at INPE were also discussed during the visit (GMT time, accuracy of orbital elements, the error contribution of the AMS subsystem, etc).

It could be worth to mention other achievements of the Electronic Lab during 1977. They are:

- modification on the MSS production software resulted in a substantial improvement of the registration between bands in the 70 mm EBIR film, for color composites.
- several of our software routines provided by the original manufacturer were revised and extensively modified and now it is possible:
 - . to double the speed and to have much increased the reliability of extraction of the data from the PCM tapes recorded at Cuiabá, which contain the necessary information to determine the satellite attitude and time bias.
 - . to reduce to a minimum the chances of operator errors by wrong data entries or commands.

1.5 - Photographic Processing Laboratory

The Photo Lab was also able to keep up to the end of 1977 the production rates reached on August/1977. The number of delivered products to users was 50% greater than in 1976, when we delivered 10.226 images. See item which follows as reference:

. 70 mm B/W positive transparency -	1646 images
. 70 mm B/W negative transparency -	1838 images
. 9 1/2" paper prints B / W -	5782 images
. 9 1/2" B/W positive transparency -	311 images
. 1:500.000 B/W paper print -	2597 images
. 1:250.000 B/W paper print -	1891 images
. 9 1/2" color transparency -	23 images
. 9 1/2" color paper print -	1085 images
. 1:500.000 color paper print -	228 images
TOTAL	15401 images

B/W Mosaics for two Brazilian regions (south and south-east) covered a total of 1.5 million square kilometers. The mosaic for the north-east region started being assembled.

Color Mosaics for small regions were also produced.

In both the Automatic and Manual Processing Sectors the exposure and processing parameter for all the productions lines are derived from densitometry tables regularly updated with new incoming generation. This has decreased the delivery time for all the output products and in special way is furnishing the correct data to statistically support the system.

1.6 - Data Dissemination

At the end of 1977 the number of users engaged on the program reached the figure of 301, almost doubling if we compare the number 156 corresponding to end of 1976. In order to present the status of users, products delivered and percentages by scale, the following tables are shown:.

TABLE 2

NUMBER OF USERS, AT THE END OF 1977

TYPE OF USER	NUMBER OF USERS
Requesting and receiving data regularly	171
Sporadic requesting and receiving data	50
Receiving catalogues and information	80
TOTAL	301

TABLE 3

NUMBER OF PRODUCTS DELIVERED TO *EXTERNAL* USERS

1973	1974	1975	1976	1977
323	1230	2044	7542	10045

- The new building for the Data Bank will be ready in August/1978. The new facility will certainly contribute to improve the interchange between INPE and users.

SECTION II

PRESENT STATUS OF INPE/FACILITIES

2.1 - Antenna Pointing Data

Orbital Elements and Equator Crossings, sent by NASA now directly to Cachoeira Paulista, air mailed, being used regularly.

2.2 - Cuiabá Tracking and Receiving Station

After an intensive work attempting to fix all the damaged equipments and subsystems, Cuiabá Station recorded its first orbit with acceptable, although regular, quality data on January 25th, 1978. From this date on Cuiabá started operations with some problems still pending on the system in special way related to: bad coding on the paper tape; paper tape data drifted from the actual orbit position; parametric amplifier marginal gain; parametric amplifier unstability due to temperature variation; etc. This causes the recording of unrecoverable noisy data and sometimes partial or complete loss of the path. The main reason for all the parametric amplifier malfunctions was a "weather proof" connector (MS 3106 E36-9P) partially damaged during the struck, replaced only on March 31st, 1978, when a new one reached us from U.S.A.

The paper tape problems, as mentioned before, were specially related to the present system capacity in generating them, but these difficulties were eliminated from the beginning of April on, adapting a new system to make the tapes within the required schedule and reliability, (hardware and software changes were considered).

It is likely that only about 50% of the data in this period will be recoverable. There will be cases where the noise content will not be acceptable for CCT production, although yet regular quality images could be produced on film.

It is our intention to provide NASA with a final list which will include the orbits from this adverse phase (January 25/ 1978 to March 28/1978) that will meet some quality criteria for CCT and/or film processing. The orbits not included in this list would have shown many problems that would make them not compatible with the requirements for data processing. This list will be closed as soon as Cuiabá resume normal operation.

The production of Quick-Look images (1:1.000.000 scale) to users could not yet be initiated once that the film recording equipment is still down. The faulty cards and the modified ones being sent by the manufacturer are not yet on site.

