SPACELAB 1 - METRIC CAMERA
User Handbook and Data Catalogue

Prepared for:
The European Space Agency's Earthnet Programme

by
Deutsche Forschungs- und Versuchsanstalt
für Luft- und Raumfahrt E. V.
Institut für Optoelektronik
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1. Introduction

A Metric Camera was flown on-board ESA/NASA's first Spacelab Mission, which was carried in orbit by the Space Shuttle on STS (Space Transport System) No. 9; the camera was a slightly modified Aerial Survey Camera of the type ZEISS RMK A 30/23.

This Spacelab Mission was originally scheduled for the summer of 1980, but due to various problems with Space Shuttle, the launch was postponed to 1983. Because the camera had to be ready for the 1980 launch date and only a very short period of development was available, no major changes could be introduced to the standard camera system. Also, the waiting period from 1980 to 1983 could not be used for further technical modifications. These were the main reasons why the camera system was **not** equipped with a Forward Motion Compensation.

Since the launch, originally planned for the summer months, was delayed twice from September to October, and then finally to the end of November, the lighting conditions over the earth became very unfavourable as the sun elevation for all camera operations never exceeded 30°.

The first Spacelab flight actually took place from 28 November to 8 December 1983. The orbit inclination was 57° and the flight altitude 250 km. This altitude and the camera's focal length of 305 mm yields an image scale of approx. 1 : 800 000, which results for the 23 cm × 23 cm image format in a ground coverage of approx. 190 km × 190 km per image frame.

For Metric Camera operations, the Shuttle flew with the open cargo bay orientated towards the earth. In this flight attitude, the camera's optical axis looked exactly vertical down to the earth's surface. Deviations from this vertical observation position were in the order of some tenths of a degree with the exception of Operation No. 32, when the deviations were in the order of several degrees - because this operation was carried out during a Shuttle attitude maneuver.

During the Mission approx. 36 h were flown in this earth oriented attitude, of which 4.5 h were suitable for taking photographs over land. Actually approx. 3 h of these were used for camera operations to expose all the film material that was loaded in the magazines.

Thirty-one (31) camera operations were planned pre-mission of which six had to be skipped due to the launch slip from summer to November. Other pre-planned operations were shortened or deleted during the mission, because cloud cover was predicted over the potential target areas. (Deleted were Operations No. 9 and 10). Operations No. 15-21 were lost due to a film transport problem in one of the magazines. Originally planned to last 8 days, the Mission was extended to 10 days, and gave the opportunity for 4 additional operations (No. 32-35). All together 21 exposure series were taken which varied in duration from 2 to 18 minutes.

One thousand nineteen (1019) photographs were exposed of which 546 were on Colour Infrared (CIR) film and 473 on black and white (B/W) film; the CIR-film was Kodak 2443 - Aerochrome film and the B/W was Kodak Double-X Aerographic film. For both films an orange filter (ZEISS D; 535nm) was used. Images were obtained over 66 countries world wide. Figure 1.1. and Table 1.1 show the ground tracks with respect to the countries over which pictures were acquired during the first week of December 1983. The ground tracks/operations are numbered from 1 to 35. Operations No. 1-13 (Image No. 1-546) used CIR-film, and operations 14 to 35 (Image No. 548-1054) used the B/W-film. The missing numbers indicate how many of the planned operations were deleted due to cloud cover or the film transport problem.

For stereoscopic evaluation, the images were made with at least 60% overlap in the flight direction. Over some regions, 80% overlapping photographs were obtained (Ops. No. 1, 8, 12, 25).

To compensate for the low lighting conditions during the mission, relatively long exposure times of 1/500 to 1/250 sec. had to be used, instead of 1/1000 sec., which was originally planned to reduce the effect of image motion during the time of exposure.

The camera was installed inside the pressurized cabin of the Spacelab Module under controlled environmental conditions. The average cabin temperature was 22°C and the air pressure was approx. 1020 mbar. The air was composed of oxygen and nitrogen to an approximately by normal atmosphere.

During the launch phase - and before reentry - the camera and its magazines were stowed in slide-out drawers in the Module racks. For operation, the camera was unstowed by the crew and mounted over a high quality optical window of 41 mm thickness, through which the photographs were exposed. The operation of the camera was fully automatic, in that the start and stop of every exposure series (operation), as well as, the settings for every single exposure were stored in the on-board master computer and were transferred to the camera via a micro-processor. No exposure meter was used for the exposure control to avoid wrong exposure settings caused by single clouds over the target areas. For operations 32 to 35, the exposure settings and start/stop of the exposure series were made manually by the crew.

During the mission, some operational changes to the preplanned operation sequences were necessary. Exposure of the first film (CIR) went according to plan. However, shortly after the scheduled change-over to the B/W - film magazine, it was detected that the film transport was no longer functioning and a film-jam occured in the magazine. In a trouble-shooting action between the ground-team and the crew it was possible to clear this film-jam, permitting further operations of the camera.

Following this action it became clear the crew should assist the film take-up by rotating the film transport indicator disk on the outside of the magazine. In doing so they may have moved the film during an exposure event; this probably happened at the end of the Operation No. 25 causing a slight blurring of some image sections and of the fiducial marks.

A post-mission failure analysis revealed that the film-jam was caused by lack of clearance between the take-up spool and the inner wall of the magazine.

At the end of all the possible pre-programmed operations approximately 80% of the available film had been exposed over the planned target areas. The extension of the mission by two days allowed the crew to use the remaining film on a target of opportunity basis. This enabled the four additional Operations (No. 32-35).

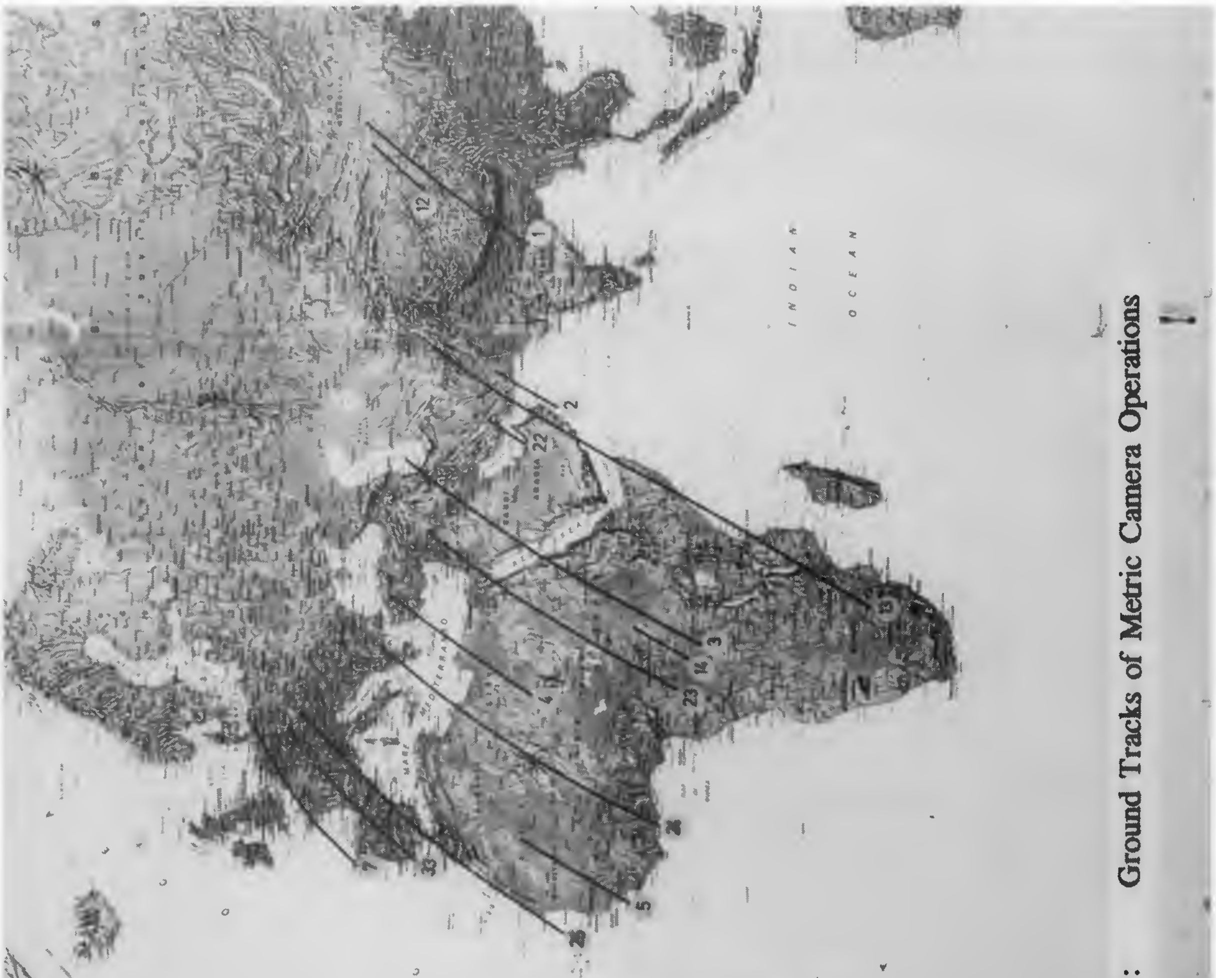


Figure 1.1: Ground Tracks of Metric Camera Operations

Table 1.1: Metric Camera Operations

Ops.No.	Day	GMT	Film	Image No.	Country
1	336	03:30 to 03:36	CIR	1 - 54	India, Nepal Sikkim,Tibet,China
2		04:57 to 05:00	CIR	56 - 73	Oman, Iran,Pakistan
3		06:21 to 06:33	CIR	74 - 146	Zaire,Central African Republic,Sudan, Saudi Arabia, Iraq, Iran
4		07:58 to 08:03	CIR	150 - 179	Libya, Greece,Turkey
5		09:22 to 09:27	CIR	180 - 209	Guinea, Guinea Bissau,Senegal, Gambia, Mali,Mauritania
6		10:41 to 10:49	CIR	210 - 258	Argentina, Paraguay, Brazil
7		11:03 to 11:08	CIR	259 - 289	Spain, France, Belgium, The Netherlands,Germany
8		12:13 to 12:22	CIR	292 - 358	Peru, Brazil, Venezuela
11		15:22 to 15:30	CIR	359 - 407	Mexico, USA
12	337	03:23 to 03:25	CIR	408 - 431	Tibet, China
13		04:34 to 04:53	CIR	432 - 546	South Africa,Zimbabwe,Mozambique, Malawi,Tanzania,Zanzibar,Somalia, Ethiopia,South Yemen,Oman, Iran,Pakistan,Afghanistan
14		06:11 to 06:13	B/W	548 - 561	Rep. of Congo, Central African Rep.
22	339	04:26 to 04:28	B/W	596 - 607	United Arab Emirates,Iran
23		05:49 to 05:59	B/W	608 - 668	Congo,Centr. African Rep.,Chad,Sudan, Egypt,Israel,Saudi Arabia, Jordan, Syria, Iraq
24		07:19 to 07:30	B/W	669 - 735	Ivory Coast, Ghana, Burkina Faso, Niger,Mali,Algeria,Libya,Greece
25		08:50 to 09:02	B/W	742 - 889	Mauritania,Western Sahara,Morocco, Spain,France,Italy,Switzerland Austria, Germany
29		13:19 to 13:21	B/W	899 - 911	Honduras, Belize,Mexico,Cuba
32		22:23 to 22:33	B/W	912 - 952	Canada, USA
33	341	08:33 to 08:38	B/W	953 - 976	Portugal, Spain, France, Germany
34		12:58 to 13:03	B/W	983 - 1012	USA
35		14:25 to 14:33	B/W	1013 - 1054	Mexico, USA

2. The Camera System

2.1 The Components of the Camera System

The camera system is comprised of the following hardware items (Figure 2.1):

- Camera body with optics and mounting brackets.
- Two (2) film magazines containing aerial film of 24 cm width and 150 m length.
- Two (2) Filters (1 Spare)
- Remote Control Unit (RCU)
- Camera Suspension Mount
- Stowage Containers

The camera, film magazines and filters were stowed in special containers in experiment racks during launch and landing (see Fig. 2.1). The camera interfaced to the optically flat High-Quality Window (see 2.1.2.1) via a suspension mount, which was permanently mounted to the window adapter plate. The Remote Control Unit was installed (during pre-launch integration) in an experiment rack and remained there during the whole mission.

In orbit, the camera was assembled on the suspension mount, fitted with a magazine, and electrically connected to the Remote Control Unit. These tasks were carried out on-board by the Payload Specialists. Before the end of the Mission they removed the camera and magazine from the window and stowed them again in the rack for the landing phase.

The camera itself consisted of a modified version of a commercial Aerial Survey Camera of the type Zeiss RMK A 30/23 (Figure 2.2). The characteristics of the camera and the experiment parameters are shown in Table 2.1 and 2.2.

Mechanical and electrical changes of the original RMK A 30/23 were necessary to meet the mission requirements concerning safety, strength, handling under zero gravity and remote control. For mass reduction, the inner lens cone and the focal plane frame were fabricated in cast aluminium instead of steel. The flight camera was equipped with special anti-vibration mounts, locking devices and reinforcing bracketry. The harness was replaced by a non-toxic and non-flammable version. Improved EMC-filters (electro magnetic compatibility) were added and the circuits for remote control were adapted to the Spacelab system requirements.

THE METRIC CAMERA SYSTEM

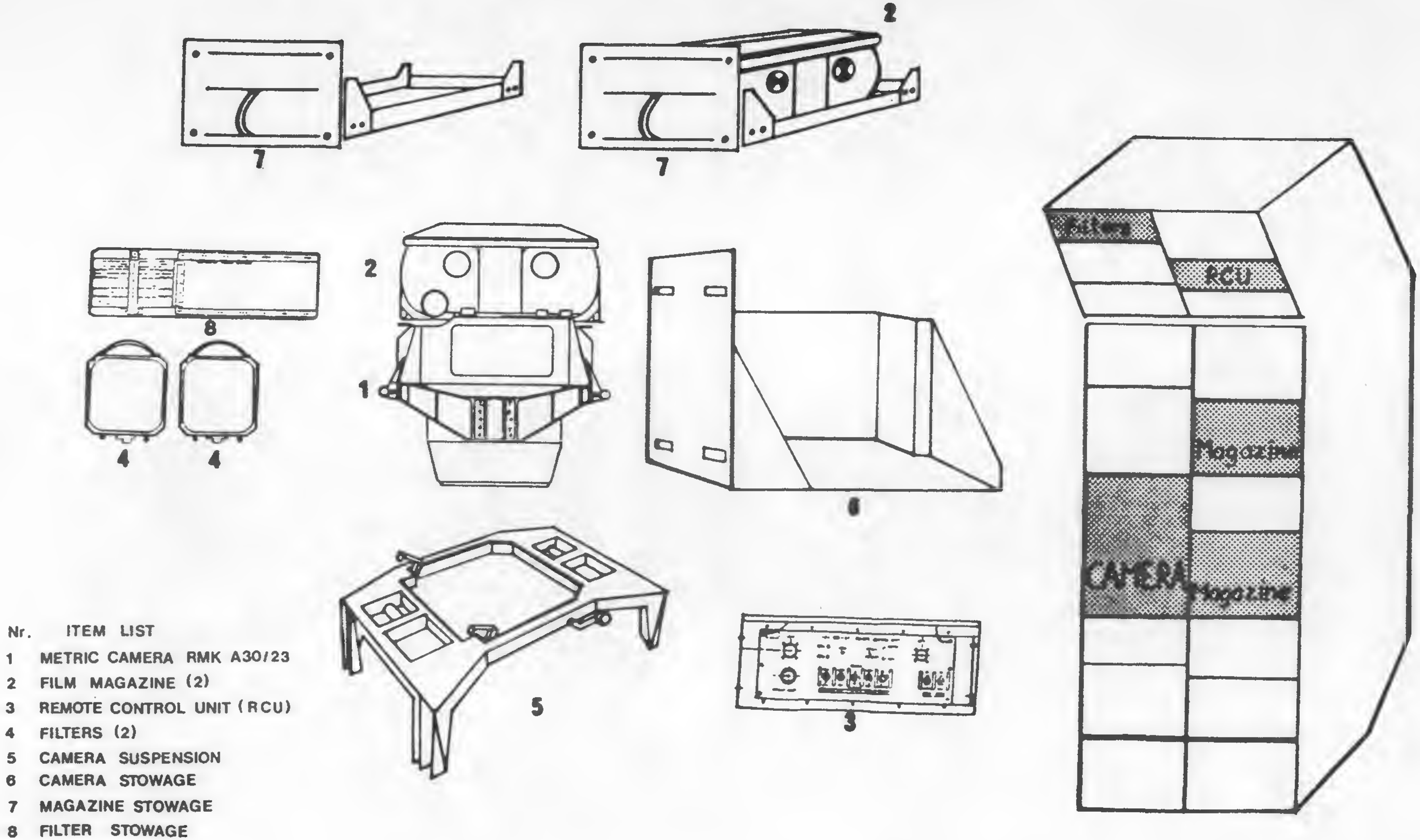


Figure 2.1: Camera System - Components Overview

Table 2.1: Characteristics of the Spacelab/Metric Camera

Type	Modified Zeiss RMK A 30/23
Lens	Topar A 1 with 7 Lens Elements
Calibrated	
Focal Length	305,128 mm (see 2.2)
Max. Distortion	6 Microns (Measured) (see 2.2)
Resolution	39 lp/mm AWAR on Aviphot Pan 30 Film
Film Flattening	By Blower Motor Incorporated in the Camera Body
Shutter	Aerotop Rotating Disk Shutter (Between the Lens Shutter)
Shutter Speed	1/250 sec.- 1/1000 sec. in 31 Steps (see Table 5.4)
f/Stops	5.6 to 11.0 in 31 Steps (see Table 5.4)
Exposure Frequency	4 to 6 sec. and 8 to 12 sec.
Image Format	23 cm x 23 cm
Film Width	24 cm
Film Length	150 m = 550 Image Frames
Dimensions:	
Camera	46 cm x 40 cm x 52 cm
Magazine	32 cm x 23 cm x 47 cm
Mass:	
Camera	54.0 kg
Magazine	24.5 kg (with Film)

Table 2.2: Characteristics of the Experiment

Scales of Images	1 : 770 000 to 1 : 840 000
Image Size	23 cm x 23 cm
Flight Altitude	Approx. 250 km
Ground Coverage of One Image	Approx. 189 km x 189 km
Velocity of Spacecraft above Ground	Approx. 7.5 km/sec.
Exposure Time	1/250 to 1/1000 sec.
Cycling Time	10 sec. for 60% Overlap 5 sec. for 80% Overlap
Image Motion	1/250 sec. : 36 Microns (30 m on ground) 1/500 sec. : 18 Microns (15 m on ground) 1/1000 sec. : 9 Microns (8 m on ground)
Base to Height Ratio	1 : 3,30 at 60% Overlap 1 : 1,65 at 80% Overlap (1st and 5th Image)

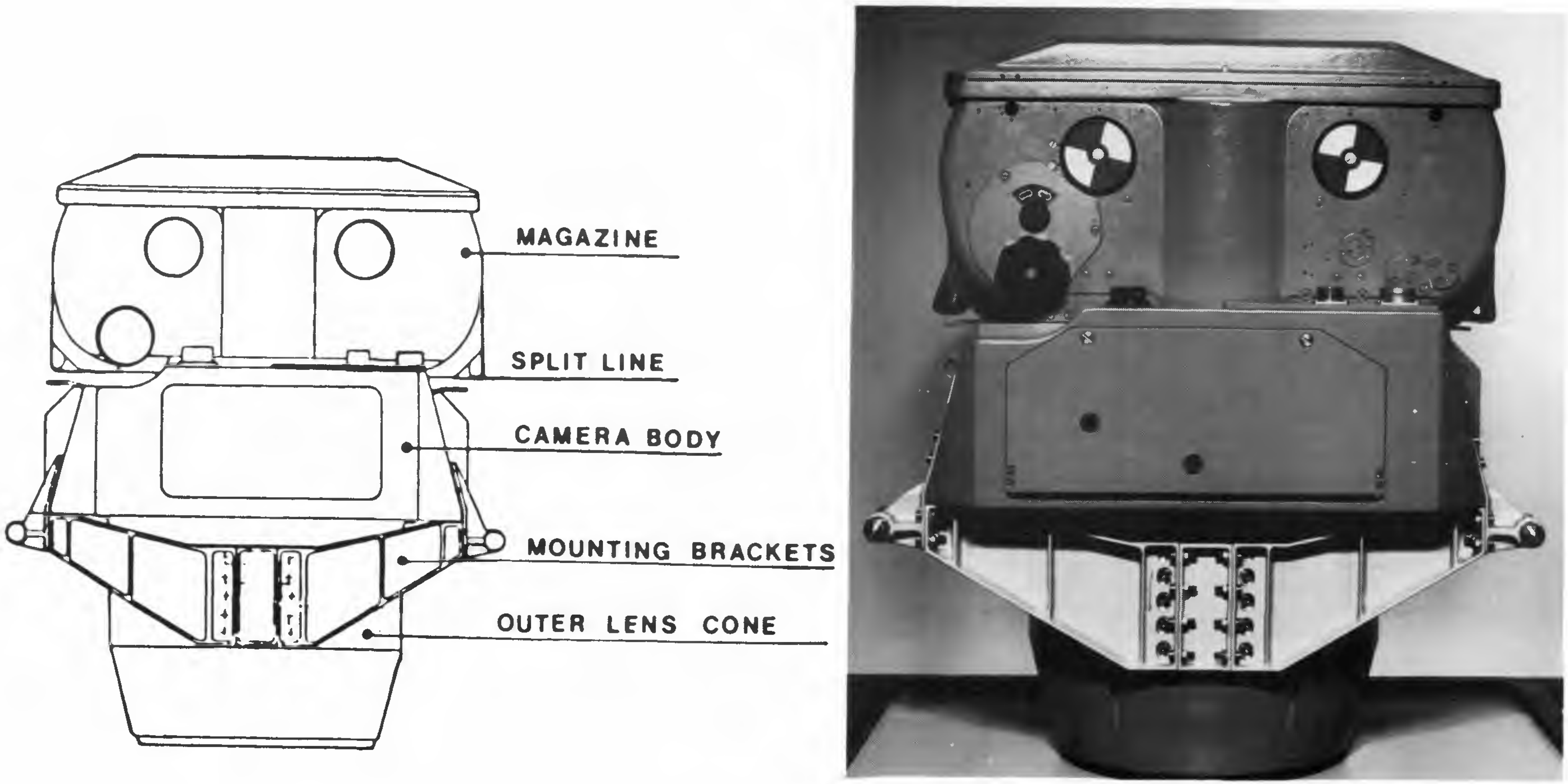


Figure 2.2: Metric Camera Instrument

The **camera body** consists of a solid casting, and houses the following parts:

- Lens Cone with Shutter and Focal-Plane Frame
- Main Motor with Drive Unit
- Blower Motor
- Display for Auxiliary Data

Lens Cone with Shutter and Focal Plane Frame

Together with the focal plane frame, the lens cone forms a single integral unit of high dimensional stability which contains the lens and the shutter. The combination of the lens and focal plane frame in one single unit guarantees an extraordinary constancy of interior orientation, i.e. of the position of the fiducial marks with respect to the projection center of the lens. The lens is the practically distortion free, high-performance Topar A1 f 5.6/305 mm (12″).

