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SERE/BANCO DE DADOS

Title: ERTS IMAGES SECTOR OF INPE's DATA BANK

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INTRODUCTION

It is on the control and conservation of the resources of our Earth - wholly vital - that depend the welfare and the future of succeeding generations, and the most promising concept fruit of the most advanced technology - is the Earth Resources Technology Satellite - ERTS.

The first of a series was launched in July 1972 by NASA, programmed to transmit information to earth receiving stations, in different wavelenghts.

The ERTS is operating in nearly polar, sun synchronous orbit, at an approximate altitude of 912 Km, maing it possible to collect data of the surface of the Earth, through repetitive sensing every 18 days.

On board the ERTS, there are installed high precision sensing instruments such as the multispectral scanner and three vidicon cameras.

The multispectral scanner, as well as the vidicon cameras, in their repetitive scanning regions, supply information covering 35,000 square kilometers per frame, with a resolution of the order of 80 meters.

Brazil is the third country after the USA and Canada which has built stations for the acquisition and processing of ERTS images.

At the Cuiaba station, operating since May 1973, the signals are received at a 10 meters diameter parabolic antenna which, through an automatic tracking system, follows the satellite from horizon to horizon.

At Cachoeira Paulista is located INPE's Image and Photo Processing Section. That is where the tapes from Cuiaba are processed. A complex and sophisticated image processing equipment, in operation since May 1974, transforms the recorded data into image.

The initial product is a black and white 70 mm film, it being possible to obtain images up to a scale of 1:100,000. Color compositions are available from 3 different bands of the Multispectral Scanner, besides Computer Compatible Tapes.

Later, all the products are coded and stored in INPE's Data Bank, from which satellite data can be distributed, at relatively low cost, to scientists of research organizations or universities and to government or private agencies engaged on the survey of earth resources.

However, it is necessary to have a perfect control of all products obtained by Cuiaba Station, processed by Image and Photo

Processing Section at Cachoeira Paulista, and available for users, besides the researches involving these products.

The system built at INPE for this control, is the main object of this report.

Figure 1, shows the Data Bank involvement on the ERTS project.

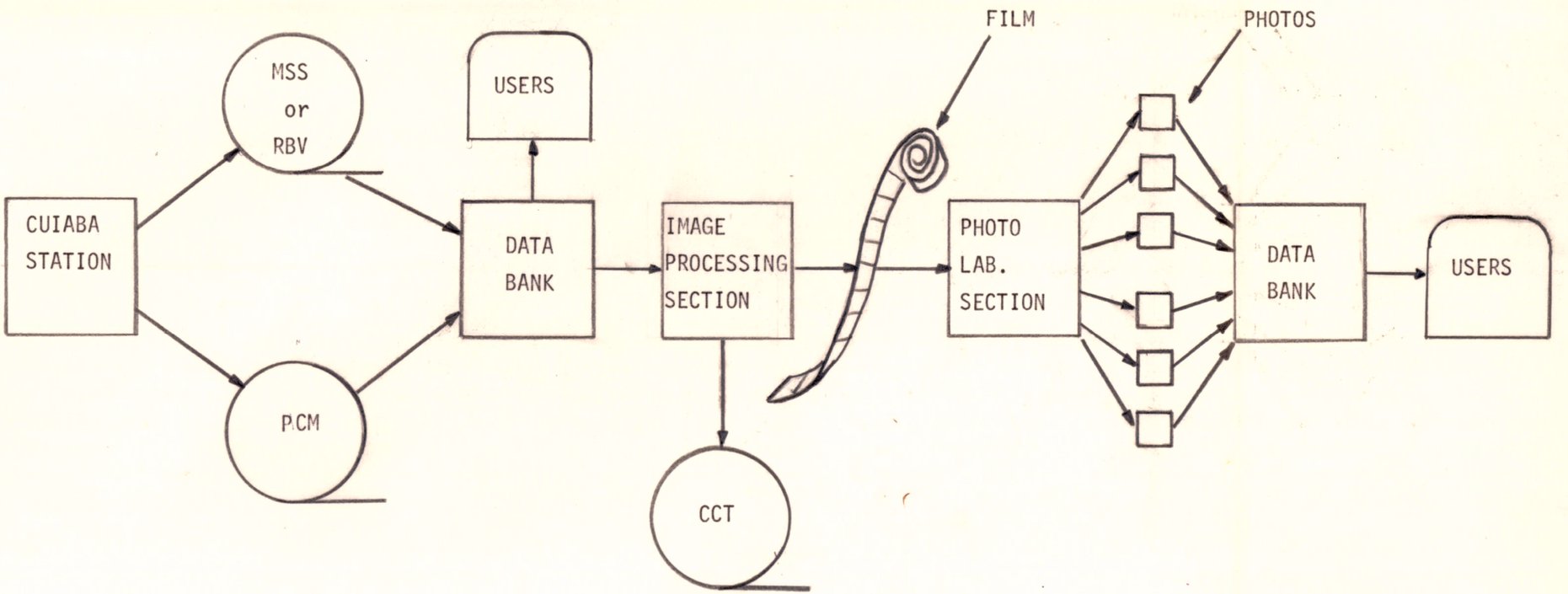
MSS
or
RBV
USERS
FILM
PHOTOS
CUIABA
STATION
DATA
BANK
IMAGE
PROCESSING
SECTION
PHOTO
LAB.
SECTION
DATA
BANK
USERS
PCM
CCT