2.3 - Electronic Processing Laboratory

- Spares of FR-1928 head assembly in acceptable level.
- The 86 rolls of S0-219 film which arrival date was January/78 have been the only good ones in stock. Kodak did not yet replace the remaining 164 rolls that according to our tests were defective.
- During January up to February 8th 1978, the Cachoeira Paulista's Laboratories stopped down their activities due to vacation. From this date up to middle of March the main activities developed in the Electronic Lab were related to the start up operation of the new support system just arrived. All the software routines that supported the production in the old system have been adapted and/or modified to account for the new requirements, new characteristics, and/or new operational procedures as far as the new system is concerned. All the hardware subsystem involved on the image correction tape generation were transfered to the new system. The final software package that will generate an Image Correction Tape is not operational yet since the mag tape units, that are

going to be shared by the two subsystems, are still tight up to the old system. This situation is being caused by the lack of an interface circuitry not available yet on site (a bus switch).

- The Electronic Lab experienced also some problems with the EBIR Controller unit. These were difficult to be eliminated due mainly to its intermitency.
- It was continued the check-out of the hardware for LANDSAT 3 data processing.
- New format for our film products has been defined and implemented according to discussions during former LGSOWG meetings.
- Effort is being spent to have the technical staff more familiar with the particularities of our geometry accuracy and mathematical models.

2.4 - Photographic Processing Laboratory

- Produced over 3.000.000 square Km of the Brazilian B & W mosaic using LANDSAT imagery. Following mosaics are deliverable: South, South-East, and North-East regions.
- The production of Black & White and Color products to users is being normal with the total capacity of 2500 images/month (including all formats).
- One additional Black & White Enlarger was acquired and already installed. It is goind to support the 1:250,000 (LANDSAT scale) production line. Webster film cleaner is also being submitted to customs clearence.

2.5 - NASA BFET's

BFET's are being regularly received and we are covered for orbits up to February 19, 1978.

2.6 - Generation of BFET's at INPE

Dr. Gylvan Meira Filho from the Department of Meteorology is looking forward to receive the closing up of the remaining open items included in our letter of Oct/25/1977. Some of the topics of this letter were introductorily discussed during the visit of Mr. S. Pereira at NASA - GSFC, on December 1977 (see item 1.4).

2.7 - Data Dissemination

Following numbers represented the material delivered to the users from February 1978 to March 31st, 1978 (the production could not be higher only due to the lack of enough requests).

. 70 mm B/W positive transparency	40 images
. 70 mm B/W negative transparency	46 images
. 9 1/2" B/W positive transparency	22 images
. 9 1/2" B/W Paper Print	1075 images
. 9 1/2" Color positive transparency	12 images
. 9 1/2" Color Paper Print	636 images
. 9 1/2" B/W Paper Print Quick-Look	- -
. 1:500.000 B/W Paper Print	240 images
. 1:500.000 Color Paper Print	28 images
. 1:250.000 B/W Paper Print	193 images
TOTAL	2292 images
. CCT's produced (set of)	14

TABLE 4
PERCENTAGE OF DELIVERED PRODUCTS BY SCALE

SCALE	PRODUCT DESCRIPTION	1976 (%)	1977 (%)
1:3.704.000	Positive or Negative Transparency	38	23
1:1.000.000	Paper Print (B & W)	47	37
1:1.000.000	Positive Transparency (B & W)	—	2
1:1.000.000	Paper Print - Color	—	6,9
1:1.000.000	Positive Transparency (color)	—	0,1
1:500.000	Paper Print B & W	11	17
1:500.000	Paper Print (color)	—	2
1:250.000	Paper Print B & W	4	12

- As the Electronic Lab. processes the orbits from the back log we are approaching to be in phase with Cuiabá Station. Besides, the requests from the users have higher probability to cover orbits already electronic processed which, in terms, can decrease the average delivery time.
- Besides this EMFA has widely released the delivery of images over areas formerly considered of national security, and therefore requiring special authorization. This has also contributed to substantially reduce the delivery time.
- Since Brasil is a country with a very high percentage of cloud coverage it has been established a "criteria of usefulness" for the recorded orbits. This criteria takes into account the number of cloud free points in every orbit, based on Quick-Look imagery. Thus, there is a much higher priority in electronic processing the orbits with less cloud coverage which will satisfy potentially a large number of users. Orbits with high percentage of clouds will only be processed under a special request. The purpose is also to speed up the phase in with Cuiabá.