Shutter

The 'Aerotop' shutter (Fig. 2.3) is a rotating-disk type shutter between the front and rear optical elements of the lens. It allows very short exposure times. From the moment the camera is switched on until it is turned off, the shutter blades rotate with a constant speed corresponding to exposure time. From the large number of 'open-time' positions produced during the rotation of the blades (130), one blade (131) which rotates at a lower speed, and a capping disk (162) controlled by the intervalometer, combine to give the desired exposure.

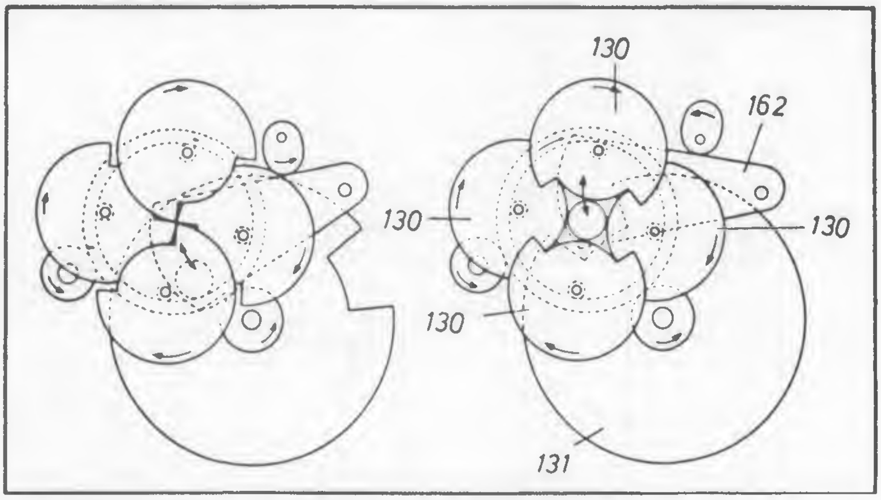


Figure 2.3: The 'Aerotop' rotating Disk Shutter

Focal Plane Frame

The focal plane frame (Fig. 2.4) serves for holding the film in place at the correct distance from the lens, which is determined by the calibrated focal length. For this purpose, the upper surface of the focal plane frame is polished. Furthermore, the focal plane frame limits the image area to 9″ × 9″ and carries the four fiducial marks. The point of intersection of the connecting lines between these fiducial marks is adjusted in a way, that will coincide with the principal point of the image, i.e. the point of intersection of the optical axis with the film plane, with an accuracy of about ±2/100 mm. The fiducial marks are designed as mechanical pointers and as optical point marks. The distance between two point marks on two opposite sides is 226.00 mm. The checking of this distance on the exposed film is used for the determination of regular film shrinkage. A small 'window' at the side of the focal plane frame is used for recording the auxiliary flight data. These auxiliary data were exposed after the film transportation cycle of each image. The total size of a negative including recorded data is therefore 230 x 250 mm.

Film Magazine

The film magazine (Fig. 2.5) has the function of providing light-tight accomodation of the film, and to effect film transport, film flattening and accurate location of the film on the focal plane frame. The magazine holds 150m of 4 mils (=0.1 mm) thick film. This corresponds to approximately 550 exposures. The film travels from the supply spool (132) over the movable reversing roller (88), and the stationary reversing roller (87) underneath the platen (89) to the take-up spool (133). Two transport rollers - splined roller (90) and rubber roller (91) - take care of film transport proper and are driven via the coupling from the camera body. The two film spools are of the friction type and are moved according to the amount of film required or supplied, as the case may be. The movable rubber roller (91) is pressed by springs towards the splined roller (90). At the same time, the movable reversing roller (88) actuates the brake provided at the supply spool. This brake is released as soon as the film exercises a slight pull on the roller.

The bottom of the magazine also houses the coupling for the drive mechanism and the connection for the vacuum hose. Both parts are coupled automatically when the magazine is fastened in position or operated.

Between the film spools is the centrally seated pressure plate which presses the film against the focal plane frame during the exposure. It also has the function of keeping the film flat. The surface against which the film is held is drilled with a large number of small orifices connected to a vacuum line so that the film is sucked against this platen. The vacuum is produced by a blower motor within the camera body and delivered to the pressure plate by a hose (101) in the interior of the camera body via the respective magazine coupling.

The film spools are seated between two axle pins (Fig. 2.5) which project through the wall of the magazine. On the outside, the axles are provided with black-and-white signal disks (Fig. 2.5) serving as indicators of film transport during operation. If for instance the film should tear , this malfunction will immediately become visible as only one of the

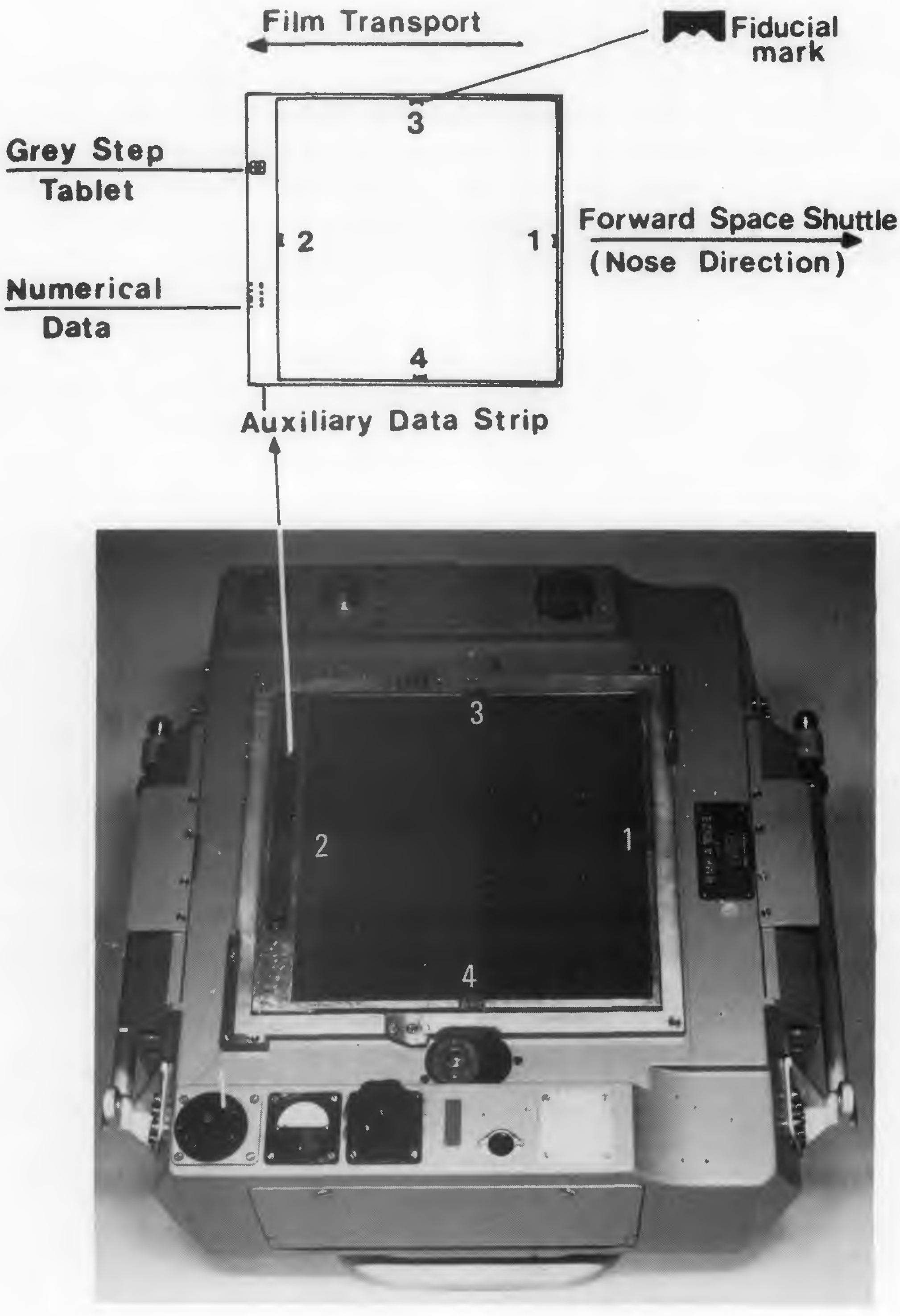
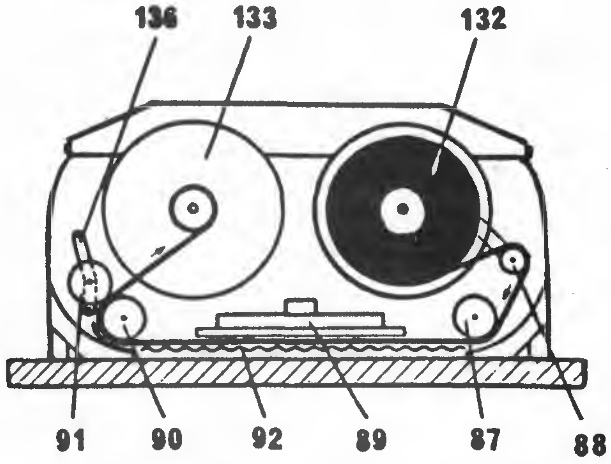


Figure 2.4: Focal Plane Frame



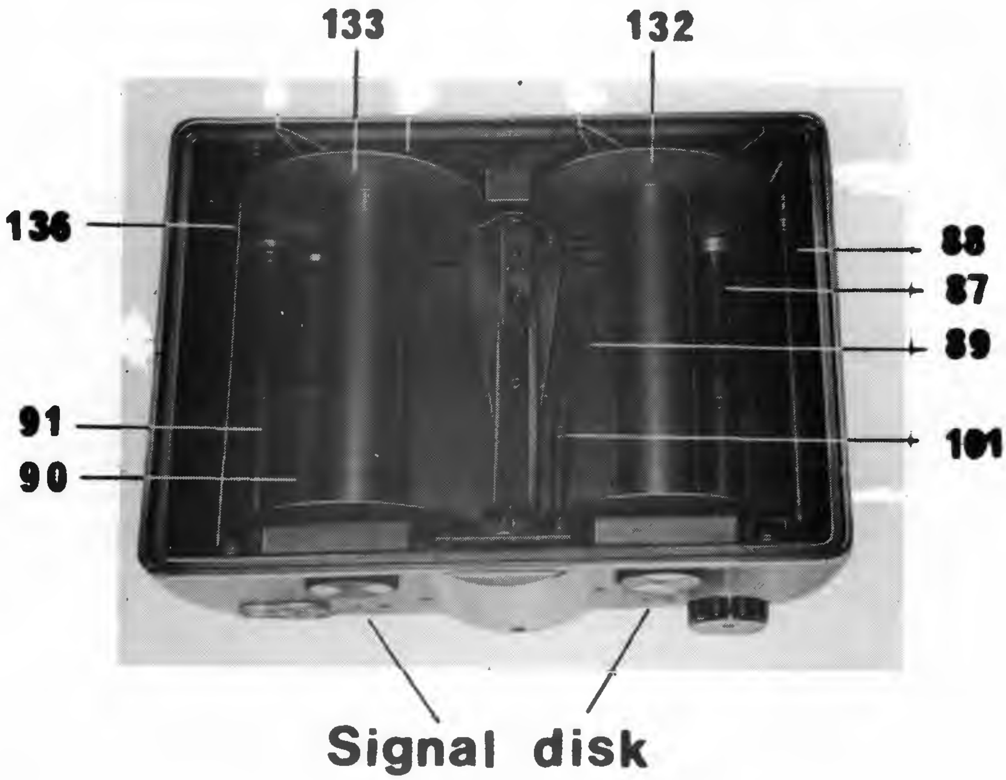


Figure 2.5: Cross Section of the Film Magazine and view of the opened Film Magazine (from above).
136 = Release Bar; 133 = Take-up Spool;
132 = Supply Spool; 91 = Moving Transport Roller
90 = Fixed Transport Roller; 92 = Dark Slide;
89 = Pressure Platen; 87 = Fixed Guide Roller;
88 = Moving Guide Roller; 101 = Hose

two spool-disks would rotate. (During the Spacelab 1 Mission, after the film jam had been cleared, the crew assisted the film transport after each exposure by rotating the disks of the take-up spool by hand.)

Mounting Brackets (Fig. 2.2)

The Mounting Brackets which were added to the standard camera had three functions:

- To reinforce the lens cone,
- To interface the camera to the suspension mount and,
- To enable better handling of the camera under zero gravity conditions.

Auxiliary Data Display

A new display module with LED's was introduced to print auxiliary data such as image number, time of release event, exposure time and f-number for every image on the film (see 5.2). The exact time of the shutter release is recorded with an accuracy of thousandths of a second. This time signal is triggered by a photodiode which is placed behind the shutter. Beside these auxiliary data, a six-step grey tablet is exposed on every image frame.

The auxiliary data are exposed on the film after shutter release and film transport. The sequence of these three events is as follows:

1. Shutter Release
2. Film Transport
3. Exposure of Auxiliary Data

A positive image with auxiliary data strip, and how it is related to the focal plane frame, and a film negative is shown in Figure 2.6.

Remote Control Unit

The operation of the camera was controlled by a specially developed RCU (Fig. 2.7) which interfaced the Spacelab Command and Data Management System (CDMS) and the Power Distribution System to the camera. The RCU utilized a 16-bit Microprocessor to control the camera operation. The control data sets were loaded from the Mass Memory Unit (MMU) of the CDMS and transferred to the camera via the RCU. The following functions could be software commanded, or manually performed, at the RCU control-panel-switches:

- ON/OFF
- Start/Stop of Serial or Single Exposure
- Adjustment of Overlap (60% or 80%)
- Adjustment of Exposure Time and Aperture

During manual operations the exposure time and aperture had to be set at the camera body using adjustment control knobs. For data recording and retrieval purposes the RCU also performed:

- Tagging of Shutter Release Time
- Conditioning of House-Keeping Data
- Conditioning and Control of Power Supply
- Control of Auxiliary Data Recording

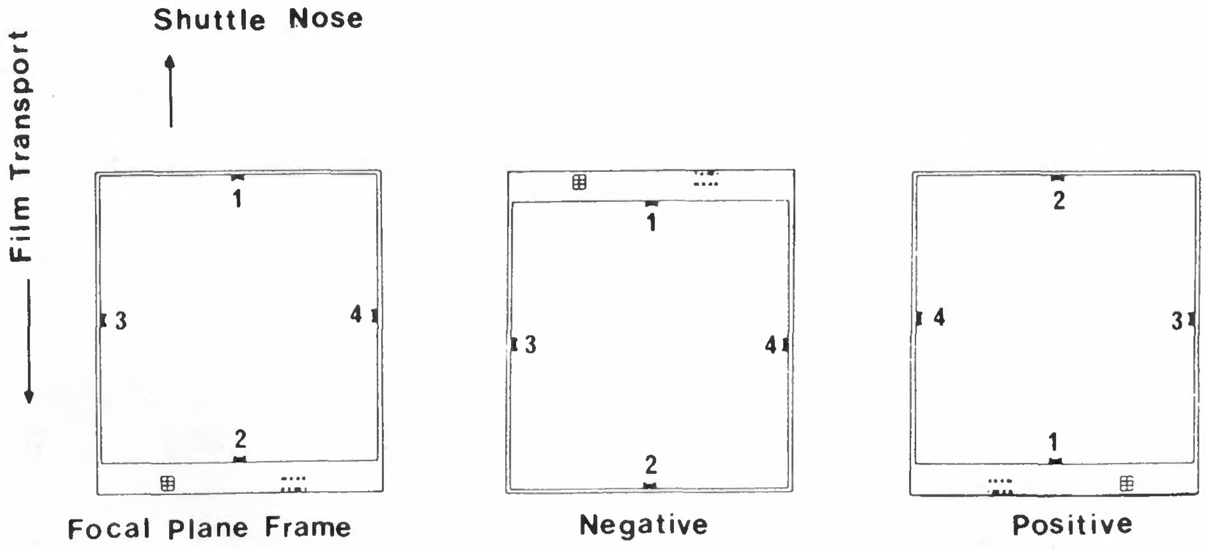


Figure 2.6: **Relation between Focal Plane Frame and Negative and Positive Film. (1, 2, 3, 4 are the Fiducial Marks)**

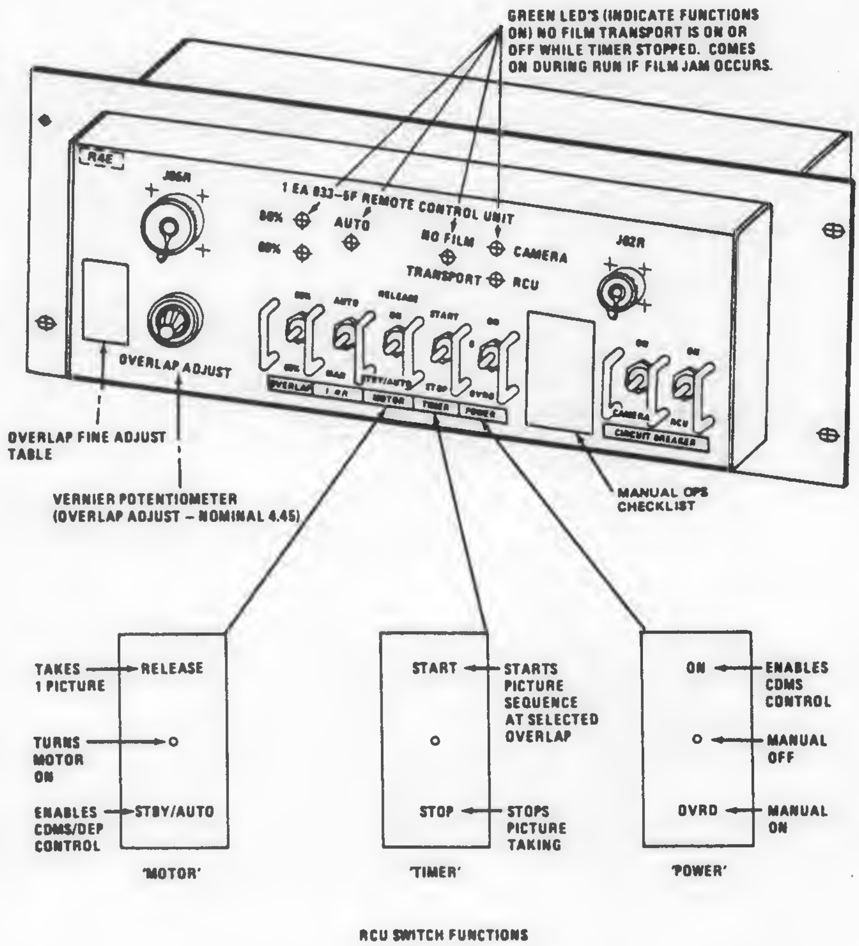


Figure 2.7: Remote Control Unit (RCU)

2.1.1 Operation and Control

The Metric Camera is designed to be operated either automatically or manually. The automatic operation mode was the nominal case and used the on-board computer system, whereas the manual mode was foreseen more as a contingency operation mode.

The installation of the camera over the high quality optical window was performed on-board by the crew. Their further duties were the mid-mission exchange of film magazines and stowage of the camera system on completion of the experiment.

The exposure settings for each picture were pre-mission calculated and stored in the on-board computer system. These data were derived from a program which used the sun angle, an average earth reflectance coefficient, film sensitivity, a filter factor and the nominal GMT to compute the f-stop and shutter speed for each picture.

The computer system, part of the Spacelab Command and Data Management System (CDMS), was instructed by a dedicated software (ECAS = Experiment Computer Application Software) to apply the pre-flight defined/stored exposure data for each photo; this consisted of an overlap (60% or 80%), f-stop and exposure instruction in coded form. The camera's performance was also monitored by the CDMS over a range of various parameters, and the data were recorded at the Houston Control Center.

All of the exposure instructions for the automatic operation of the camera were routed through a microprocessor in a Remote Control Unit (RCU) which was installed in a Spacelab rack separate from the camera. An interconnecting cable harness carried the experiment data to and from the CDMS, and supplied the requisite power for the camera and RCU.

The control data for each sequence of exposures, known as Cycle Control Data (CCD) - comprising the exposure data, number of pictures in the respective sequence, and the start GMT - were stored in the Mass Memory Unit (MMU) of the CDMS and retrieved by the ECAS on command from the computer just prior to each picture taking sequence.

The picture sequence or operations contained a number of exposures depending on the target size (geographically) to produce a series of overlapped pictures taken at 5 second (80% overlap) or 10 second (60% overlap) intervals. The path or ground track that these series of pictures covered can be seen in Fig. 1.1.

On an average, a cycle comprised around 50 pictures with the shortest run being covered in 13 consecutive frames and 148 for the longest.

During the mission the camera operations were scheduled in a so-called Mission Timeline (pre-flight computed) which basically allocated the resources needed by the camera (e.g. crew, power, computer time) along with all the other experiments. This computer controlled time-table initiated the start/stop times of the experiment via its computer and the CDMS.

The manual mode of operation was intended more as a contingency mode in cases where the computer system fails or the demand on the computer time (by other experiments) exceed the buffer capacity.

Manual operations were indeed resorted to on the 9th mission day when runs were made during periods for which no nominal camera operations were planned. In these runs the crew had to set in the camera functions by hand, using exposure parameters supplied in the on-board Flight Data File and selecting those data which fitted the sun elevation at the time.

The Metric Camera ground team in the Houston Payload Operations Control Center (POCC) monitored the whole 10 day mission and could interact with the experiment when satellite radio-contact with the Shuttle/ Spacelab was possible. During these so-called Acquisition of Signal (AOS) periods for instance, changes to the on-board stored exposure parameters could be uplinked (via the command system) as well as picture inventory updating (e.g. total picture counter corrected). These changes were needed in some cases to account for deleted or altered exposure sequence due to cloud cover forecasts.