Figure 1

The present system, called BIT, Earth Images Data Bank, is subdivided into seven phases:

1 - Latent Images Bank (tapes recorded at Cuiaba Station);

2 - Real Images Bank;

3 - Users and Researches Bank;

4 - Security Areas Bank;

5 - Users Work Orders Control;

6 - Shipping Control;

7 - Users Reports Control.

Figure 2, shows the information flow diagram between all phases and gives a better idea of the BIT system structure.

A brief description of the above phases is given below.

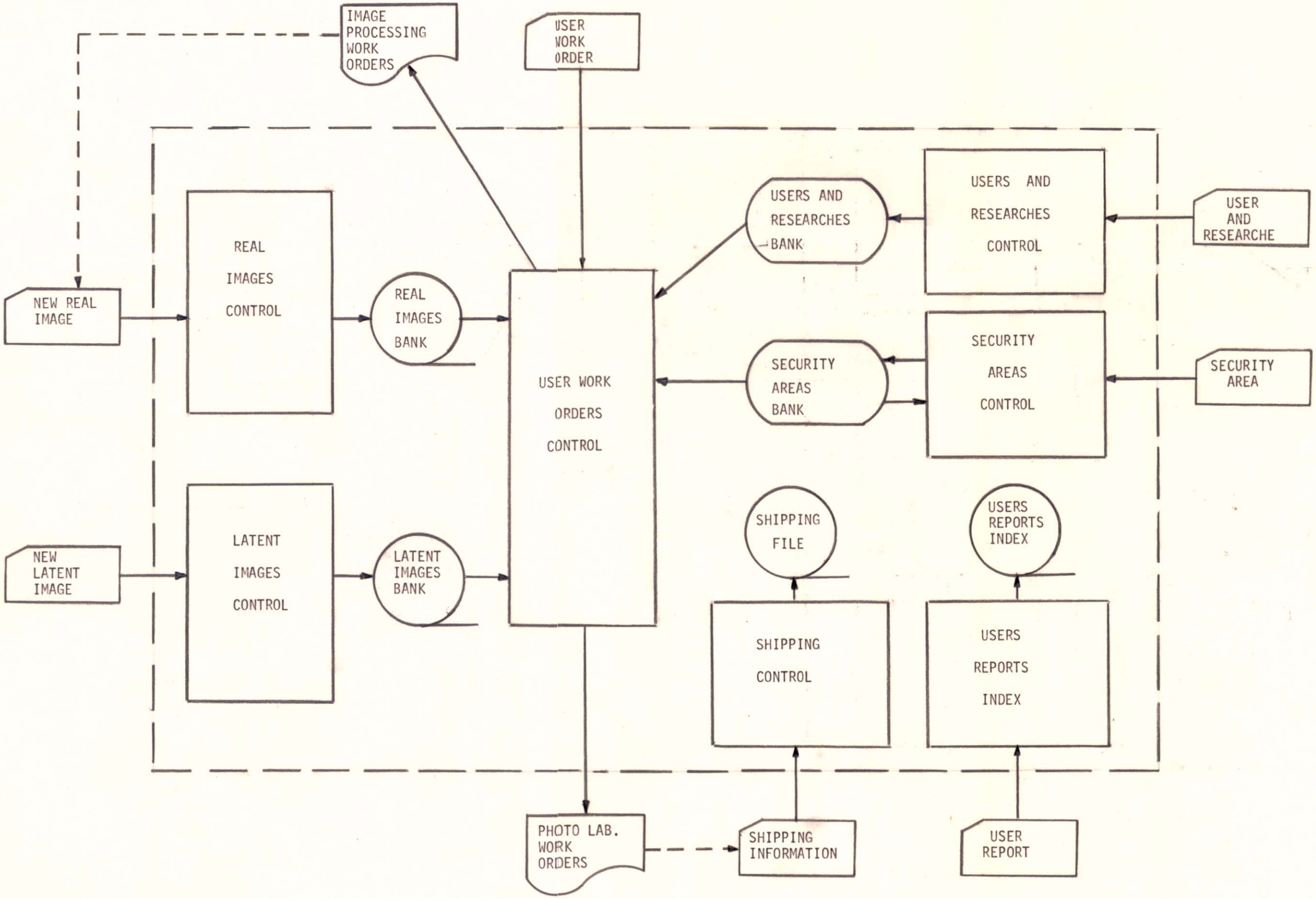
IMAGE PROCESSING WORK ORDERS
USER WORK ORDER
NEW REAL IMAGE
REAL IMAGES CONTROL
REAL IMAGES BANK
USERS AND RESEARCHES BANK
USERS AND RESEARCHES CONTROL
USER AND RESEARCHE
USER WORK ORDERS CONTROL
SECURITY AREAS BANK
SECURITY AREAS CONTROL
SECURITY AREA
NEW LATENT IMAGE
LATENT IMAGES CONTROL
LATENT IMAGES BANK
SHIPPING FILE
USERS REPORTS INDEX
SHIPPING CONTROL
USERS REPORTS INDEX
PHOTO LAB. WORK ORDERS
SHIPPING INFORMATION
USER REPORT