- . Catalogue Volume VII had its last update in January/78 and has already been sent to the users.
- . Catalogue Volume VIII (for the year of 1978) will have its first issue on April/1978.
- . Last shipment of Masters MSS tapes for LACIE PROGRAM was programmed according to the telex of October 21/1977 (first request) and was sent on March 24th, 1978. The second request (telex of February 27/1978) is in process to be shipped in one full package. All orbits for this request will be within 40 tapes.
- . It was installed an User Service Center, using microfilm readers with LANDSAT images, in the following cities: Cachoeira Paulista, São José dos Campos and Natal. Before July/1978 are planned Centers in Brasília and Rio de Janeiro.
- . On January and February/1978 EROS Data Center provided an extensive training program to Mr. José Luiz Aguirre, Chief Engineering for the Data Bank, in the area of LANDSAT data base handling.

SECTION III

ANNEX

Transparencies presented during LGSOWG meeting of
Sioux Falls, October/1977.

NUMBER OF LANDSAT SCENES
RECEIVED AND RECORDED

SEPT. 30, 1977

(MSS) LANDSAT-1 = 1544 ORBITS

APPROX. 25.000 FRAMES

(MSS) LANDSAT-2 = 723 ORBITS

APPROX. 16.000 FRAMES

INPE - SÃO JOSÉ DOS CAMPOS - BRAZIL

**NUMBER OF LANDSAT SCENES
CONVERTED TO IMAGES**

SEPT. 30, 1977

(MSS) LANDSAT-1 = 405 ORBITS

APPROX. 6.500 FRAMES

(MSS) LANDSAT-2 = 206 ORBITS

APPROX. 4.500 FRAMES

NOTE:

- AVERAGE NUMBER OF SCENES/ORBIT,

LANDSAT-1 = 16

LANDSAT-2 = 22

- CCT's ARE GENERATED UNDER USFR REQUEST

(NO MASTER COPIES ARE AVAILABLE)