2.1.2 Integration of the Metric Camera into Spacelab

Spacelab is a manned and reusable laboratory developed by ESA to be carried into orbit by the Space Shuttle. Spacelab consists of two elements: a pressurized module with several segments and a non-pressurized instrument platform consisting of up to five pallets. During the whole mission Spacelab remains within the cargo bay of the Space Shuttle (Fig. 2.8).

The Metric Camera was part of the payload in the pressurized Spacelab module. For operation, the camera was mounted by the crew over a High Quality Window (HQW) through which the exposures were made. The HQW is an integral part of the Spacelab Window Adapter Assembly (SWAA).

The SWAA (Fig. 2.9) was mounted on the Spacelab module opening, and contained a Skylab S-190A high quality window for photographic or other instrument usage, and a Spacelab Viewport (VP). The assembly includes external shields and a thermal protection, with removable internal safety shields latching and actuation mechanisms for the external shields with latch status indications heaters and temperature sensors/controls for maintaining proper thermal conditions. Two handrails for crew mobility/stability were also provided.

The camera was installed over the HQW on a special developed suspension mount shown in Fig. 2.10 and bolted to the SWAA at four points (Fig. 2.9). This mount was equipped with a tilt mechanism by which the camera could be swiveled and 'parked' in an oblique position for easy exchange of lens cover, filters, and removal/refitting of the inner safety cover of the HQW. In the nominal working position the optical axis of the Camera looked vertically through the window in the $-Z_B$ - axis of the Orbiter (Fig. 2.8).

The relative position of the camera with respect to the Space Shuttle and the HQW is shown in Figures 2.11 and 2.12.

The intersection of the optical axis of the camera with the inner surface of the window was displaced from the window center towards the $-X_B$ - direction by 102 mm (Fig. 2.11). The direction of film transport was in the $-X_B$ - direction.

The distance between the outer lens surface and the window was 19 mm and the distance of the lens' point of divergence and the window was 199 mm (Fig. 2.12).

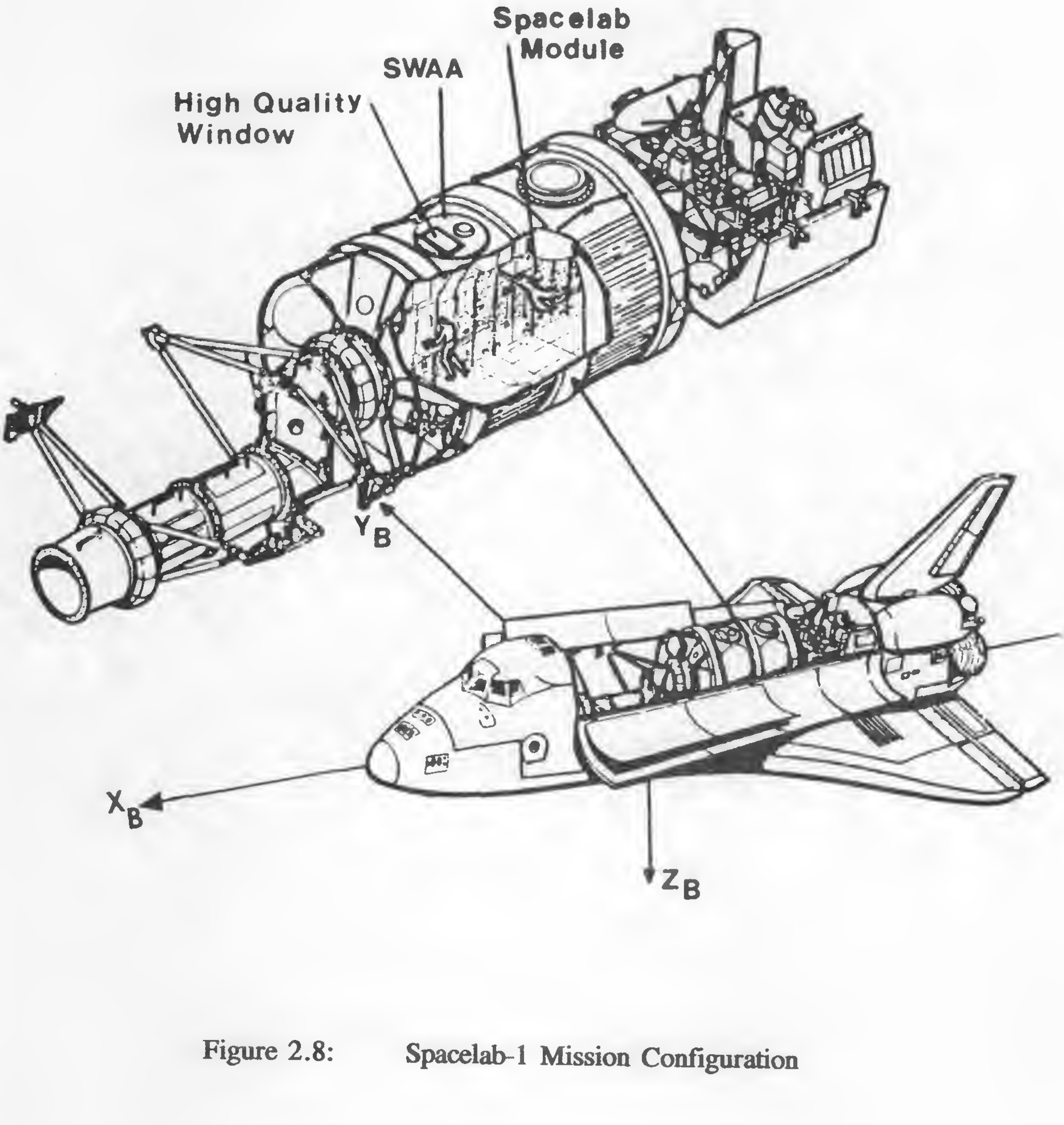


Figure 2.8: Spacelab-1 Mission Configuration

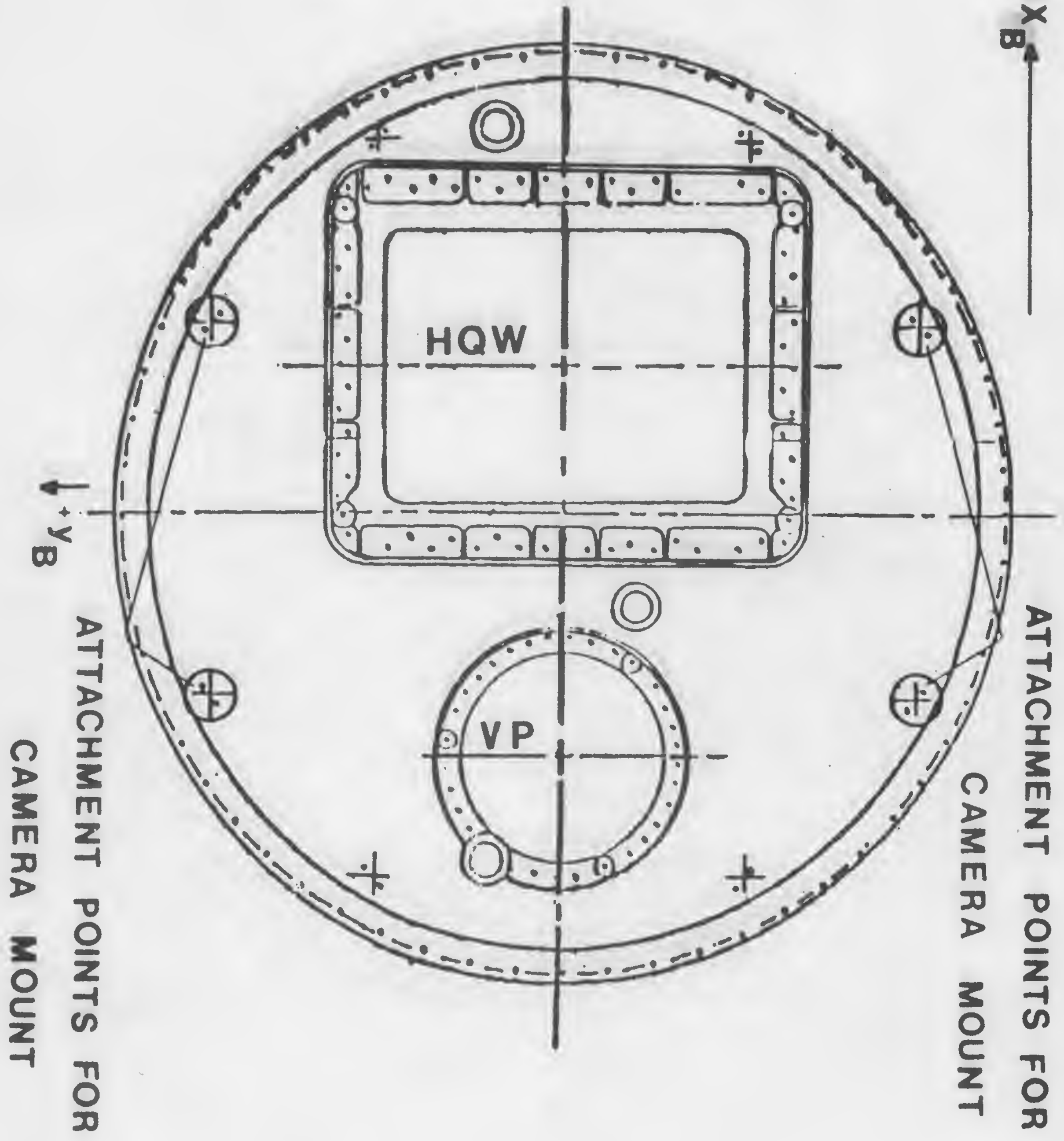


Figure 2.9: Spacelab Window Adapter Assembly. (Internal View) HQW: High Quality Window; VP: View Port.

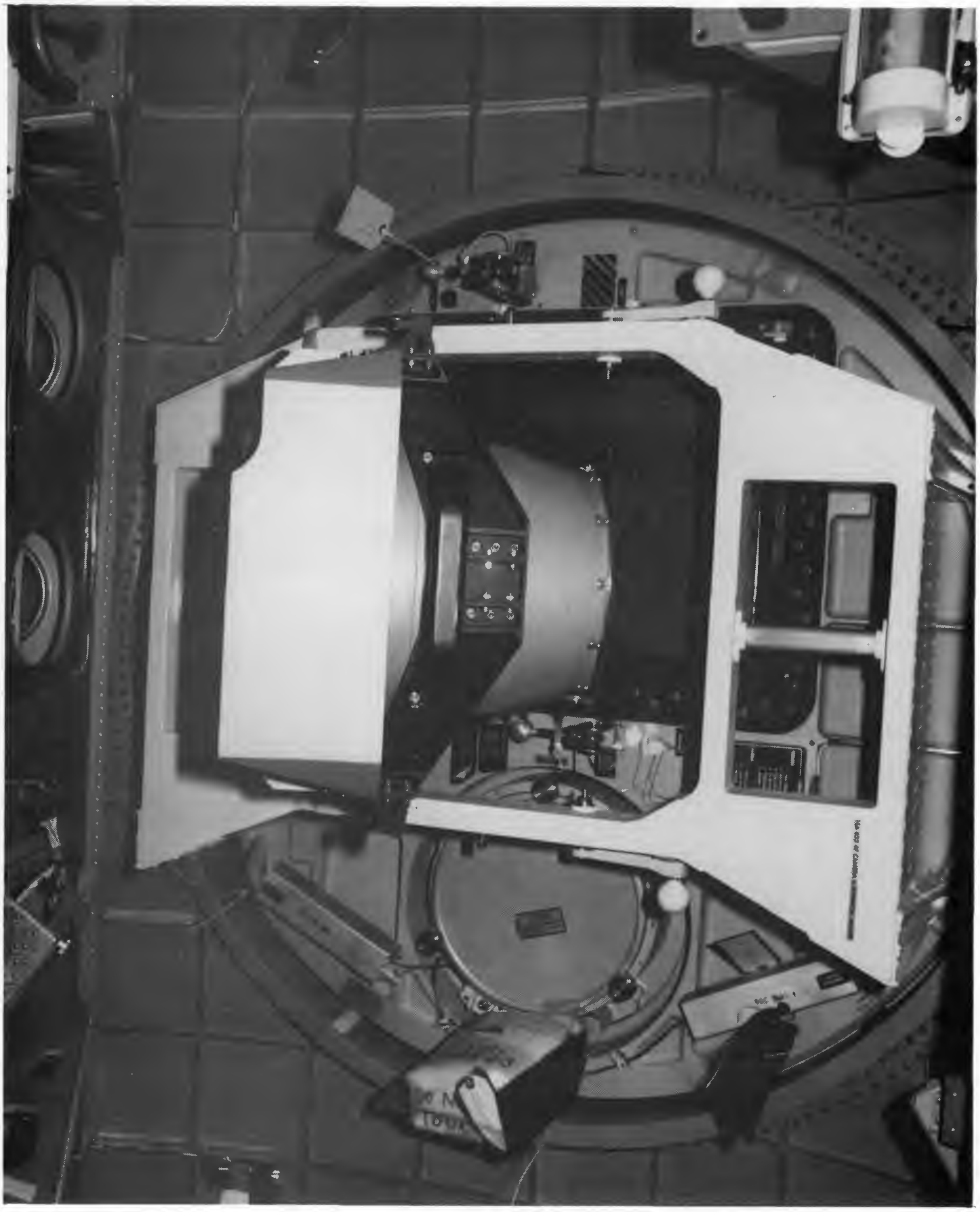


Figure 2.10: Camera Suspension Mount with Camera Mock-up in tilted position installed over High Quality Window in Spacelab (Photo: NASA)

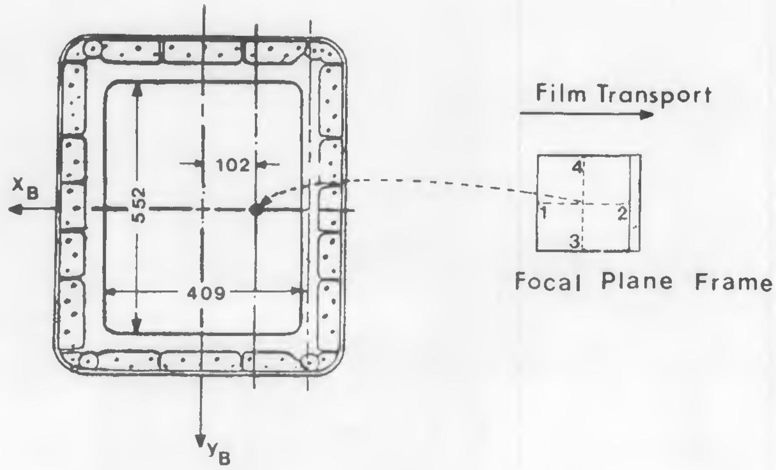


Figure 2.11: Position of the focal plane frame with respect to the HQW and the Space Shuttle Body Coordinate System (Internal view on the window surface). Viewing direction of the Camera is $-Z_B$, that is vertical through the paper plane from the observer. (All distances in mm)

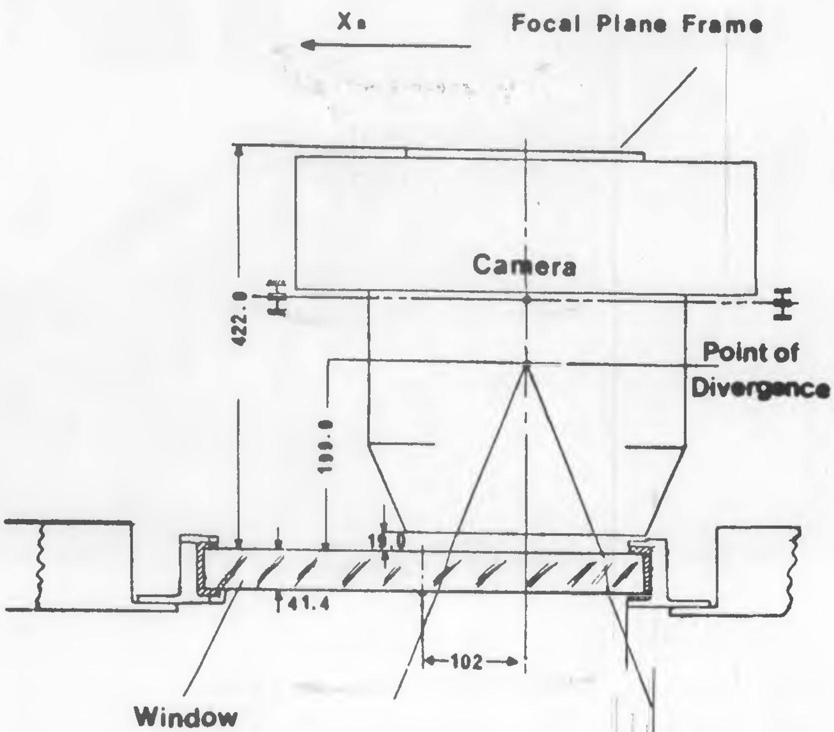


Figure 2.12: Position of the Camera over the High Quality Optical Window (All distances in mm)

2.1.2.1 The Optical Window of Spacelab

A spare unit of the Skylab Optical Window (left-over from the Skylab program) was requalified for use with Spacelab. An adapter assembly enabled the mounting of the window assembly in Spacelab and the viewport in the 1.3m diameter opening in the module as shown in Figure 2.9. This assembly is known as the SWAA.

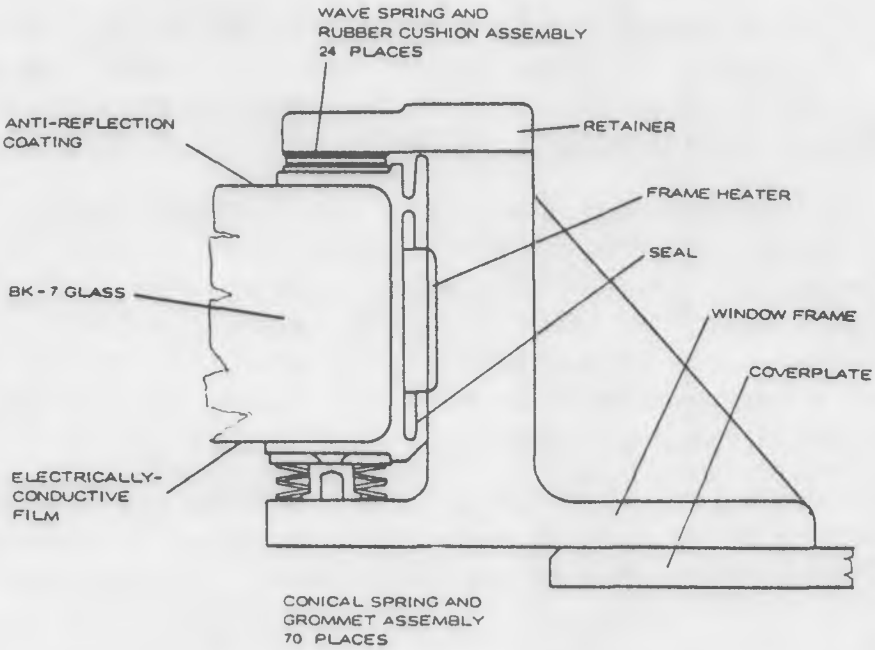
The high quality window itself consists of a single 41 mm thick plane of BK-7 glass of rectangular (41 x 55 cm) shape enclosed in a molded seal and supported by a flexible spring system in an aluminum frame. Window cross section details are shown in Figure 2.13. The window is equipped with a heater system that controls window temperature to minimize thermal gradients across the glass, and thus maintain optical performance. The outer surface of the glass has a 40 W electric conductive film (ECF) heater and two 100 W heater elements are mounted in the frame surrounding the glass.

An external manually operated cover is installed to protect the window glass from radiation, meteoroid impact and contamination during periods when the window is not in use. A removable safety shield is mounted over the inside of the window when the window is not in use.

The window's transmission curve from 300 to 1000 nm are shown in Figure 2.14. Other optical characteristics are given in Table 2.3.

Viewing Area:

The window has 2245 cm^2 (348 in^2) of viewing area. There are two areas 1 x 19 cm, as shown in Figure 2.13 where temperature sensors and their associated wiring are mounted to the outside of the glass. To avoid interference of the camera's field of view with these sensors the position of the camera was selected as shown in Figure 2.11 and 2.12.