Figure 2

1. Latente Images Bank

This phases handles the information concerning the magnetic tapes recorded at Cuiaba Station.

Three different kinds of tapes are recorded there, besides the Ephemeris tape weekly sent by NASA to INPE.

a - MSS (Multispectral scanner) tape

b - RBV (Return Bean Vidicon) tape

c - PCM (Telemetry) tape

Each tape sent from Cuiaba is coded and all information about the orbits, on the tape, are stored in the Bank.

An example of the computer printout is shown in Figure 3.

This bank provides information about which tapes were recorded and where to find the orbit or orbits we would like to process.

BANCO DE DADOS - I N P E

FITAS MAGNETICAS - PROJETO E R T S

FITA DE DADOS MSS - GRAVADOS EM CUIABA

ORBITA BASE 164

DATA	SATELITE	ORBITA	NUM. FITA	DADOS DE INICIO		DADOS DE TERMINO		DADOS DE DURACAO	
				HORARIO	POSICAO	HORARIO	POSICAO	TEMPO	COMPRIM.
30/07/73	1	5184	329	12:26:25	341	12:35:53	3184	9:27	2843
4/09/73	1	5686	574	12:25:32	127	12:34:55	2942	9:23	2815
22/09/73	1	5937	698	12:24:13	130	12:34:30	3220	10:17	3090
28/10/73	1	6439	906	12:23:21	3628	12:33:30	6671	10:09	3043
15/11/73	1	6690	1023	12:24:11	2517	12:33:33	5332	9:22	2815
3/12/73	1	6941	1147	12:24:10	123	12:35:05	3400	10:55	3277
8/01/74	1	7443	1333	12:22:32	4720	12:30:24	7089	7:52	2369
26/01/74	1	7694	1457	12:23:30	1690	12:32:00	4240	8:30	2550
30/08/74	1	10706	1945	12:17:19	1656	12:24:42	3866	7:23	2210

Figure 3

2. Real Images Bank

This phase handles the information in film or photo forms, processed at the Image and Photo Processing Section, at Cachoeira Paulista.

Each time that one film or photo enter into this Bank, the interested users are automatically notified.

Information about cloud cover and quality for each frame are also stored in the Bank.

With this bank, we can know which products are readily available for the users.

An example of the computer printout is shown in Figure 4.