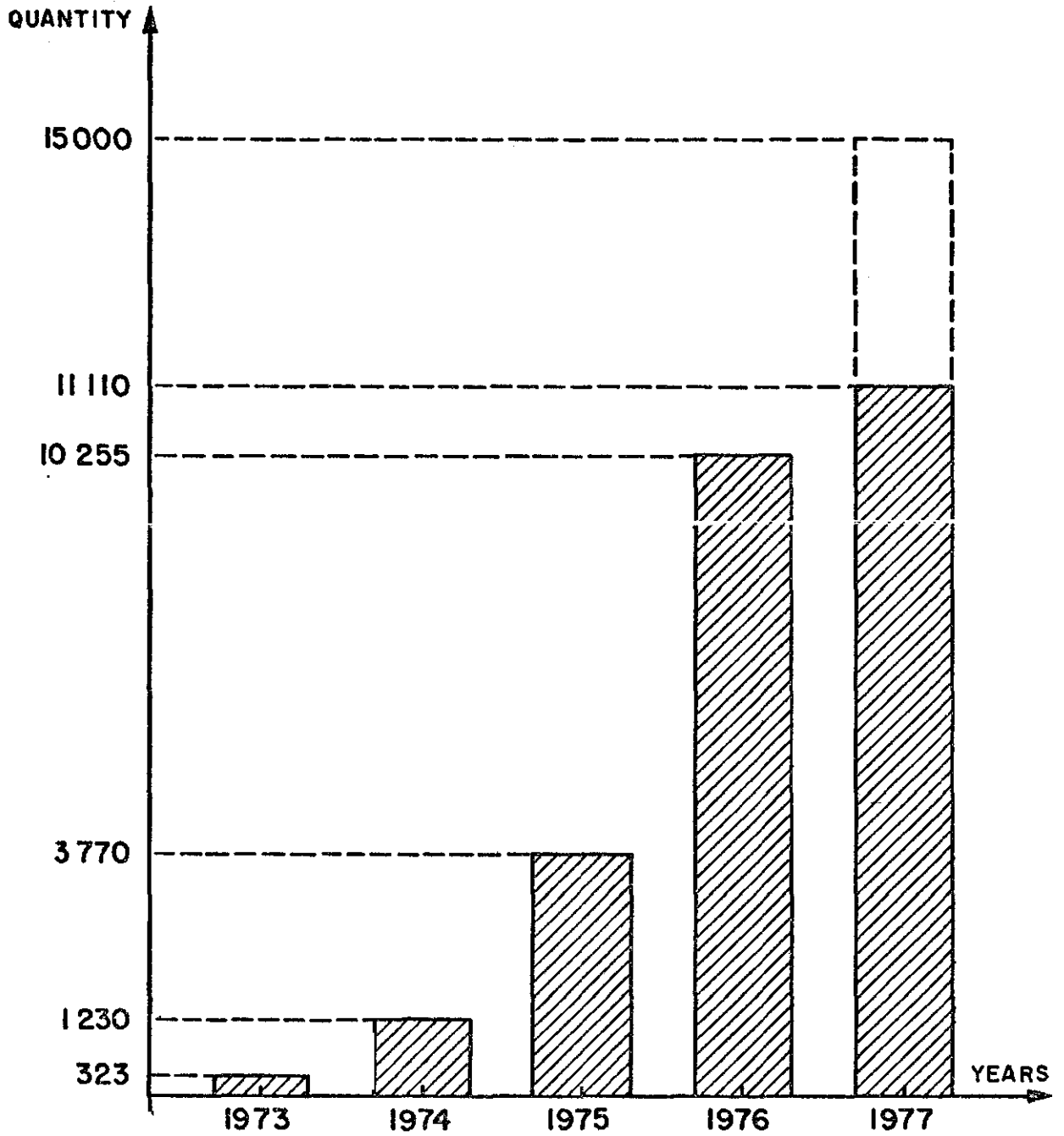
INPE - SÃO JOSÉ DOS CAMPOS - BRAZIL

IMAGES DATA BANK

- USERS (36% ↑)	TODAY	MARCH 1977
- NORMALLY REQUESTING DATA	165	110
- SPORADICALLY REQUESTING DATA	50	46
- ONLY RECEIVING INFORMATION	23	19
TOTAL	238	175

- NEW BUILDING PLANNED TO BE READY ON APRIL, 1978

NUMBER OF IMAGES DISTRIBUTED TO USERS



A

NUMBER OF IMAGES DISTRIBUTED TO USERS

YEARS TYPE	1973	1974	1975	1976	1977 UP TO SEPT.
70mm B&W	259	464	1168	3814	2954
9 1/2" B&W	44	658	1993	4804	4416
20" B&W	-	55	316	1143	1591
40" B&W	20	53	293	453	1171
9 1/2" Color	-	-	-	41	845
20" Color	-	-	-	-	133
CCT's(1 SCENE)	-	10	30	141	110
TOTAL IMAGES	323	1230	3770	10255	11110

**TOTAL REVENUE RECEIVED FROM
SALES OF LANDSAT IMAGES/CCT'S
AND INTERPRETATION SERVICES**

TYPE \ YEARS	1973	1974	1975	1976	1977
	US \$	US \$	US \$	US \$	US \$
DIRECT SALE	-	4,808	26,020	56,015	35,329
INTERPRETATION SERVICES	-	-	22,050	41,396	69,937
TOTAL US \$	-	4,808	48,070	97,411	105,266
EXPECTED 1977 US \$					117,500

OPERATIONAL STATUS OF FACILITIES

Cuiaba Station

- DATA ACQUISITION OF LANDSAT-2 (MSS) BEING NORMAL SINCE OCTOBER 20, 1976
- QUICK LOOK IMAGERY PRODUCTION REASSUMED AT THE END OF FEBRUARY, 1977 (MODIFICATIONS - DURING NOVEMBER, 1977)
- DATA ACQUISITION OVER CUIABA SITE BEING NORMAL SINCE LAST JULY.

ELECTRONIC PROCESSING LAB.

- MSS DATA PROCESSING (FILM AND CCT GENERATION) OF LANDSAT 1 AND 2 UNDER USER REQUEST.
- PRODUCTION RATE FOR FILMS INCREASED
FROM 28,6 ORBITS/MONTH (AT THE END OF THE LAST YEAR)
TO 36,2 ORBITS/MONTH, UP TO SEPTEMBER.
- ADDITIONAL COMPUTER SUB-SYSTEM PLANNED TO BE INSTALLED ON NOVEMBER
 - 48 K MEMORY
 - 7,5 MBYTES DISC MEMORY
 - 2 DISPLAY TERMINAL
 - 1 HARDCOPY "
 - 1 PRINTER
- BFET's GENERATION DEPENDING ON THE FINAL TESTS (END EXPECTED DECEMBER).

PHOTOGRAPHIC PROCESSING LAB.

- IMAGE PRODUCTION UP TO SEPTEMBER 30, 1977 WAS 11,110 IMAGES
(DURING 1976 THE TOTAL AMOUNT WAS 10,225 IMAGES)
ESTIMATION FOR THIS YEAR-15,000 IMAGES
- LANDSAT COLOR PRODUCTS NORMALLY PRODUCED IN 1:1.000.000 AND
1:500.000.
- BW AND COLOR MOSAICS BEING ASSEMBLED (APPROX. 1.5 MILLION KM² -
RSS CHANNEL 7 - READY).