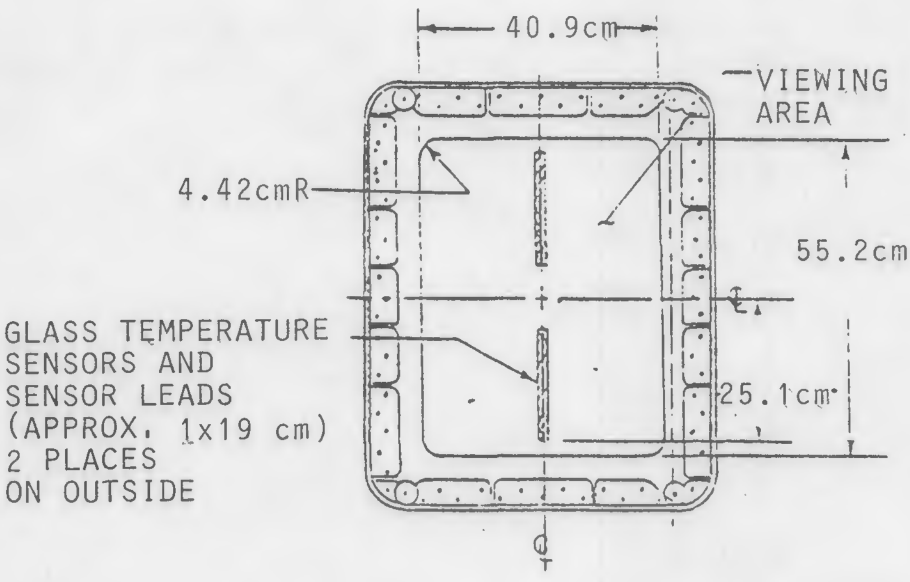


Figure 2.13: **Detail Section through the Window Frame and Location of Temperature Sensors**

Table 2.3: Optical Characteristics of the Window

OPTICAL CHARACTERISTICS	WINDOW PERFORMANCE
Parallelism	2 arc sec
Reflectance	2 % on Inside 4 % on Outside
Seeds and Bubbles	Total Area: $0,1mm^2$ / $100cm^3$ of glass Maximum Dimension: 0,76 mm of Single Imperfection
Surface Quality	60 - 40 or better as defined in MIL-13 830

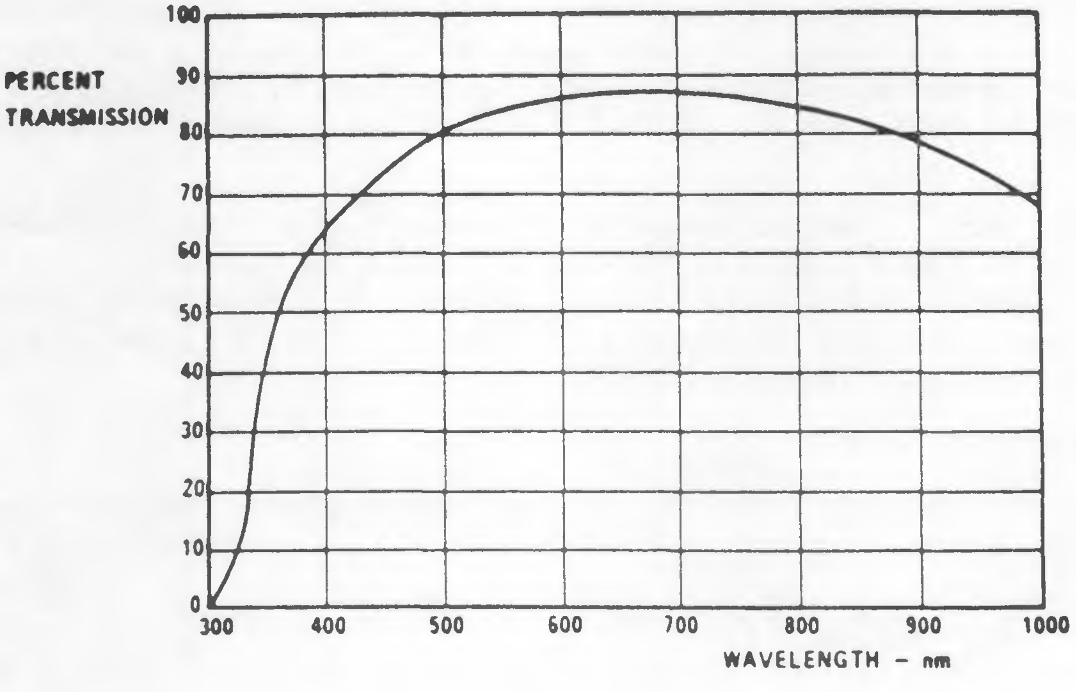


Figure 2.14: Window Spectral Transmission

2.1.2.2 Environmental Conditions inside the Spacelab Module

The cabin air was composed of nitrogen and oxygen, and the percentage of each was close to that of normal air on earth with O_2 partial pressure of 0,22 bar. The relative humidity was maintained between 30% and 70%.

The average ambient cabin temperature during camera operations was approx. 22°C. The air pressure varied between 1016 and 1027 mbar.

The actual measured values for cabin temperature and air pressure can be found in Fig. 2.15 and 2.16. Superimposed in these Figures are the camera operation periods, indicated as black bars.

2.2 Camera Calibration

The camera was calibrated twice, pre-mission and post-mission.

The pre-mission calibration was carried out in September 1980, about three years before the flight. In the meantime, the camera was kept and stored under controlled conditions. The camera was operated during this time only in the laboratory for functional tests. The camera was shipped from Germany to the USA in August 1982. The post-mission calibration was carried out six months after the mission in May 1984. Between the end of the mission and the calibration the camera was shipped back to Germany and again stored under controlled conditions.

The main difference established between both calibrations, is that the distance between the fiducial marks 3 and 4 increased by 0,029 mm. The camera was tested in accordance with the existing regulations, and the methods used were based on the recommended procedures for Calibrating Photogrammetric Cameras and for Related Optical Tests (International Society of Photogrammetry, 1960, reaffirmed 1964).

Calibrated Focal Length

The calibrated focal length is chosen so as to minimize the square sum of the radial measured distortion.

Distortion

The values of radial distortion refer to the calibrated focal length and to the principal point of symmetry. A positive value indicates that the image is further from the center than its distortion free position.

The radial distortion is measured for points of the focal plane separated by 10 mm from the axis for each of the 4 radii A, B, C, and D (Fig. 2.17). AV is the average radial measured distortion at a given radial distance. Measurements are made at maximum aperture on the goniometer by attaching the filter D (cut-off wavelength 535 nm at transmittance 50%). The standard deviation of the distortion values given can be assumed to be less than 0,002 mm.

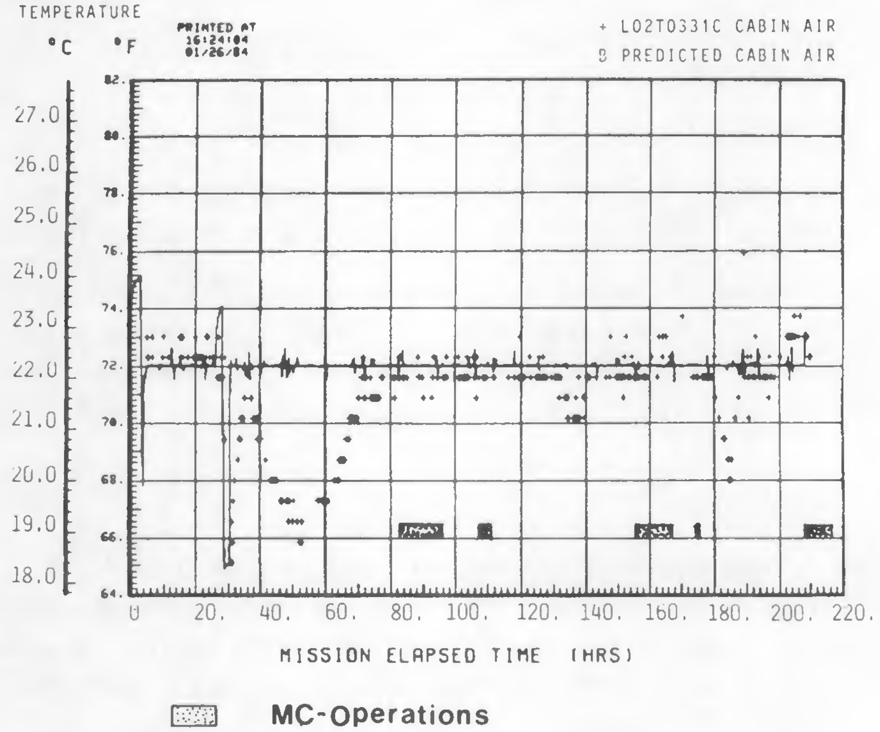


Figure 2.15: Actual and Predicted Cabin Air Temperature

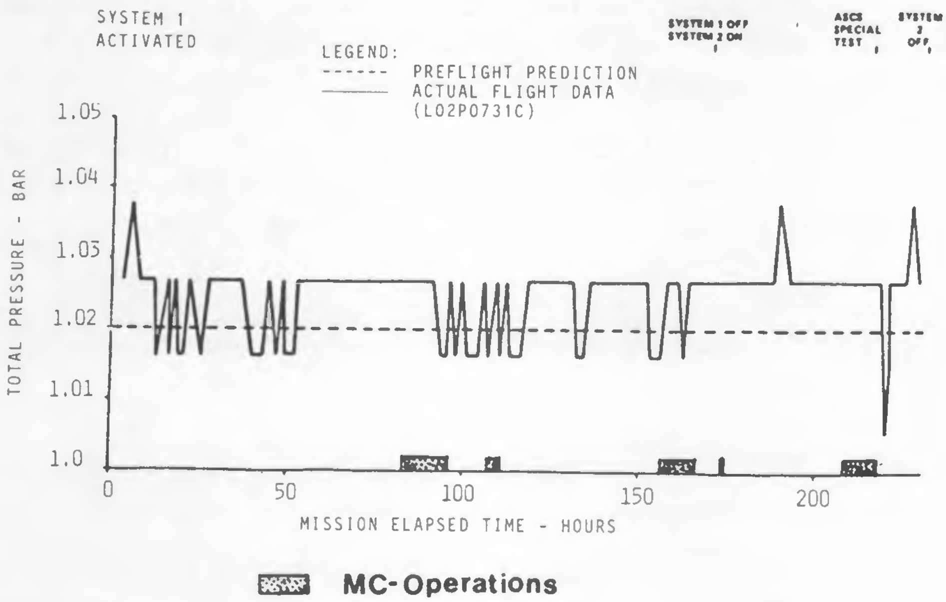


Figure 2.16: Spacelab total Pressure versus Time

The maximum tangential distortion, i.e. the displacement of the central image from a straight line connecting corresponding image points at equal but opposite angular separations from the axis, does not exceed 0.005 mm.

Principal Point and Fiducial Center

The positions of the principal point of auto-collimation and of the fiducial center are given in a rectangular coordinate system as shown in Fig. 2.17, with the principal point as origin.

Regarding the origin for distortion values it must be realized that in the photogrammetric process, the asymmetry due to a displacement of that point is eliminated together with the asymmetry introduced by camera tilt. The principal point of symmetry is chosen as origin for distortion, because only this residual asymmetry cannot be eliminated by single compensation.

Fiducial Marks

Coordinates of the fiducial marks are given in a rectangular system as shown in Fig. 2.17, with the principal point of symmetry as origin. Fiducial marks are numbered from 1 to 4 (Fig. 2.17). The lines joining opposite pairs of fiducial marks intersect at an angle within 30 seconds of 90°. The point of intersection (fiducial center) is with 0.02 mm of the principal point of auto-collimation. The location of the fiducial marks can be assumed to be accurate within 0.005 mm.

Photographic Resolving Power

The resolving power is obtained by photographing a series of three line test figures. The difference of log luminance between the lines and the background is 1.6. The photographs are taken under the recommended standard illumination by using the filter B (cut-off wavelength 480 nm at transmittance 50%) in parallel light. The camera is used at full aperture.

The resulting image is examined with a low power stereoscopic microscope to find the spatial frequency of the smallest pattern resolved. The values of resolving power are reduced to the image plane and refer to the focus setting as used for determining the calibrated focal length.

Filters

The two surfaces of the filter listed in the certificate are within 5 seconds of being parallel.

Magazine Platen

The platen mounted in FK 24/120 film magazine, serial no. as indicated in the certificate (2.2.1 and 2.2.2), does not depart from a true plane by more than 0.010 mm.

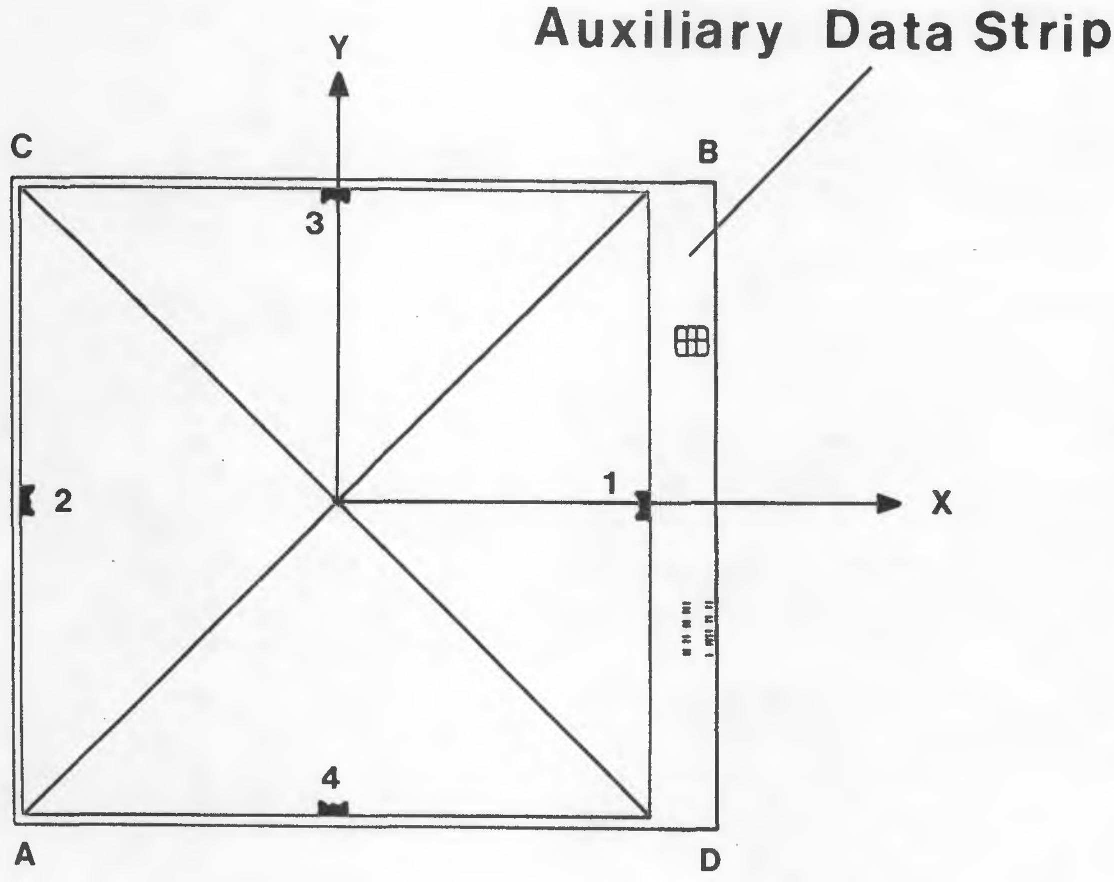


Figure 2.17: Metric Camera Image (Positive) with Fiducial Marks 1,2,3,4 and four radii A,B,C and D along which the distortion was measured

2.2.1 Pre-Mission Calibration

C A R L Z E I S S
OBERKOCHEN/WUERTT.

C A L I B R A T I O N   C E R T I F I C A T E
FOR PHOTOGRAMMETRIC CAMERAS

CAMERA TYPE: RMK A 30/23 SERIAL NO. 124531
LENS TYPE: TOPAR A1 SERIAL NO. 124516
MAX.APERTURE: F/5.6 NOM. FOCAL LENGTH: 305 MM

1) CALIBRATED FOCAL LENGTH = 305.128 MM

2) DISTORTION /0.001 MM, REFERRING TO P.P. OF SYMMETRY PPS

S/MM=	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
A	0	2	2	1	3	1	-1	1	-2	-2	-2	-2	0	-1	0	1
B	0	-1	0	-2	0	-2	-1	-3	-4	-4	-3	-6	-1	0	4	3
C	0	2	4	2	2	1	3	2	-1	-1	0	0	2	2	2	1
D	0	0	0	-1	-2	-3	-1	-4	-2	-4	-2	-4	2	2	4	6
AV.	0	1	2	0	1	-1	0	-1	-2	-3	-2	-3	1	1	3	3

3) P.P. OF AUTOCOLLIMATION AND FIDUCIAL CENTRE, REFERRING TO PPS

P.P. OF AUTOCOLLIMATION PPA X= .042 Y= .037 MM
FIDUCIAL CENTRE FC X= .034 Y= .045 MM

4) FIDUCIAL MARKS, REFERRING TO PPS

X1= 113.033 X2=-112.956 X3= .034 X4= .035 MM
Y1= .045 Y2= .046 Y3= 113.035 Y4=-112.958 MM
DISTANCES 1-2= 225.999 3-4= 225.393 MM

5) PHOTOGRAPHIC RESOLVING POWER, IN CYCLES PER MM

AREA WEIGHTED AVERAGE RESOLUTION 39

FIELD ANGLE /DEG =	0	7	14	24
RADIAL LINES	45	44	34	36
TANGENTIAL LINES	45	44	42	37

FILM: AVIPHOT PAN 30 SPEED 21 DIN
DEVELOPED IN ULTRAFIN 1+15

6) FILTERS
KL (CLEAR) NO. ----
B (YELLOW) NO. 124535
D (ORANGE) NO. 124547

7) MAGAZINE PLATEN
FK 24/120 NO. 124831, 127630, 127648

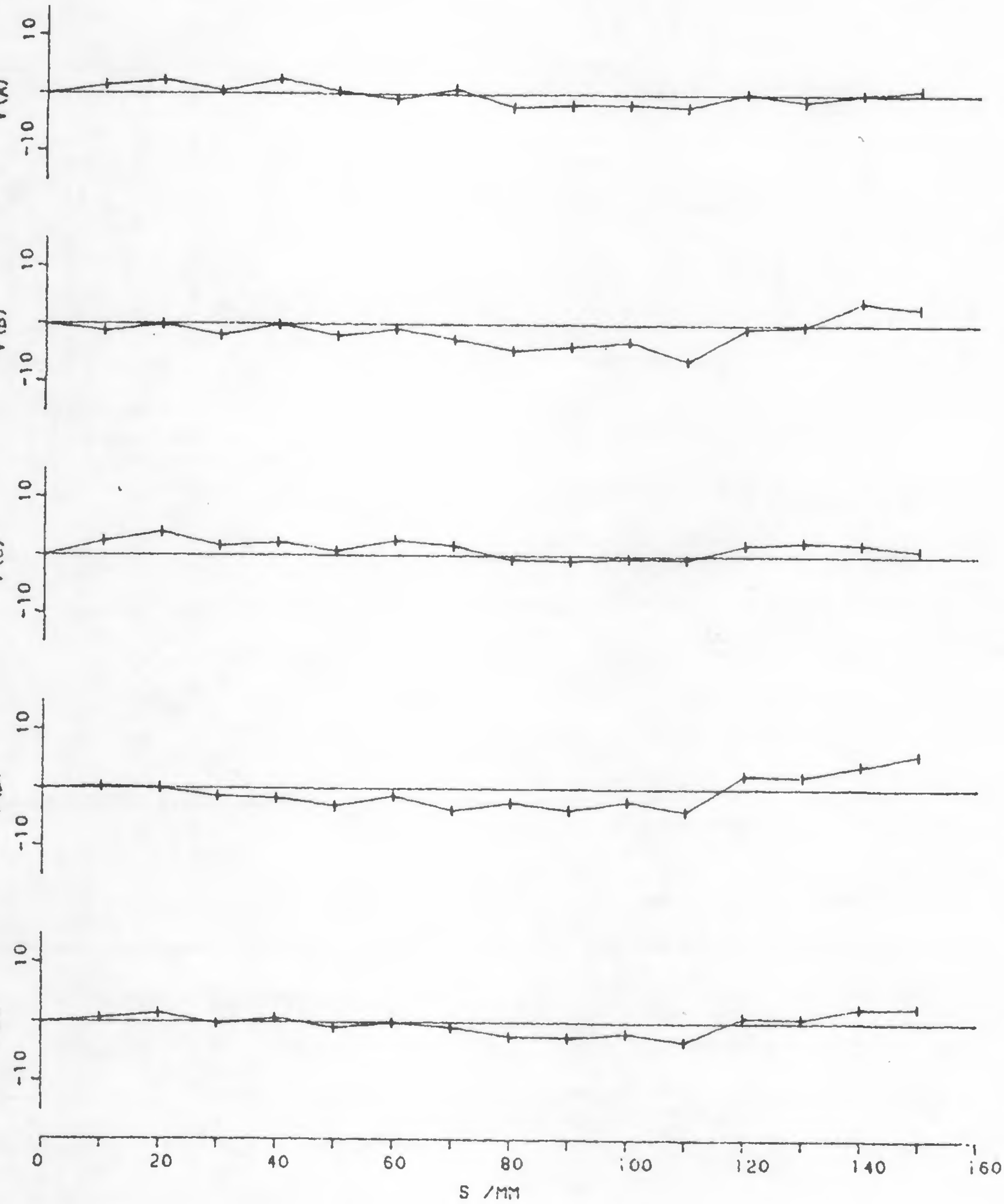
ABTEILUNG FUER GEODAESIE UND PHOTOGRAMMETRIE

I.A. R. Schwebel

DATE 11.09.80 Dr.-Ing. R. Schwebel

RMK A 30/23 NO. 124501
TOPAR A1 5.6/305 NO. 124516
CFL=305.128 MM

DISTORTION /0.001 MM. REFERRING TO PPS



2.2.2 Post-Mission Calibration

C A R L   Z E I S S
OBERKOCHEN/WUERTT.

C A L I B R A T I O N   C E R T I F I C A T E
FOR PHOTOGRAMMETRIC CAMERAS

CAMERA TYPE: RMK A 30/23 — SERIAL NO. 124501
LENS TYPE: TOPAR A1 — SERIAL NO. 124516
MAX. APERTURE: F/5.6 — NOM. FOCAL LENGTH: 305 MM

1) CALIBRATED FOCAL LENGTH = 305.123 MM

2) DISTORTION /0.001 MM, REFERRING TO P.P. OF SYMMETRY PPS

S/MM=	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
A	0	0	1	0	1	0	0	-1	-2	-2	-3	-2	1	0	1	0
B	0	1	0	1	0	0	-1	-1	-4	-2	-4	-2	1	1	1	1
C	0	1	1	2	0	1	0	0	-3	-2	-3	-2	1	1	5	3
D	0	1	3	0	1	0	1	-1	-1	-3	0	-1	0	3	1	4
AV.	0	1	1	0	0	0	0	-1	-2	-2	-3	-2	1	1	2	2

3) P.P. OF AUTOCOLLIMATION AND FIDUCIAL CENTRE, REFERRING TO PPS

P.P. OF AUTOCOLLIMATION	PPA	X= .051	Y= .038 MM
FIDUCIAL CENTRE	FC	X= .049	Y= .033 MM

4) FIDUCIAL MARKS, REFERRING TO PPS

X1= 113.041	X2=-112.955	X3= .047	X4= .051 MM
Y1= .031	Y2= .035	Y3= 113.017	Y4=-112.948 MM
DISTANCES	1-2= 225.996		3-4= 225.964 MM

5) PHOTOGRAPHIC RESOLVING POWER, IN CYCLES PER MM

AREA WEIGHTED AVERAGE RESOLUTION 39

FIELD ANGLE /DEG =	0	7	14	24
RADIAL LINES	45	44	34	36
TANGENTIAL LINES	45	44	42	37

FILM: AVIPHOT PAN 30 — SPEED 21 DIN
DEVELOPED IN ULTRAFIN 1+15

6) FILTERS
KL (CLEAR) NO.
B (YELLOW) NO.
D (ORANGE) NO.

7) MAGAZINE PLATEN
FK 24/120 NO.