BANCO DE DADOS - INPE

17/01/74 LISTAGEM DE IMAGENS POR PRODUTO NO. (ERTS) PAGINA 87

PRODUTO NO.	DIMENSOES	APRESENTAÇÃO	DISPOSITIVO	CANAL	TIPO	NUMERO	LATITUDE	LONGITUDE	DATA	HORA	CN
E-1214/12520-5	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208112	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-6	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208113	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-7	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208114	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-4	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208199	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-5	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208200	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-6	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208201	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-4	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208179	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-5	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208180	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-6	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208181	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12520-7	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208182	S/04/12/00	W/047/57/00	22/02/73	12/52	
E-1214/12522-4	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208761	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-5	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208762	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-6	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208763	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-7	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208764	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-4	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	209475	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-6	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	209476	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-7	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	209477	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-4	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208773	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-5	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208774	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-6	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208775	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12522-7	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208776	S/05/39/00	W/048/19/00	22/02/73	12/52	
E-1214/12525-4	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208765	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-5	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208766	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-6	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208767	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-7	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208768	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-4	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	209478	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-6	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	209479	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-7	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	209480	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-4	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208777	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-5	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208778	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-6	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208779	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12525-7	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208780	S/07/07/00	W/048/40/00	22/02/73	12/52	
E-1214/12531-4	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	206056	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-4	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	208769	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-5	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	206057	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-5	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208770	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-6	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	206058	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-6	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208771	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-7	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	206059	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-7	0070/0070	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208772	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-4	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	204729	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-4	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	209481	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-5	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	206055	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-6	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	204728	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-6	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	209482	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-7	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	204730	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-7	0070/0070	TRANSP NEGAT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	209483	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-4	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	4	ORIGINAL	209078	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-5	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	5	ORIGINAL	208781	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-6	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	6	ORIGINAL	208782	S/08/33/00	W/049/00/00	22/02/73	12/53	
E-1214/12531-7	0240/0240	TRANSP POSIT - BULK	MULTISPEC SCAN - MSS	7	ORIGINAL	208783	S/08/33/00	W/049/00/00	22/02/73	12/53	

Figure 4

3. Users and Researches Bank

This phase handles the information concerning the users and researches.

First of all, the users must send to INPE a proposal including:

- Agencies' information
- Investigators' information
- Research information

This information will be used to check the future work orders validity.

It is important to say that we assign one number for each research, instead of one number for each user, because for us it is most important to know how many differents researches are in development.

4. Security Areas Bank

This phase handles the information concerning security areas as established by higher authority. In this case the images are subject to special procedures.

5. Users Work Orders Control

At this point, we must have on hand all information furnished by the Bank of Users and Researchers, so that the users' forthcoming requests for products (placed through standard order forms) can be processed. The order forms are checked for coherence.

Afterwards, it is verified if there are no processed orbits on the Bank of Latent Images that may be necessary for the total task. In this case, a processing work order is emitted to the Image Processing Section including these orbits. The users' standard work orders wait until this processing is ready.

When all requested products are on the Bank of Real Images the users' standard work orders are rapidly sent. For this, one work order goes directly to Photo Lab. instead of to Image Processing Section.

Presently available for users in the Data Bank are the following bulk products:

- Black and white, 70 x 70 mm, paper or positive transparency;
- Black and white, 240 x 240 mm, paper or positive transparency;
- MSS colour composition, 240 x 240 mm, paper.
- MSS CCT (computer compatible tape).

Black and white enlargements are also available up to the scale of 1:100,000.

6. Shipping Control

After the users' standard work order have been processed we are ready for the shipping phase. This control is made using parts of information sent to Photo Lab. or Image Processing Section that come back to shipping. Then, with this control, we can know which products were processed and sento to any user. It is also useful in the sense of permitting the control of costs and possible mail failures.

7. Users Reports Control

According with NASA Dissemination Policy, the users must periodically send reports of results based on the furnished products. These results are used to maintain an index of all researches involving products furnished by INPE to any interested user.

Not only that, but the Data Bank Division has the responsibility of storage and retrieved of all information existing at INPE.

Besides ERTS images, books, papers, catalogs, maps, airborne or Skylab images, tapes, microfilms, etc. are the most important information sources that are used by INPE researchers. Each type of information has a similar system for its control.