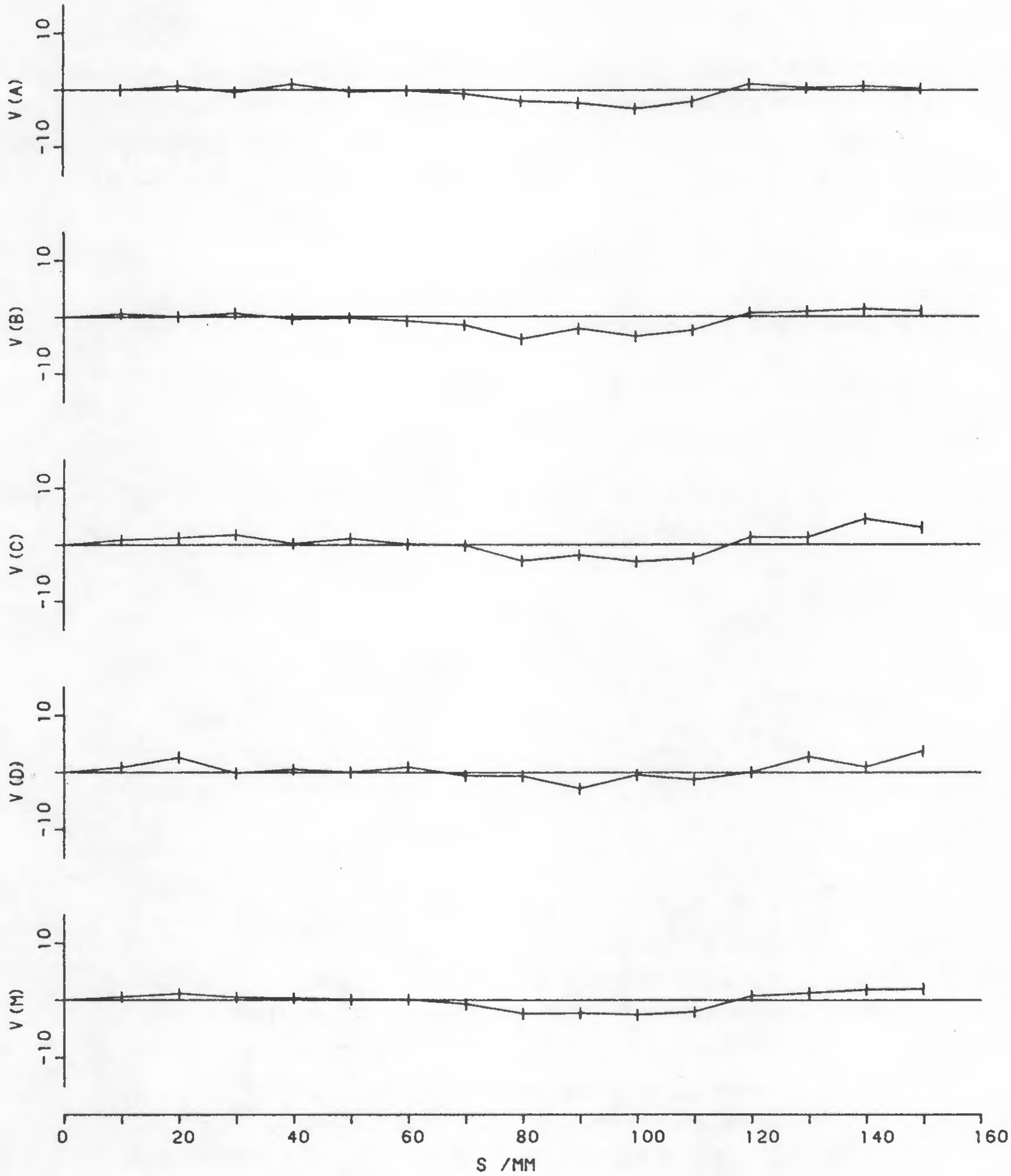
ABTEILUNG FUER GEODAESIE UND PHOTOGRAMMETRIE

I.A. W. Lorch

DATE 30.05.1984 Dr.-Ing. W. Lorch

RMK A 30/23 NO. 124501
TOPAR A1 5.6/305 NO. 124516
CFL=305.123 MM

DISTORTION /0.001 MM, REFERRING TO PPS



3. Mission Parameters

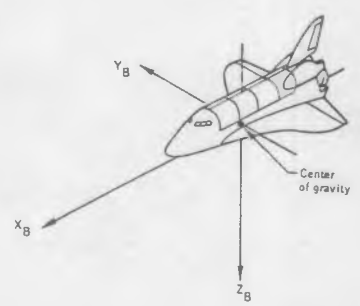
3.1 Flight Attitude for Camera Operations

The orbiter body coordinate system (X_B, Y_B, Z_B) has the positive X_B-axis through the nose, the positive Y_B-axis out the right wing, and the positive Z_B-axis through the bottom of the Orbiter. This is shown in Figure 3.1.

For operation of the camera the Orbiter flew with the open cargo bay oriented towards the earth. In this attitude the negative Z_B-axis is directed along the radius vector towards the center of the earth (NADIR). With the $-Z_B$-axis in earth direction four orientations of the X_{B-} and Y_{B-}axis with respect to the flight velocity vector (VV) were possible for camera operations:

1. $+X_B$ in direction VV (Nose Forward)
2. $-X_B$ in direction VV (Tail Forward)
3. $+Y_B$ in direction VV (Right Wing Forward)
4. $-Y_B$ in direction (Left Wing Forward)

Table 3.1 shows the direction of the Velocity Vector (VV) for the various camera operations.



Name:	**Body Axis Coordinate System**
Origin:	**Center of Mass**
Orientation:	**X_B axis is parallel to the orbiter structural body axis; positive toward the nose. Z_B axis is parallel to the orbiter plane of symmetry and is perpendicular to X_B, positive down with respect to the orbiter fuselage. Y_B axis completes the right-handed orthogonal system.**

Figure 3.1: Orbiter Body Coordinate System

Table 3.1: Direction of the Shuttle Flight Velocity Vector (VV)

Ops. No.	Direction of Velocity Vector (VV)
1	$-X_B$
2	$-Y_B$
3	$-Y_B$
4	$-X_B$
5	$-Y_B$
6	$-X_B$
7	$-X_B$
8	$-X_B$
11	50° yaw of the $-X_B$ -axis
12	$-X_B$
13	$-Y_B$
14	$-Y_B$
22	$-X_B$
23	$-Y_B$
24	$-Y_B$
25	$-X_B$
29	$-X_B$
32	15° - 45° yaw of the Y_B -axis
33	$+X_B$
34	$+X_B$
35	$+X_B$

The consequence of these changing flight attitudes is that the orientation of consecutive pictures differs for various flight attitudes. This is shown in Figure 3.2.

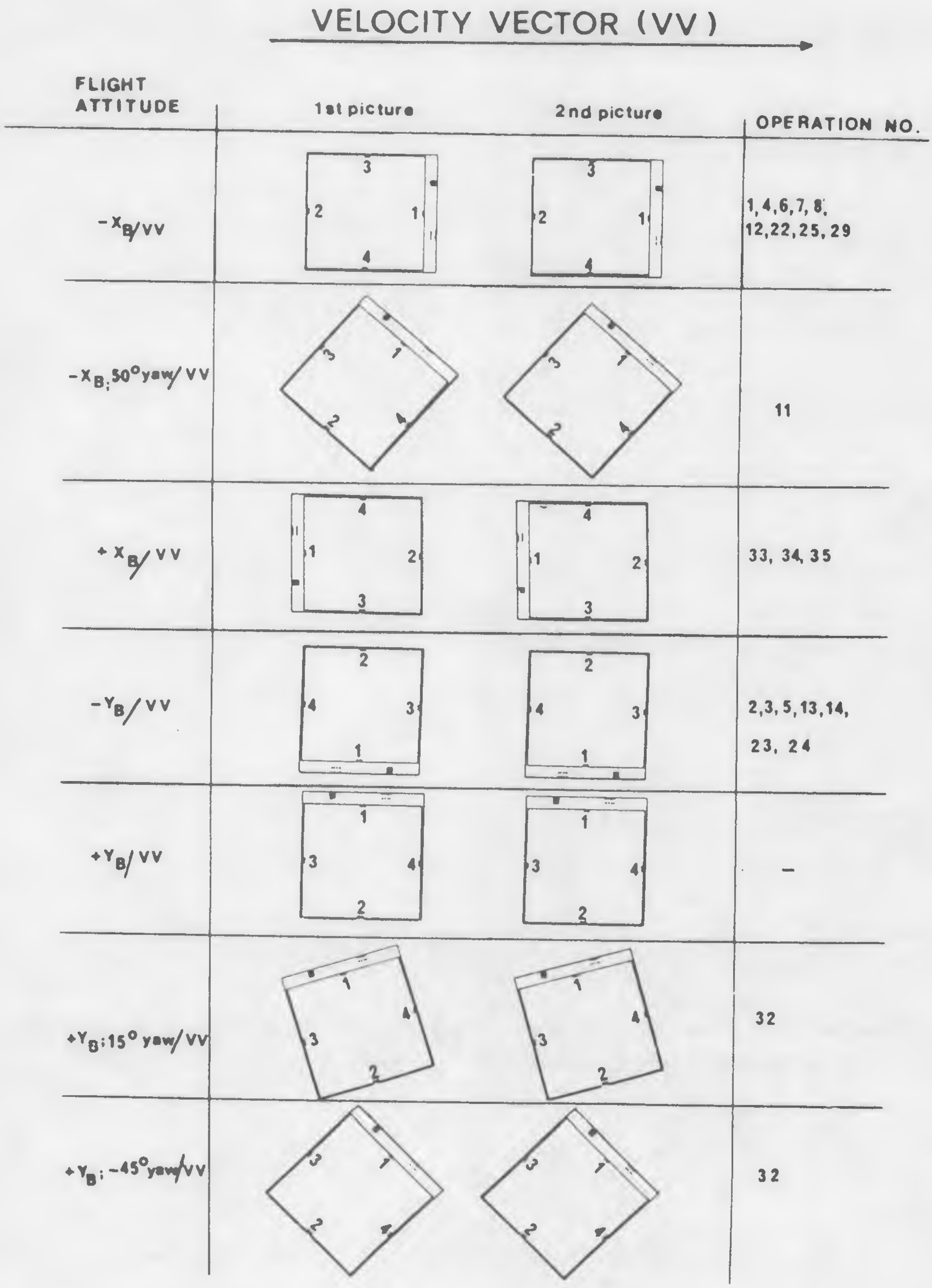


Figure 3.2: Orientation of consecutive pictures for various Shuttle Flight Attitudes

3.1.1 Roll, Pitch and Yaw

To define the attitude data for roll (omega), pitch (phi) and yaw (kappa) two coordinate systems have to be introduced. The first coordinate system named X_0, Y_0, Z_0 - system, is a Cartesian Coordinate System and moves along the Shuttle orbit, and the second system named Image Coordinate System (X_C, Y_C, Z_C) , is fixed in the center of each image. Both systems are defined in Fig. 3.3 and 3.4.

The angles omega, phi, kappa for Roll, Pitch and Yaw define the orientation of the three axes of the X_0, Y_0, Z_0 system with respect to the X_C, Y_C, Z_C-Image Coordinate System.

To align the X_0, Y_0, Z_0- system with the corresponding axes of the X_C, Y_C, Z_C- system three rotations in roll, pitch and yaw have to be carried out. The sequence of these rotations is as follows:

1. The $X_0, Y_0 Z_0$- system is rotated by the angle omega (roll) about the X_0- axis. Positive rotation is Y_0 towards Z_0.
2. With the X_0, Y_0, Z_0- system in the position resulting from 1. it is then rotated by the angle phi (pitch) about the Y_0- axis. Positive rotation is Z_0 towards X_0.
3. With the X_0, Y_0, Z_0- system in the position resulting from 1. and 2., it is then rotated by the angle kappa (yaw) about the Z_0- axis. Positive rotation is X_0 towards Y_0.

The values for Roll, Pitch and Yaw for each picture are listed in the Data Catalogue (Chapter 6) in Columns 6 to 8.

3.2 Time of Exposure

The midpoint of exposure is determined by a photodiode located behind the shutter. The time for the midpoint of exposure was received from the on-board clock and was recorded with an accuracy of 1/1000 sec in Greenwich Mean Time (GMT). GMT is the local mean solar time on the Greenwich Meridian. The GMT of launch was Julian day 332 (28 Nov. 1983), 16h.

The GMT of exposure midpoint for each picture is listed in Column 3 of the Data Catalogue (Chapter 6).

Remark: Universal Time Code (UTC) = GMT

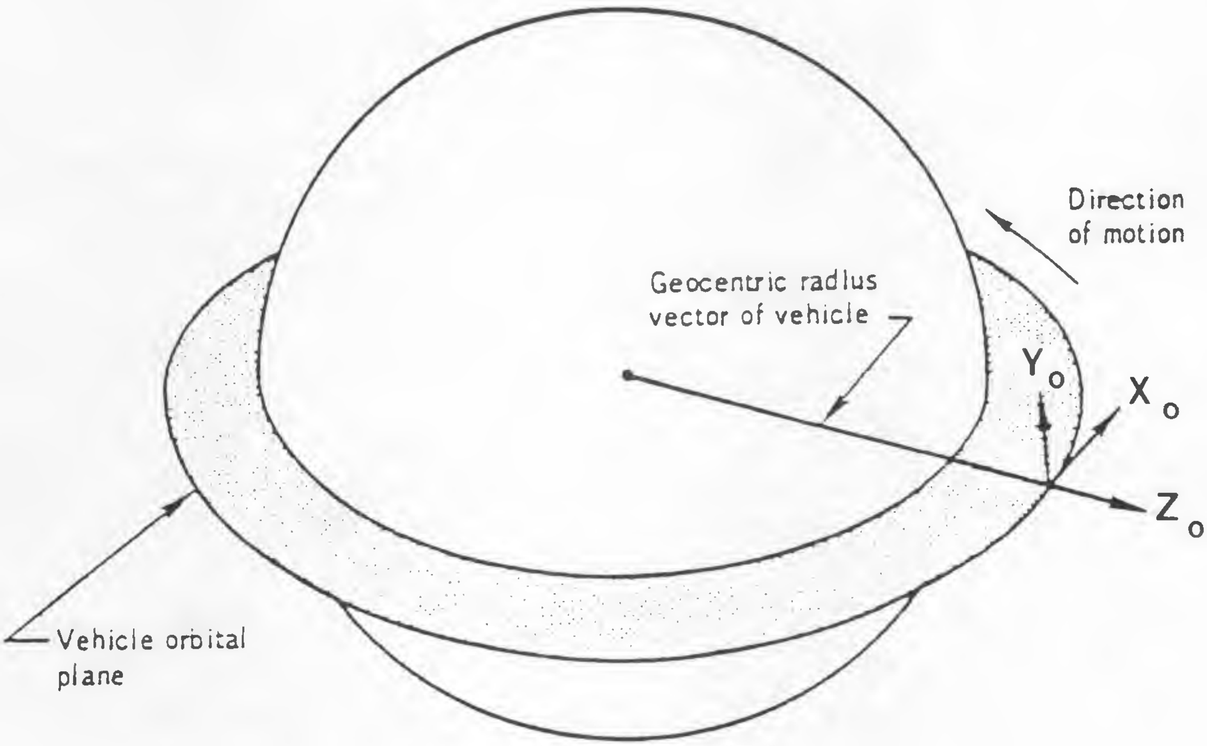
3.3 Geographic Coordinates

The geographic coordinates, which are listed in Column 4 and 5 of the Data Catalogue (Chapter 6) are the *geodetic coordinates* for the Shuttle's Nadir point at the midpoint of exposure. The relationship between geodetic- and geocentric latitude is given by the following equation:

$$\tan(\varphi_D) = \frac{\tan(\varphi_C)}{(1 - \frac{1}{298.3})^2}$$

with φ_D : Geodetic Latitude
and φ_C : Geocentric Latitude
The definition of (φ_D) and (φ_C) is given in Figure 3.5.

The geographic longitude is counted positive to the East and negative to the West (see Fig. 3.5).

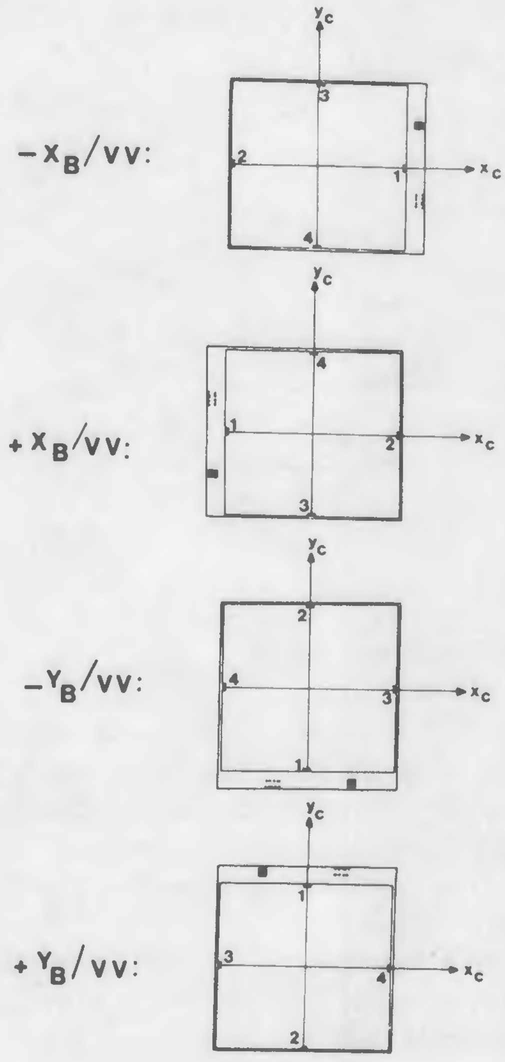


Name:	$X_{o,} Y_{o,} Z_o$- Coordinate System
Origin:	Point of Interest
Orientation:	The $X_o - Z_o$ plane is the instantaneous orbit plane at epoch. The Z_o axis lies along the geocentric radius vector to the vehicle and is positive radially outward. The Y_o axis lies along the instantaneous orbital angular momentum vector at epoch and is positive in the direction of the angular momentum vector. The X_o axis completes a right-handed system.
Characteristics:	Quasi-inertial, right-handed, Cartesian coordinate system. This system is quasi-inertial in the sense that it is treated as an inertial coordinate system, but it is redefined at each point of interest.

Figure 3.3: Coordinate System $X_{o,} Y_{o,} Z_o$

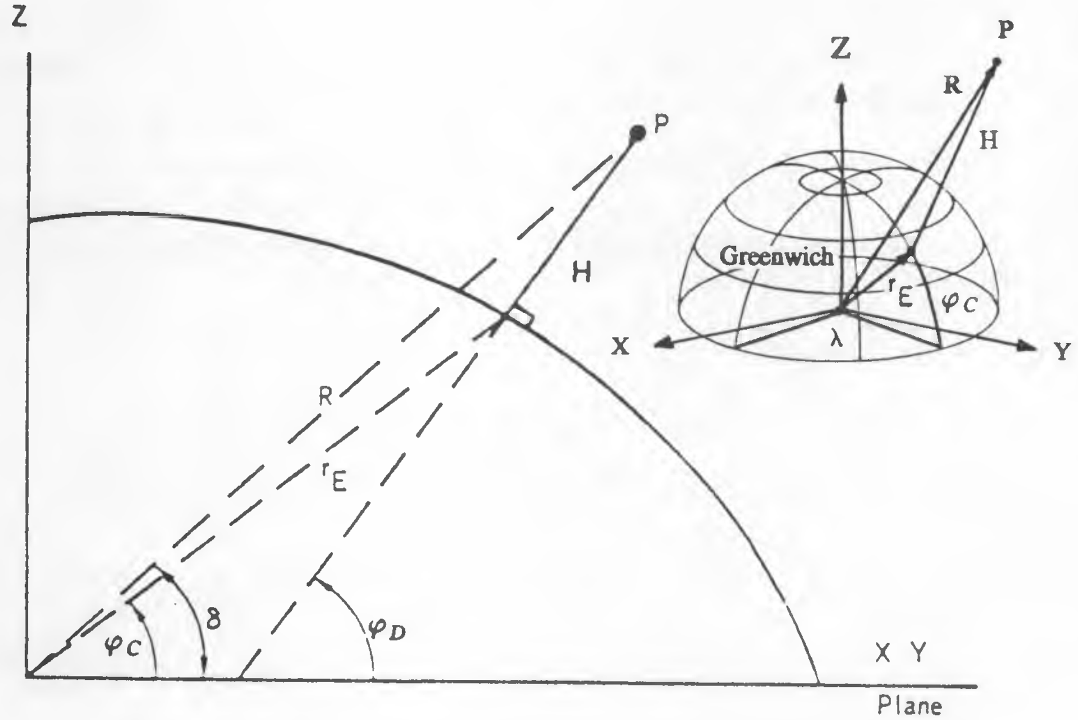
Name:	$X_{c,} Y_{c,} Z_c$ Coordinate System
Origin:	Fiducial Center in the image plane.
Orientation:	

- The $X_{c,} Y_c$-plane is the image plane.
- The X_c-axis lies approximately along the Flight Velocity Vector (VV).
- For the four main flight attitudes for operation of the camera the direction of the X_c and Y_c axes are given by th following figures:



- The Z_c-axis is perpendicular to the image plane and completes a right-handed System.

Figure 3.4: Image Coordinate System $X_{c,} Y_{c,} Z_c$



Name: Geodetic Coordinate System of Point P.

Orientation: The X- Y- plane is the earth's true of date equator. The Z-axis is directed along the earth's true of date rotational axis and is positive pointing North. The surface of the earth (geoid) is approximated by the Fischer ellipsoid modell of 1960.

Definitions: The Point P is the instantaneous position of the Space Shuttle. The geographic longitude of Point P is the angle between the plane of the figure and the plane formed by the Greenwich meridian.

H is the altitude of Point P. Measured perpendicular from the surface of the referenced ellipsoid.

φ_D
is the geodetic (geographical) latitude of Point P.

φ_C
is the geocentric latitude of Point P.

δ is the angle between radius vector and equatorial plane (declination).

λ is the longitude of Point P. Angle (+east) between plane of the figure and the plane formed by the Greenwich meridian.

Figure 3.5: Definition of geodetic-, geocentric latitude (φ_D) (φ_C), geographic longitude and altitude (H)

3.3.1 Flight Altitude

The geodetic altitude H is the distance from the Space Shuttle (see Fig. 3.5) to the reference ellipsoid, measured along the geodetic local vertical.

The altitude for the midpoint of exposure is listed for each image in Column 9 of the Data Catalogue (Chapter 6). These values are rounded to 1/100 km. The altitude for the different camera oprations varied between 235 and 255 km. Table 3.2 shows the flight altitude ranges for the different camera operations.

Table 3.2: Flight-Altitudes

Ops. No.	Altitudes (km)
1	246 - 251
2	244 - 246
3	243 - 249
4	246 - 250
5	243 - 245
6	243 - 248
7	251 - 255
8	243 - 245
11	244 - 249
13	241 - 247
14	241
22	240 - 241
23	238 - 242
24	238 - 244
25	238 - 246
29	238 - 239
32	243 - 247
33	239 - 243
34	237 - 241
35	235 - 241

3.4 Sun Elevation

Since the launch was originally planned for the summer months, but was delayed to 28 November 1983, the lighting conditions on the ground were very unfavorable as the sun elevation for all camera operations never exceeded 30°. The CIR-film was exposed at sun elevations between 15° and 29°. For the B/W film the sun elevation over Europe and North America reached only 4° to 16°.

Many B/W photographs were taken at extremely low sun angles over North America. Nevertheless, they reveal the morphology of the terrain, especially in arid zones. Table 3.3 shows the range of sun elevation angle for the different camera operations. The sun elevation angle for each picture is listed in Column 16 of the Data Catablogue (Chapter 6).

Table 3.3: Sun Elevation

Ops. No.	Sun Elevation (deg.)	Film
1	28 - 29	Colour Infrared
2	28 - 29	
3	24 - 28	
4	23 - 27	
5	27 - 28	
6	17 - 26	
7	15 - 21	
8	21 - 27	
11	22 - 26	
12	21 - 22	
13	15 - 24	
14	22 - 23	Black and White
22	15 - 16	
23	12 - 15	
24	13 - 15	
25	13 - 15	
29	13 - 14	
32	4 - 9	
33	8 - 10	
34	6 - 8	
35	4 - 8	

4. Film and Filters

4.1 Filter

A Zeiss-D Filter with a 50% transmittance cut-off wavelength at 535 nm was used with both films. The spectral transmission of the filter is shown in Figure 4.1.

The filter was positioned in front of the lens.

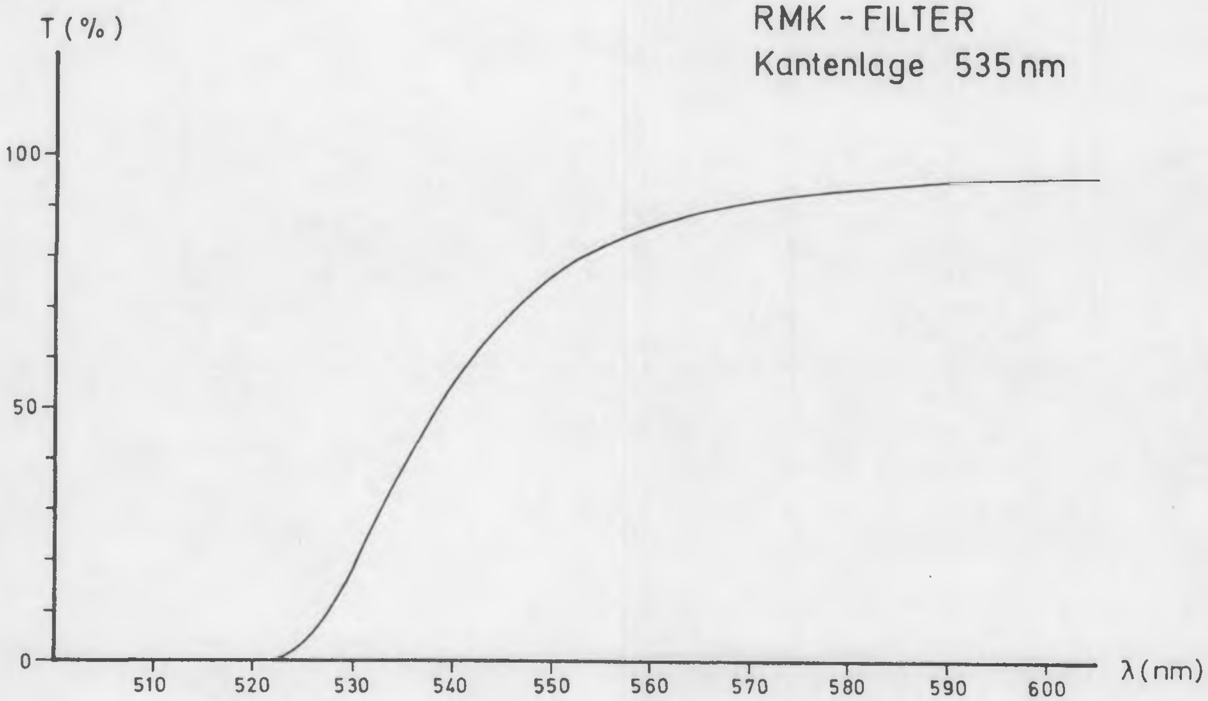


Figure 4.1: Spectral Transmission of Zeiss Filter D

4.2 Kodak Double - X Aerographic Film 2405

4.2.1 Manufacturer's Data Sheet

(From Kodak Publication M-29 'Kodak Data for Aerial Photography')

KODAK DOUBLE-X AEROGRAPHIC FILM 2405 (*ESTAR* BASE)

A panchromatic, negative camera film that has good contrast, wide exposure latitude, and extended red sensitivity for the reduction of haze effects. Its emulsion is highly hardened for high-temperature processing in continuous-processing machines. It is a medium- to high-speed film for aerial mapping, charting purposes, and general aerial photography.

Base: 4.0-mil ESTAR Base with a B-11 (fast-drying) backing.

Sensitivity: Panchromatic, with extended red sensitivity.

Safelight: None. Total darkness is required.

Total Film Thickness: The nominal total thickness (unprocessed)—including emulsion (0.4 mil), base (4 mils), and fast-drying backing (nil)—is 4.4 mils.

Gel/Base Ratio: 0.10

Weight: The weight of this film (unprocessed)—in equilibrium with 50 percent relative humidity—is 0.034 lb/ft^2 (0.017 g/cm^2).

Aerial Film Speed: Daylight (no filter)—500 (based on development in KODAK Developer D-19 at 68°F [20°C] for 8 minutes in a sensitometric processing machine).

Typical Camera Exposure: A typical camera exposure for this film is approximately 1/500 second at *f*/11. This exposure is based on an EAFS of 400, a solar altitude of 10 degrees, an aircraft altitude of 10,000 feet, and a clear day. Processing in a KODAK VERSAMAT Film Processor, Model 11, with KODAK VERSAMAT 885 Chemicals, two developer racks, a machine speed of 10 ft/min (3 m/min), and a developer temperature of 85°F (29.5°C).

In an aerial camera equipped with an antivignetting filter, it is important to increase this typical exposure by the appropriate filter factor.

Filter Factors:

KODAK WRATTEN Filter	Color of Filter	Filter Factor
No. 3	Light Yellow	1.5
No. 8	Yellow	2
No. 12 (minus blue)	Medium Yellow	2.5
No. 15	Deep Yellow	2.5
No. 25	Red	4

RMS Granularity Value: KODAK VERSAMAT Film Processor, Model 11—26*

Resolving Power: Test-Object Contrast 1000:1—125 lines/mm*
Test-Object Contrast 1.6:1— 50 lines/mm

Reciprocity Characteristics: Exposure times between 1/1000 and 1/10 second require no adjustment for reciprocity.

For an exposure time in the range of 1/10,000 second, no lens aperture or exposure time adjustments are required—however, a 10% increase above normal in development time is recommended.

For an exposure time in the range of 1 second, a 10% decrease in development time is recommended with EITHER a lens aperture increase of +½ *f*-stop OR an exposure time increase to 1½ seconds.

*These data are based on processing with KODAK VERSAMAT 885 Chemicals in a KODAK VERSAMAT Film Processor, Model 11, at a machine speed of 15 ft/min (4.5 m/min), with 2 developer racks and a processing temperature of 85°F (29.5°C) producing a gamma of 1.10.

PROCESSING

This film can be processed in the KODAK VERSAMAT Film Processor, Model 11 using KODAK VERSAMAT 885 Chemicals. It also can be processed in rewind-processing machines, such as the Gordon/Morse M-10 Developing Outfit (Military Designator: B-5), using KODAK Developer D-19 or KODAK Developer DK-50.

PROCESSING IN REWIND EQUIPMENT

The following recommendations are for processing in equipment such as the Gordon/Morse M-10 Developing Outfit (Military Designator: B-5). For complete instructions, see the "General Information" section under "Rewind Processing."

Chemicals

KODAK Chemicals for Rewind Processing KODAK DOUBLE-X AEROGRAPHIC Film 2405 (ESTAR Base)
KODAK Developer DK-50 or KODAK HC-110 Developer KODAK Stop Bath SB-1a or KODAK Stop Bath SB-5 KODAK Rapid Fixer or KODAK Fixer KODAK Hypo Clearing Agent* (Optional) KODAK PHOTO-FLO Solution

*Can be used to reduce washing time and conserve water.

Development:

KODAK Developer	Length of Film (feet)	Temp	Time of Development*	Number of Cycles	Approximate Gamma	Effective Aerial Film Speed
DK-50	75 250	68°F (20°C)	1 pass + 15 min 1 pass + 20 min	8 4	1.1 to 1.3	250
HC-110 Dilution A	125 250	75°F (24°C)	1 pass + 15 min 1 pass + 30 min	6 12	0.9 to 1.0	500

*If a pass is incomplete at the end of the recommended time, finish the pass.

Rinse, Fix, Wash, and Dry: See "General Information" section.

PROCESSING IN A *KODAK VERSAMAT* PROCESSOR, MODEL 11

Processing Sequence—KODAK VERSAMAT 885 Chemicals

Processing Step	Temperature	Number of Racks	Path Length feet	Path Length metres
Develop	85 ± 1/2°F (29.5 ± 0.3°C)	1 or 2	4 or 8	1.2 or 2.4
Fix	85°F (29.5°C), nominal	3	12	3.6
Wash	79 to 83°F (26 to 28.5°C)	2	8	2.4
Dry	135 to 145°F (57 to 63°C)	—	8	2.4

Sensitometric Data for KODAK VERSAMAT 885 Chemicals (85°F [29.5°C])

Machine Speed ft/min	Machine Speed m/min	No. of Dev Racks	Average Gamma	Effective Aerial Film Speed	Minimum Density
5	1.5	1	1.25	500	0.21
10	3	1	0.90	250	0.12
15	4.5	1	0.80	160	0.11
20	6	1	0.70	100	0.10
25	7.5	1	0.65	64	0.10
5	1.5	2	—	—	0.50
10	3	2	1.30	500	0.22
15	4.5	2	1.10	400	0.16
20	6	2	1.00	250	0.14
25	7.5	2	0.85	200	0.13

MAXIMUM RECOMMENDED MACHINE SPEEDS

For Adequate Fixing	20 ft/min (6 m/min)
Washing—For Archival Records	Up to 5 ft/min (1.5 m/min)
For Adequate Drying	20 ft/min (6 m/min)

REPLENISHMENT RATES (See Table 21, IBC)

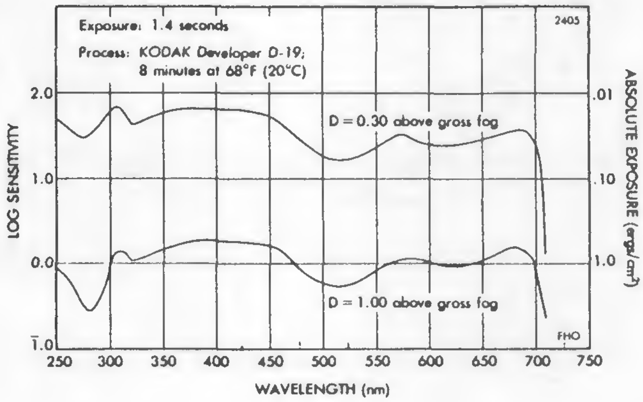
Basic Developer Replenishment Rate: 0.29 mL/square inch

Basic Fixer Replenishment Rate: 0.45 mL/square inch

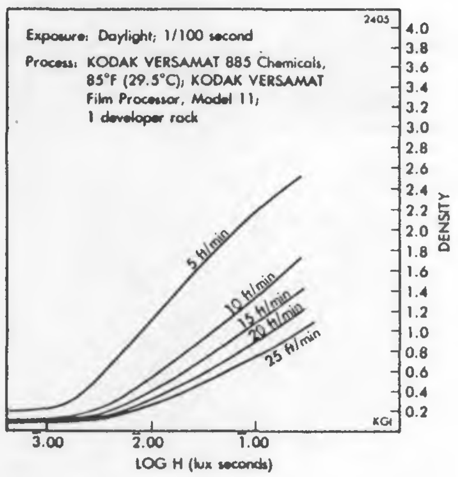
Water Pickup in Processing:

10 fpm g/ft²	10 fpm mg/cm²	20 fpm g/ft²	20 fpm mg/cm²
3.1	3.3	3.8	4.1

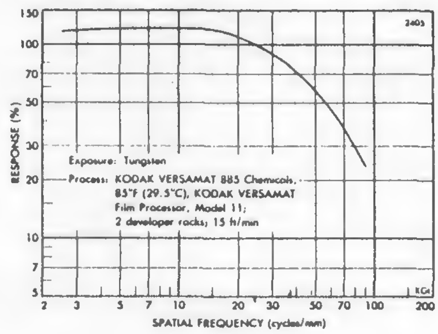
Spectral Sensitivity Curves

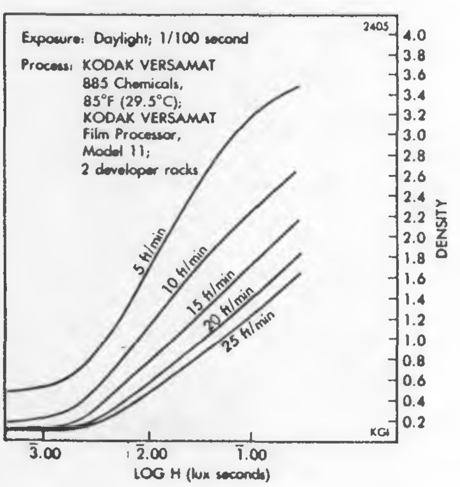


Characteristic Curves

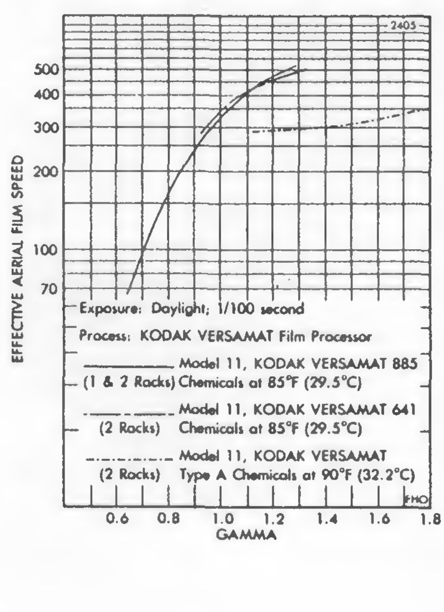


Modulation-Transfer Curves





EAFS vs. Gamma Curves



4.2.2 Development and Sensitometric Control of DX 2405 - Film

Four days after completion of the mission the film was developed in the DFVLR photolab at Oberpfaffenhofen.

The film was processed in an Agfa Pakotone film processor using Kodak 885 chemicals at a temperature of 30°C and a machine speed of 28 inch/min.

For sensitometric control a 20-step grey tablet was exposed on the film with a EG & G sensitometer, Model Mark VI.

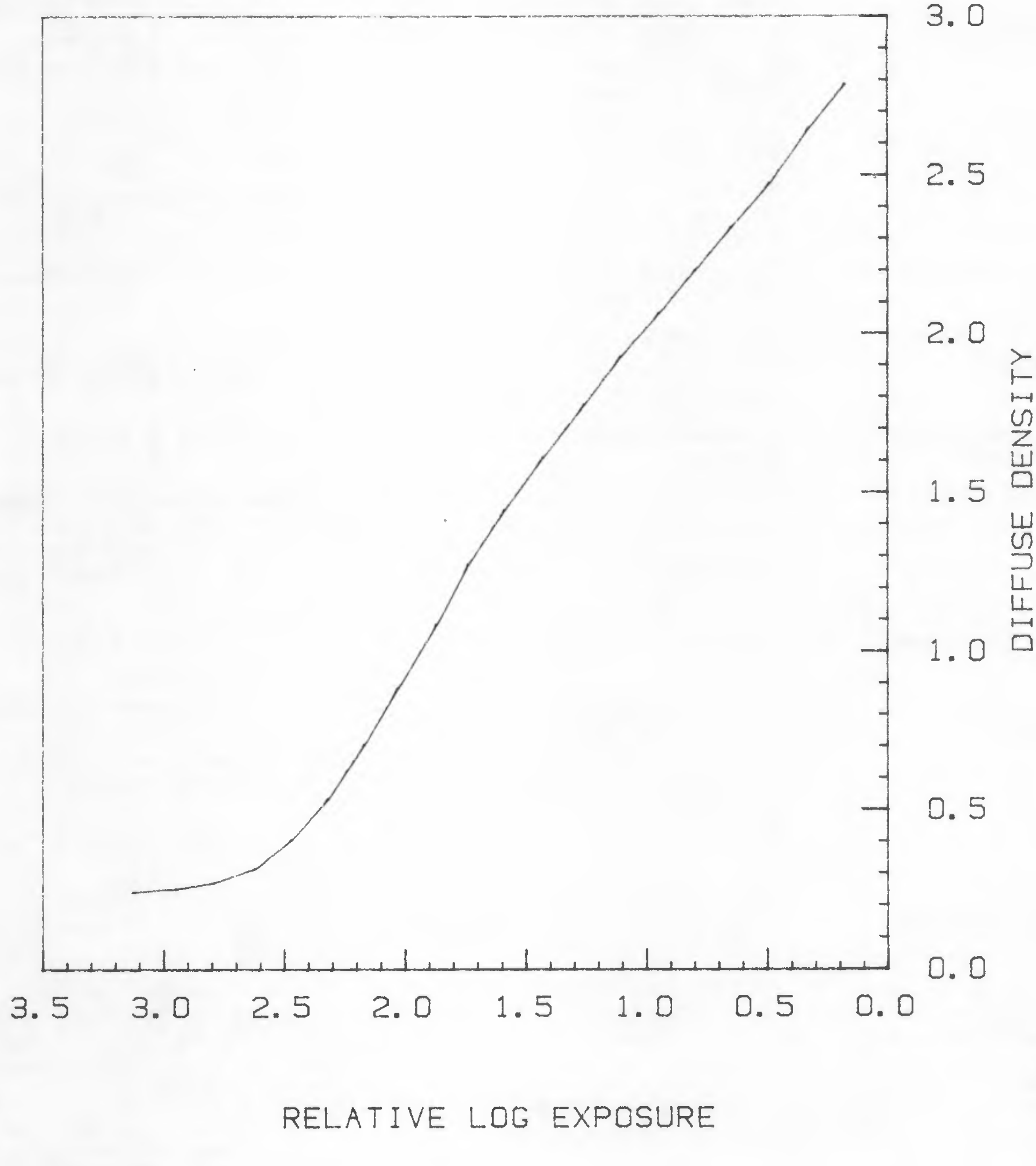
The densities of the grey step tablet and the corresponding densities measured in the film negative are given in Table 4.1.

From the values of Table 4.1 the characteristic curve for the DX-2405 film can be derived, which is shown in Fig. 4.2. From this curve the film gamma can be determined as 1.1.

Table 4.1: Sensitometric Control of DX-2405 Film

	Exposed Grey Step Tablet	Measured Density (Film Negative)
Step No.	D	D
1	0,18	2,79
2	0,33	2,65
3	0,49	2,48
4	0,65	2,34
5	0,80	2,20
6	0,95	2,07
7	1,11	1,93
8	1,26	1,78
9	1,43	1,61
10	1,59	1,45
11	1,74	1,28
12	1,87	1,09
13	2,03	0,89
14	2,17	0,77
15	2,32	0,54
16	2,47	0,41
17	2,62	0,32
18	2,79	0,27
19	2,95	0,25
20	3,13	0,24

Figure 4.2: Characteristic Curve for DX-2405-film. Gamma: 1.1



4.3 Kodak Aerochrome Infrared Film 2443

4.3.1 Manufacturer's Data Sheet

(From Kodak Publication M-29 'Kodak Data for Aerial Photography')

KODAK *AEROCHROME* INFRARED FILM 2443 (*ESTAR* BASE)

A "false color" reversal film for remote-sensing applications where infrared discrimination is required.

Base:	4.0-mil ESTAR Base with a B-11 (fast-drying) backing.
Sensitivity:	Sensitive to ultraviolet, visible, and infrared radiation to approximately 900 nm.
Safelight:	None. Total darkness is required.
Total Film Thickness:	The nominal total thickness (unprocessed)—including emulsion (0.8 mil), base (4 mils), and fast-drying backing (nil)—is 4.8 mils.
Gel/Base Ratio:	0.20
Weight:	The weight of this film (unprocessed)—in equilibrium with 50 percent relative humidity—is 0.035 lb/ft² (0.018 g/cm²).
Effective Aerial Film Speed:	40 (based on exposure through a KODAK WRATTEN Filter No. 12, and processing in EA-5 chemicals).
Typical Camera Exposure:	A typical camera exposure for this film is 1/500 second at *f*/5.6 with a KODAK WRATTEN Filter No. 12. This exposure is based on a solar altitude of 40 degrees or above, an aircraft altitude of 10,000 feet, and a clear day. The No. 12 Filter must be used over the camera lens to absorb the blue radiation to which all three layers are sensitive.
RMS Granularity Value:	17
Resolving Power:	Test-Object Contrast 1000:1—63 lines/mm Test-Object Contrast 1:1.6—32 lines/mm
Reciprocity Characteristics:	Short exposure times of 1/100 to 1/1000 second require no adjustment for reciprocity. For an exposure in the order of 1/10 second, an exposure increase of 1 *f*-stop and the addition of a KODAK Color Compensating Filter CC20B is recommended. An exposure time of 1 second or more is not recommended.

PROCESSING

This film can be processed in EA-5 chemicals in modern continuous processing machines such as KODAK RT Color Processor, Model 1411C, KODAK EKTACHROME RT Processor, Model 1411, and the KODAK EKTACHROME RT Processor, Model 1811.

While not a primary recommendation, this film can also be processed in rewind equipment or on stainless steel reels.

PROCESSING IN REWIND EQUIPMENT

The following recommendations are for processing in equipment such as the Gordon/Morse M-10 Developing Outfit (Military Designator: B-5). For complete instructions, see General Information section under "Rewind Processing."

Note on Exposure: For best results, if 2443 Film is to be rewind-processed, expose the film in the aerial camera with **either** a KODAK WRATTEN Filter No. **15** alone **or** a KODAK Color Compensating Filter CC10M **plus** the usual KODAK WRATTEN Filter No. **12** (or equivalent filters) to offset the different color balance produced by this process.

Chemicals

KODAK Chemicals for Rewind Processing of KODAK AEROCHROME Infrared Film 2443 (ESTAR Base)
KODAK Prehardener and Replenisher, Process E-4
KODAK Neutralizer MX 875 **and**
KODAK Neutralizer Additive MX 870
KODAK First Developer, Process E-4
KODAK Stop Bath and Replenisher, Process E-4
KODAK Color Developer, Process E-4
KODAK Bleach and Replenisher, Process E-4
KODAK Color Film Liquid Fixer and Replenisher
KODAK Stabilizer and Replenisher, Process E-4

Chemicals

See first cycle for the list of EA-5 chemicals.

Processing Sequence

Processing KODAK AEROCHROME Infrared Film 2443 (ESTAR Base) in the KODAK EKTACHROME RT Processor, Model 1411 and Model 1411A (Modified with the KODAK EKTACHROME RT Speed-Up Kit, Model 1411 and Model 1411A)

Processing Step	Tank No.	Time (seconds)	Temperature °F	Replenishment Rates mL/ft²	Replenishment Rates mL/min (9½" width)
Prehardener	1 & 2	90	100 ± 1	60	260
Neutralizer	3	45	115 ± 2	60	260
First Developer	4 & 5	90	120 ± ½	175	750
First Stop	6	45	115 ± 2	225	960
Wash	7	45	97 ± 3	2 gallons per minute	
Color Developer	8 & 9	90	120 ± 1	225	1035
Second Stop	10	45	120 ± 2	200	860
Wash	11	45	97 ± 3	2 gallons per minute	
Bleach	12	45	125 ± 2	90	385
Fixer	13	45	125 ± 2	90	385
Final Wash*	14	45	97 ± 3	2 gallons per minute	
Dry†	—	90	135 ± 5	—	—

*Inject EA-5 Stabilizer and Replenisher in the final wash at a rate of 50 mL/min for all film widths.

†Set air damper control knobs at 8. The temperature of the dryer may require adjustment, depending on the ambient temperature and humidity conditions in the processing area.

Replenishment Rates

Rate in mL/ft²	Rates in mL/min for film widths of 70 mm	5 inches	9½ inches
60	75	135	260
175	**220**	**400**	**750**
225	280	510	1035
200	250	450	860
90	115	205	385

KODAK EKTACHROME RT PROCESSOR, MODEL 1811

2443 Film can be processed in the Model 1811 in EA-5 chemicals at **9** feet per minute. At a film transport speed of **9** feet per minute, the following processing cycle provides dry-to-dry processing in **9** minutes. The film may be fed either *emulsion up* or *emulsion down* into the processor.

Chemicals

See first cycle for the list of EA-5 chemicals.

Processing Sequence

Processing KODAK AEROCHROME Infrared Film 2443 in the KODAK EKTACHROME RT Processor, Model 1811

Processing Step	Tank No.	Time (seconds)	Temperature °F	Replenishment Rates mL/ft²	Replenishment Rates mL/min (9½" width)
Prehardener	1 & 2	53	115 ± 1	60	430
Neutralizer	3	27	115 ± 2	60	430
First Developer	4, 5, & 6	80	120 ± ½	175	1250
First Stop	7	27	115 ± 5	200	1430
Wash	8	27	120 ± 5	2 gallons per minute	
Color Developer	9, 10, 11, & 12	107	120 ± 1	225	1760
Second Stop	13	27	120 ± 5	200	1430
Wash	14	27	120 ± 5	2 gallons per minute	
Bleach	15	27	125 ± 5	90	645
Fix	16	27	125 ± 5	90	645
Wash	17	27	120 ± 5	2 gallons per minute	
Stabilizer	18	27	Equilibrium	120	860
Dry*	—	53	145 ± 5	—	—

*Set air damper control knobs at 8. The temperature of the dryer may require adjustment, depending on the ambient temperature and humidity conditions in the processing area.

Replenishment Rates

Rate in mL/ft²	Rates in mL/min for film widths of 70 mm	5 inches	9½ inches
60	125	225	430
175	**365**	**655**	**1250**
200	415	750	1430
225	465	845	1760
90	190	340	645
120	250	450	860

KODAK EKTACHROME RT PROCESSOR, MODEL 1811 (Modified with the KODAK EKTACHROME Quick-Change Kit, Model 1811)

2443 Film can be processed in the KODAK EKTACHROME RT Processor, Model 1811 (modified with the KODAK EKTACHROME RT Quick-Change Kit, Model 1811), with EA-5 chemicals at **5.4** feet per minute. At a film transport speed of **5.4** feet per minute, the following cycle provides dry-to-dry processing in about **13** minutes. The film is fed *emulsion down* into the processor.

Chemicals

See first cycle for a list of EA-5 chemicals.

Processing Sequence— 9½-inch x 125-foot rolls

Processing Step	Step Time	Total Time*	Solution Temperature	
	(Minutes)		°C	°F
1. Prehardener	5	5	29.5 ± 0.6	85 ± 1
2. Neutralizer	1†	6	29.5 ± 1	85 ± 2
3. First Developer	9	15	**29.5 ± 0.3**	**85 ± ½**
4. First Stop‡	2	17‡	29.5 ± 1.1	85 ± 2
5. Wash	4	21	29.5 ± 1.1	85 ± 2
6. Color Developer	15	36	29.5 ± 1.1	85 ± 2
7. Second Stop	3	39	29.5 ± 1.1	85 ± 2
8. Wash	3	42	29.5 ± 1.1	85 ± 2
9. Bleach	10	52	29.5 ± 1.1	85 ± 2
10. Fixer	10	62	29.5 ± 1.1	85 ± 2
11. Wash	8	70	29.5 ± 1.1	85 ± 2
12. Stabilizer	1†	71	29.5§	85§
13. Dry	—	—	—	—

*Total processing time in minutes after end of that step.
†Minimum of one pass.
‡Room lights may be turned on after completion of this step.
§Approximately.

PROCESSING ON SPIRAL REELS (not a primary recommendation)

For best results, if 2443 Film is to be processed on spiral reels, expose the film in an aerial camera with **either** a KODAK WRATTEN Filter No. **15** alone, **or** a KODAK Color Compensating Filter CC10M **plus** the usual KODAK WRATTEN Filter No. **12** (or equivalent filters).

Processing Chemicals: KODAK Film Chemicals, Process E-4 (or equivalent), are recommended for spiral reel processing of 2443 Film.

PROCESSING IN *KODAK* ROLLER-TRANSPORT PROCESSORS

The following cycles are for processing 2443 Film in EA-5 chemicals.

Chemicals

EA-5 Chemicals for Processing KODAK AEROCHROME Infrared Film 2443
KODAK EA-5 Prehardener and Replenisher
KODAK EA-5 Neutralizer and Replenisher
KODAK EA-5 First Developer
KODAK EA-5 First Developer Replenisher
KODAK EA-5 First and Second Stop Bath and Replenisher
KODAK EA-5 Color Developer
KODAK EA-5 Color Developer Replenisher
KODAK EA-5 Bleach and Replenisher
KODAK EA-5 Fixer and Replenisher
KODAK EA-5 Stabilizer and Replenisher

KODAK RT COLOR PROCESSOR, Model 1411C (Modified with the *KODAK* RT COLOR QUICK-CHANGE KIT, Model 1411C)

KODAK AEROCHROME Infrared Film 2443 can be processed in the KODAK RT Color Processor, Model 1411C (modified with the KODAK RT Color Quick-Change Kit, Model 1411C) in EA-5 chemicals at **2.7** feet per minute. At a film transport speed of **2.7** feet per minute, the following processing cycle provides dry-to-dry processing in **21** minutes. This film is fed *emulsion down* into the processor.

Processing Sequence

Processing KODAK AEROCHROME Infrared Film 2443 in the KODAK RT Color Processor, Model 1411C (Modified with the KODAK RT Color Quick-Change Kit, Model 1411C) with KODAK EA-5 Chemicals

Processing Step	Tank No.	Time (seconds)	Temperature °F	Replenishment Rates	
				mL/ft²	mL/min (9½" width)
Prehardener	1	90	100 ± 1	60	130
Neutralizer	2	90	Equilibrium	150 mL/min for all widths	
Skip Tanks 3 & 4	—	—	—	—	—
First Developer	5	90	**120 ± ½**	175	375
First Stop Bath	6	90	105 ± 2	200	430
Wash	7	90	95 ± 5	2 gallons per minute	
Color Developer	8	90	120 ± 1	225	480
Second Stop Bath	9	90	110 ± 2	200	430
Wash	10	90	95 ± 5	2 gallons per minute	
Bleach	11	90	110 ± 2	90	190
Fixer	12	90	110 ± 2	90	190
Wash	13	90	95 ± 5	1 gallon per minute	
Final Wash*	14	90	95 ± 5	1 gallon per minute	
Dry†	—	180	125 ± 5	—	—

*Add EA-5 Stabilizer and Replenisher to the final wash at a rate of 50 mL/min for all film widths.
†Set air damper control knobs at 8. The temperature of the dryer may require adjustment, depending on the ambient temperature and humidity conditions in the processing area.

Replenishment Rates

Rate in mL/ft²	Rates in mL/min for film widths of		
	70 mm	5 inches	9½ inches
60	40	70	130
175	**110**	**200**	**375**
200	125	225	430
225	140	255	480
90	55	100	190

KODAK EKTACHROME RT PROCESSOR, Model 1411 and Model 1411A (Modified with the *KODAK EKTACHROME* RT SPEED-UP KIT, Model 1411 and Model 1411A)

KODAK AEROCHROME Infrared Film 2443 (ESTAR Base) can be processed in the KODAK EKTACHROME RT Processor, Model 1411 or Model 1411A (modified with the KODAK EKTACHROME RT Speed-Up Kit, Model 1411 and Model 1411A), in EA-5 chemicals at **5.4** feet per minute. At a film transport speed of **5.4** feet per minute, the following processing cycle provides dry-to-dry processing in **12** minutes. The film is fed *emulsion up* or *emulsion down* into the processor.

Processing Sequence

Processing KODAK AEROCHROME Infrared Film 2443 in the KODAK EKTACHROME RT Processor, Model 1811 (Modified with the KODAK EKTACHROME RT Quick-Change Kit, Model 1811)					
				Replenishment Rates	
Processing Step	Tank No.	Time (seconds)	Temperature °F	mL/ft²	mL/min (9½" width)
Prehardener	1 & 2	90	**115 ± 1**	60	260
Neutralizer	3	45	Equilibrium	60	260
Skip Tanks 4, 5, & 6	—	11	—	—	—
First Developer	7 & 8	90	**120 ± ½**	175	750
First Stop Bath	9	45	115 ± 5	200	860
Wash	10	45	120 ± 5	2 gallons per minute	
Color Developer	11 & 12	90	120 ± 1	225	1035
Second Stop Bath	13	45	120 ± 5	200	860
Wash	14	45	120 ± 5	2 gallons per minute	
Bleach	15	45	125 ± 5	90	385
Fixer	16	45	125 ± 5	90	385
Wash	17	45	120 ± 5	1 gallon per minute	
Final Wash*	18	45	120 ± 5	1 gallon per minute	
Dry†	—	90	135 ± 5	—	—

*Inject EA-5 Stabilizer and Replenisher into the final wash at a rate of 50 mL/min for all film sizes.

†Set air damper control knobs at 8. The temperature of the dryer may require adjustment, depending on the ambient temperature and humidity conditions in the processing area.

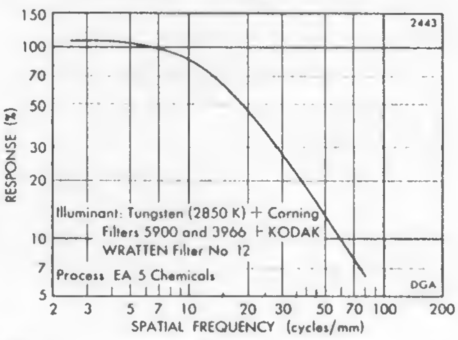
Replenishment Rates

Rate in mL/ft²	Rates in mL/min for film widths of		
	70 mm	5 inches	9½ inches
60	75	135	260
175	**220**	**400**	**750**
200	250	450	860
225	280	505	1035
90	115	205	385

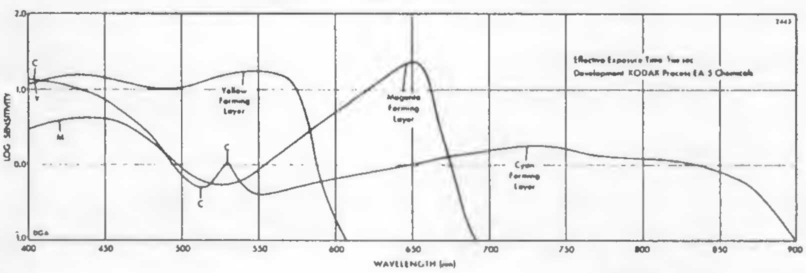
PROCESS CONTROL STRIPS

KODAK Control Strips, Process EA-5, are available and are recommended for monitoring the processing of 2443 Film and several other *color* aerial films in Kodak roller-transport processors using EA-5 chemicals.

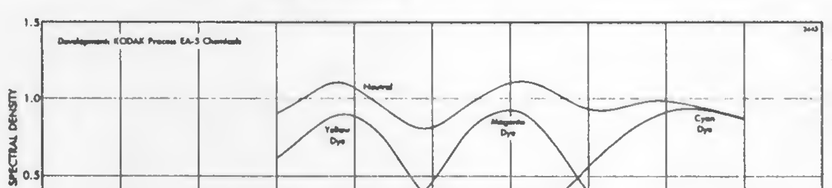
Modulation-Transfer Curve



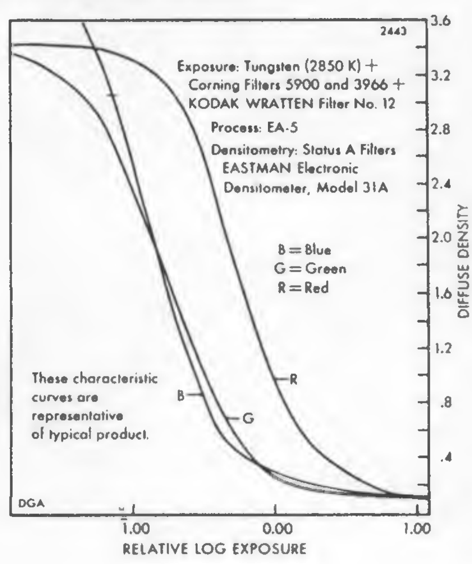
Spectral Sensitivity Curves



Spectral Dye Density Curves



Characteristic Curves



4.3.2 Development + Sensitometric Control of the Colour IR-Film 2443 (CIR 2443)

The Colour Infrared Film 2443 had to be loaded into the magazine 5 weeks before the mission, this being the latest point of access to the Module in the Shuttle pre-flight preparation. During these five weeks the film remained in the magazine under controlled laboratory conditions. The film was developed 7 days after completion of the mission at IGN-France photolabs in Creil using a Kodak Versamat 1811.

For sensitometric control a 21 step grey tablet was exposed with a Kodak type VI sensitometer through a Wratten 15 filter on the film before development. The Wratten 15 filter's spectral characteristic are very similar to the Zeiss D-filter, which was used in Spacelab with the CIR-2443 film. For comparison the same sensitometric control was made with a fresh film of the same emulsion, which was kept until development under controlled conditions in a refrigerator at approx. -20°C.

The processing conditions are listed in Table 4.2. The densities of the grey step tablet and the corresponding densities measured in the film positive are given in Table 4.3. From the values of Table 4.3 the characteristic curves of the developed films can be derived and are shown in Figure. 4.3 to Figure 4.5.

From these curves it can be found:

- The IR-balance [00]) of the fresh film (Fig. 4.4) was 5; this means that the film was IR-enhanced, which is very favourable for high altitude applications.
- The IR-balance [00]) of the film used in Spacelab (Fig. 4.3) increased during the five weeks pre-mission storage to 20, which is still IR-enhanced.
- The characteristic curve of the blue and green layers for the Spacelab film shifted at D=1.0 on the log E-axis by 0.08 to the right, which means they became approx. 1/4 f-stop slower.
- The characteristic curve of the red layer for the Spacelab film shifted at D=1,0 on the log E-axis by 0.23 to the right, which means it became approx. 3/4 f-stop slower.
- The characteristic curve of the neutral density for the Spacelab film shifted at D=1,0 on the log E-axis by 0,13 to the right, which means the film became approx. 1/2 f-stop slower.

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[1]) Definition of Infrared-Balance:
Two points on the characteristic curves at D=1,0 are established: One being at the mid-point between the green and the blue curve and the second on the IR-curve. The distance between these two points, measured parallel to the log E-axis and multiplied by 100 is a measure for the IR-balance.
(J. F. Fleming, Standardization Techniques for Aerial Colour Infrared Film, The Survey and Mapping Branch, Department of Energy Mines and Resources, Ottawa, Canada)

Table 4.2: Processing Conditions for Colour IR-Film 2443

	Machine	Chemicals	Transport Speed	Temperature
Kodak Recommendations	1811	EA-5	5,4 ft/min	120°F
Spacelab Film	1811	EA-5	5,6 ft/min	120°F
Fresh Film	1811	EA-5	5,4 ft/min	120°F

Table 4.3: Sensitometric Control of the Colour IR-Film 2443
(Measured with Macbeth TD-504)

Grey Step Tablet		Spacelab-Film				Fresh Film			
Step No.	D	Measured Densities Neutral	Blue	Green	Red	Measured Densities Neutral	Blue	Green	Red
1	0,18	0,095	0,10	0,12	0,08	0,080	0,09	0,10	0,05
2	0,34	0,105	0,11	0,13	0,09	0,085	0,09	0,10	0,06
3	0,48	0,115	0,12	0,14	0,11	0,090	0,09	0.10	0,07
4	0,62	0,130	0,14	0,14	0,14	0,100	0,11	0,11	0,08
5	0,76	0,150	0,15	0,15	0,18	0,110	0,12	0,12	0,10
6	0,91	0,180	0,18	0,16	0,23	0,120	0,14	0,12	0,12
7	1,04	0,220	0,22	0,18	0,32	0,150	0,16	0,14	0,15
8	1,16	0,285	0,26	0,21	0,47	0,180	0,21	0,15	0,21
9	1,32	0,390	0,32	0,27	0,64	0,240	0,27	0,19	0,31
10	1,46	0,610	0,47	0,48	0,94	0,395	0,39	0,34	0,47
11	1,59	0,930	0,74	0,77	1,37	0,650	0,63	0,61	0,74
12	1,72	1,290	1,11	1,08	1,84	0,960	0.94	0,88	1,03
13	1,86	1,680	1,57	1,42	2,34	1,340	1,37	1,09	1,46
14	2,00	2,045	2,03	1,74	2,68	1,775	1,82	1,56	1,98
15	2,15	2,350	2,49	2,03	2,90	2,170	2,34	1,90	2,49
16	2,29	2,590	2,84	2,28	3,04	2,470	2,68	2,16	2,82
17	2,44	2,760	3,05	2,44	3,11	2,660	2,96	2,35	3.02
18	2,58	2,860	3,23	2,58	3,14	2,760	3,11	2,45	3,08
19	2,72	2,920	3,30	2,64	3,15	2,860	3,24	2,52	3,11
20	2,87	2,975	3,30	2,69	3,15	2,905	3,30	2,59	3,15
21	3,09	2,950	3,30	2,69	3,15	2,915	3,30	2,59	3,15

Figure 4.3: Characteristic Curve for Colour Infrared
2443 Film used in Spacelab

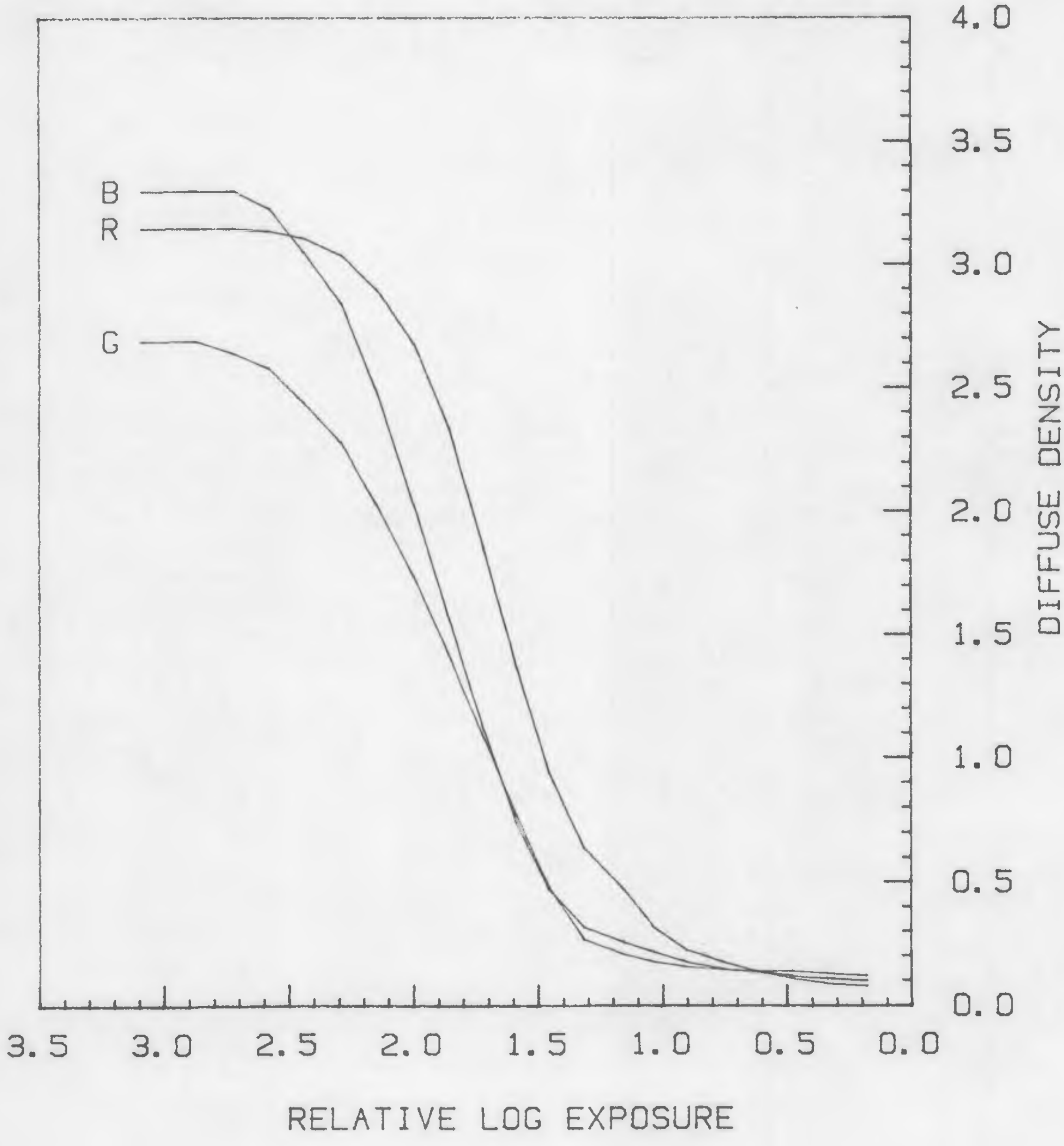


Figure 4.4: Characteristic Curve for the 'fresh' Colour Infrared Film 2443

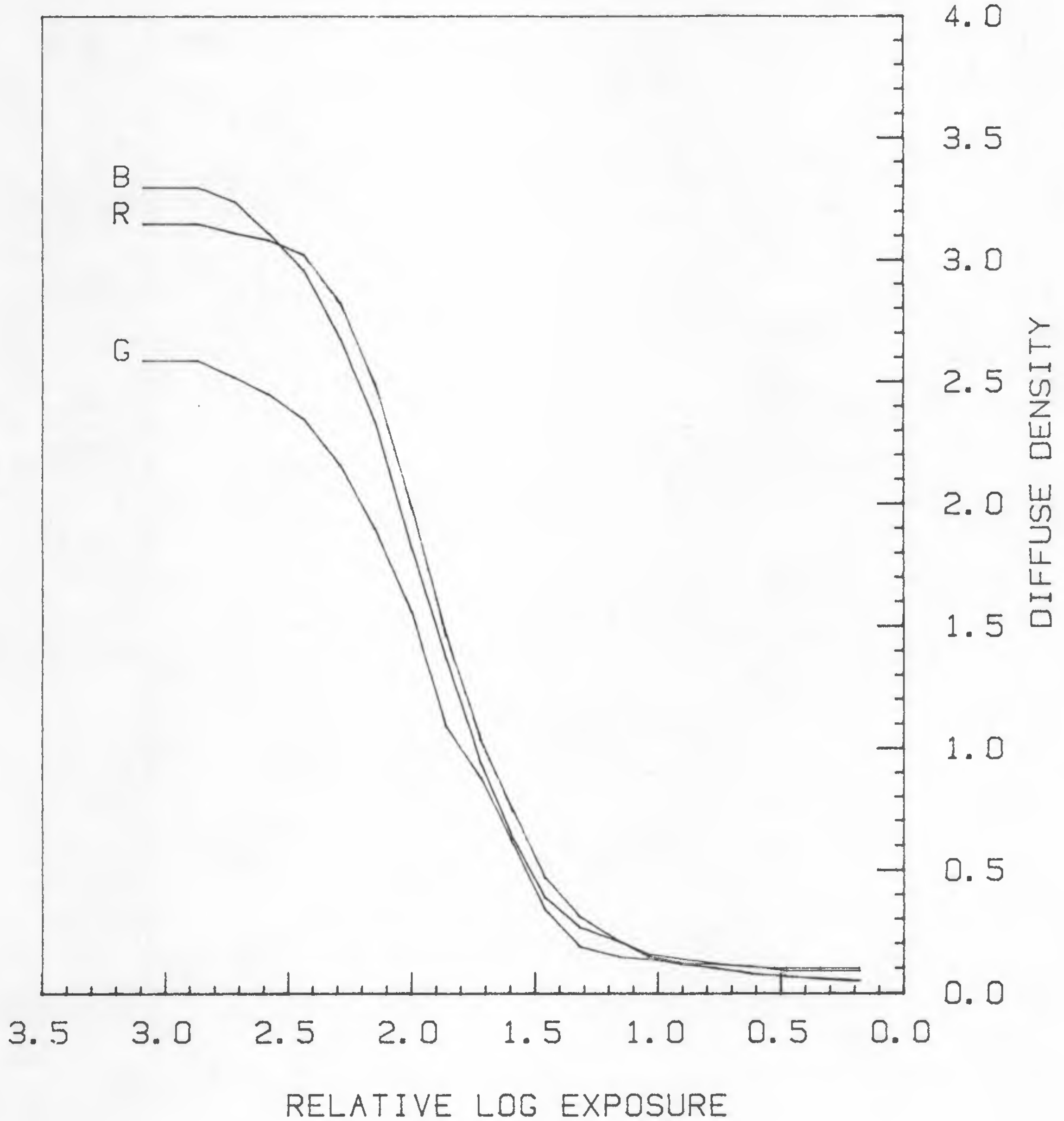
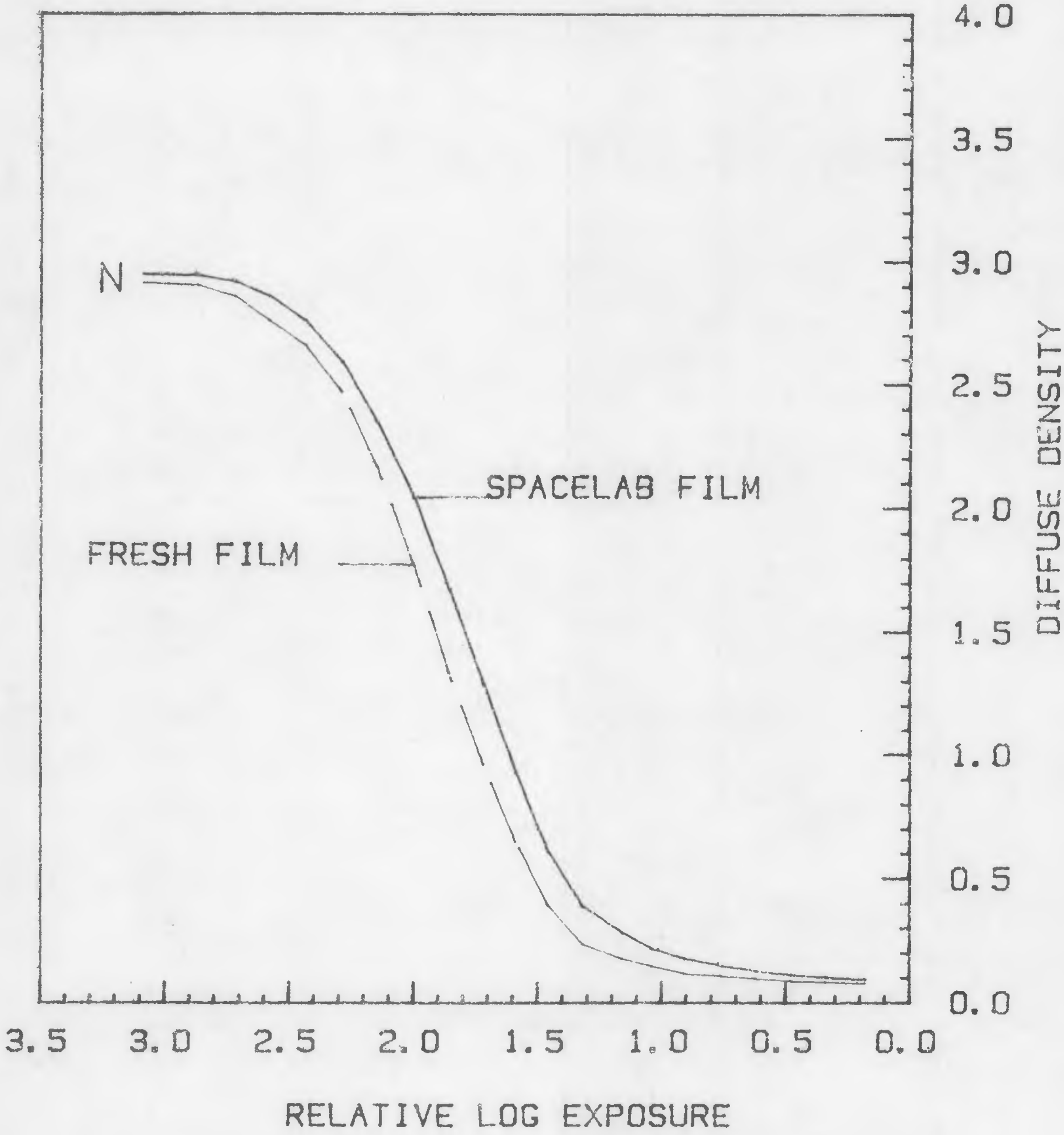


Figure 4.5: **Characteristic Curve for the Neutral Density of the Colour Infrared Film 2443 for the film used in Spacelab and for the 'fresh' film**



5. Data Products

5.1 Copy Material

The products delivered to the users are first generation copies of the original images, Table 5.1 shows the film or paper material that is used for the copies.

Table 5.1: Copy Material for first Generation Copies

Colour Film	Ilford-Cibachrome II CTD.F7
Colour Paper	Ilford-Cibachrome II CPS.1K
B/W-Film	Agfa-Scannerfilm S 230 P
B/W-Paper	Ilford-Ilfospeed-Multigrade II

5.2 Auxiliary Data

Auxiliary data were exposed on every original image immediately after film transport. These data consist of a six step grey tablet and two lines of numerical data as shown in Fig. 5.1 for a positive image.

Grey Step Tablet

A six step grey tablet was built into the focal plane frame of the camera and was exposed on the original image via a small lamp. The bulb was *not* a standard 'white' light source.

The densities which were measured with a Macbeth-densitometer for the grey step tablet in the original films are listed in Table 5.2. These density values can be used to determine the D/log E-curves and the film gamma for the copy film. To obtain these curves it is necessary only to plot the densities of the copy film as function of the densities of the original film.

Table 5.2: Densitites of the Grey Step Tablet in the Original Film

Grey Step	CIR 2443				DX - 2405
No.	N	B	G	R	N
1	0,57	1,62	0,54	0,75	2,29
2	1,42	2,86	1,32	1,72	1,81
3	2,30	3,46	2,07	2,78	1,38
4	2,76	3,71	2,62	3,13	0,90
5	2,86	3,75	2,67	3,19	0,59
6	2,89	3,75	2,72	3,21	0,49

Numerical Data

The first line of the numerical data gives the time in GMT for the midpoint of exposure (Fig. 5.1):

```
    hh : Hour
   min : Minutes
   sec : Seconds
  1/10 : 1/10 Seconds
 1/100 : 1/100 Seconds
1/1000 : 1/1000 Seconds
```

The second line comprises from left to right (Fig. 5.1).

d: Day of year coded by a one digit number from 0 to 9. Table 5.3 shows to which calendar date the code number corresponds.

Image No.: A four digit number between 0001 and 1054; it is a sequential number unique for each image.

t: Exposure time coded by a two digit number from 01 to 31. Table 5.4 shows how these code numbers correspond to the exposure time.

f-stop: Aperture number coded as two digit numbers from 01 to 31. Table 5.4 shows how these code numbers correspond to the f-stop.

Table 5.3: Coding of the Calendar Date

Code No.	Julian Day	Calendar Date
2	332	28 November 1983
3	333	29 November 1983
4	334	30 November 1983
5	335	1 December 1983
6	336	2 December 1983
7	337	3 December 1983
8	338	4 December 1983
9	339	5 December 1983
0	340	6 December 1983
1	341	7 December 1983

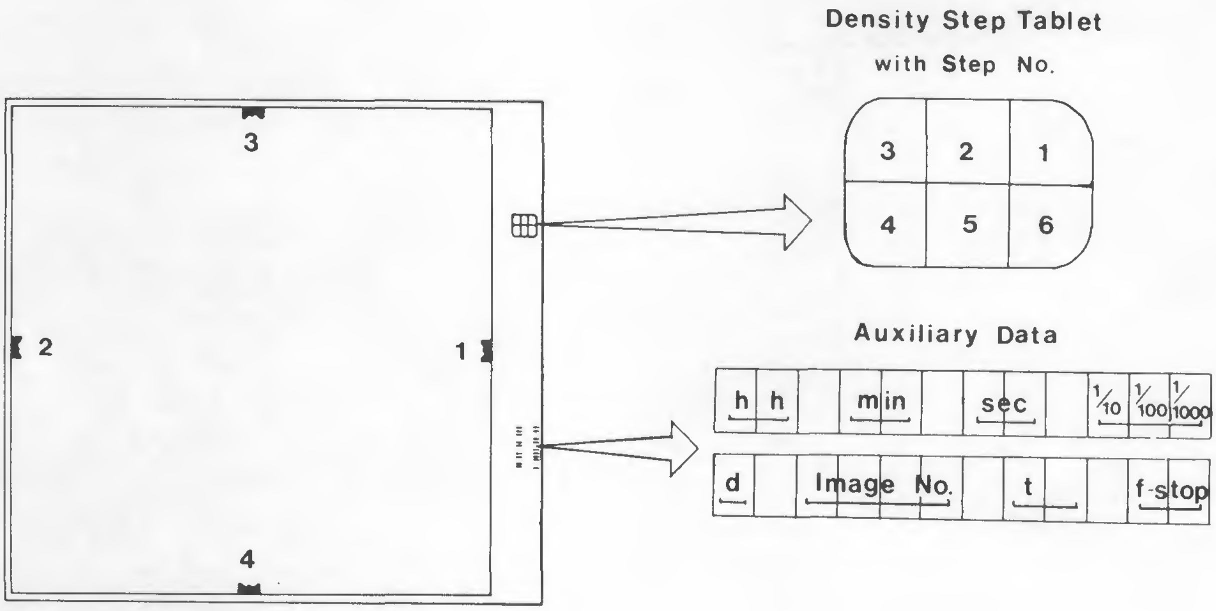


Figure 5.1: **Auxiliary Data Strip**

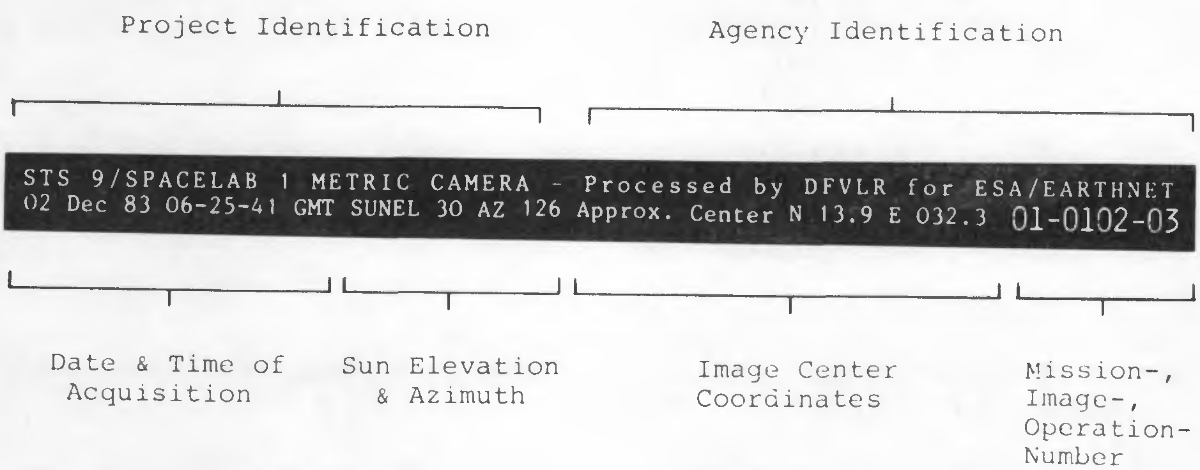


Figure 5.2: **Example of Annotation Strip**

Table 5.4: Coding of Exposure Time (t) and f-stop

Code	t(sec)	f-stop
1	1/250	5,6
2	1/275	5,7
3	1/300	5,8
4	1/325	5,9
5	1/350	6,0
6	1/375	6,1
7	1/400	6,1
8	1/425	6,2
9	1/450	6,3
10	1/475	6,4
11	1/500	6,5
12	1/525	6,6
13	1/550	6,7
14	1/575	6,8
15	1/600	7,0
16	1/625	7,1
17	1/650	7,3
18	1/675	7,4
19	1/700	7,6
20	1/725	7,8
21	1/750	8,0
22	1/775	8,2
23	1/800	8,4
24	1/825	8,6
25	1/850	8,9
26	1/875	9,2
27	1/900	9,5
28	1/925	9,9
29	1/950	10,3
30	1/975	10,7
31	1/1000	11,3

5.3 Annotation

A two line annotation strip inserted either over or under the auxilliary data strip is exposed on every copy. An example of the annotation strip is shown in Fig. 5.2.

The data for the Sun Elevation and the Image Center Coordinates may differ from those given in the Data Catalogue (Chapter 6) by some tenth of a degree. The reason for this difference is that the data for the annotation strip were generated shortly after the mission with an approximated orbit programm, whereas the data in Chapter 6 (Data Catalogue) were generated from actually measured orbit data. The data in the catalogue are therefore more accurate.

5.4 Microfiche Catalogue

A set of 8 microfiches has been produced which consists of a map with all ground tracks for the camera operations and all Metric Camera images from the first Spacelab Flight. Four of the microfiches are in colour for the images on CIR-2443 film and four are in black and white for the images on DX-2405 film. The Microfiche Catalogue is only available through ESA/Earthnet Frascati (see 5.5).

5.5 Data Distribution

Data requests should be directed to:

DFVLR-DA
D-8031 Wessling
W-Germany
Phone: (49) 8153-28(0)-673
T/X 525419 dvlopd

or

ESA/Earthnet, Programme Office, User Services
ESRIN C.P. 64
Via Galileo Gallilei
00044 Frascati, Italy
Phone: (39) 6-94011
T/X: 610637 ESRIN I

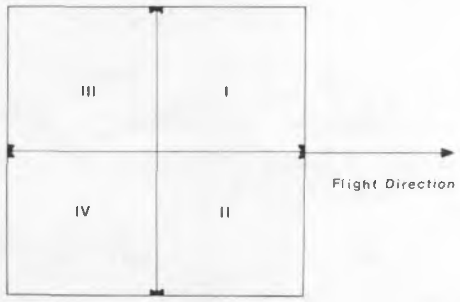


Figure 6.1: Four Quadrants of an image for Cloud Cover Estimation

6. Data Catalogue

6.1 Data List

The data catalogued in the following list identify those MC photographs which were obtained during the first Spacelab Mission on Space-Shuttle Flight No. 9. It also includes specific parameters associated with each image frame such as image No., date, Greenwich Mean Time (GMT), geographic coordinates, attitude and altitude, overlap, cloud coverage, image quality, film type, MC settings, sun elevation and the photographed country. These parameters are listed for every MC image in 17 columns which are explained below.

The data for geographical coordinates, attitude and altitude are based on the PATH (Post Flight Attitude and Trajectory History) data recorded during the mission in 1 sec. intervals. The data listed in this catalogue were derived from the PATH data by linear interpolation over the two nearest points with respect to the GMT of the exposure event.

Column 1 - Image ID: Mission-Image Number-Operation

Column 2 - Calendar Date

Column 3 - Greenwich Mean Time (=UTC= Universal Time Code) for the midpoint of exposure.

Column 4 - Geographic latitude (geodetic) of Nadir Point (see 3.3).

Column 5 - Geographic longitude of Nadir Point (see 3.3).

Column 6 - Roll-angle (see 3.1.1).

Column 7 - Pitch-angle (see 3.1.1).

Column 8 - Yaw-angle (see 3.1.1).

Column 9 - Geodetic Altitude (see 3.3.1).

Column 10 - Overlap:
The Metric Camera was able to acquire photography with 60% or 80% overlap in flight direction. The percent overlap indicates how much of each frame was re-photographed by the following frame.

Column 11 - Cloud Cover:
An estimate of the percentage of cloud cover was made for each frame of photography. For this estimation the image was devided into four quadrants as shown in Fig. 6.1. For each quadrant the cloud cover is given by a digital number between 0 and 9. This number has the following meaning:
0.........0-10 % Cloud Cover
1........11-20 % Cloud Cover

.

.

9........91-100% Cloud Cover
Each digit represents one quadrant in the sequence of the quadrants (see Fig. 6.1).

Column 12 - Image Quality:
The image quality value (digital number from 0 to 9 or X) was obtained by visual inspection of first generation copies and is intended to give the user a rough indication of the overall interpretability of the image content. For scoring, the following criteria were used:
X...Quality not assessed, entire sea scene or ground not visible due to clouds.
0...Exceptional in contrast and definition (relative to all MC-1 images).
1...Exceptional, but not in all parts of the image.
3...Excellent in either contrast or definition and very good in the remaining criterium.
5...Part of the image with quality equal to 3, and part equal to 7, or overall missing contrast and details e.g. in linear features or also poor details due to the nature of the object (sand desert).
7...Ground visibility reduced to a large extend by cirrus clouds, haze or mist. Still some contrast to distinguish shore lines, rivers and/or different types of vegetation or soil.
9...Very poor contrast, image appears just grey.

Column 13 - Film type:
CIR...Kodak Aerochrome Infrared Film 2443
B/W...Kodak Double-X Aerographic film 2405

Column 14 - Aperture Number or f-stop.

Column 15 - Reciprocal of exposure time.

Column 16 - Sun Elevation Angle

Column 17 - Name of Country or Region

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 1

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0001-01	83/12/ 2	3:30: 3.510	24.23	84.62	0.64	-0.20	-0.06	246.100	60	0000	0	CIR	6.8	500	28.03	INDIA
01-0002-01	83/12/ 2	3:30: 8.402	24.50	84.81	0.65	-0.22	-0.03	246.160	80	0000	0	CIR	6.8	500	27.98	INDIA
01-0003-01	83/12/ 2	3:30:13.300	24.76	85.01	0.63	-0.19	0.00	246.230	80	0000	0	CIR	6.8	500	27.94	INDIA
01-0004-01	83/12/ 2	3:30:18.206	25.03	85.20	0.63	-0.17	0.02	246.290	80	0000	0	CIR	6.8	500	27.89	INDIA
01-0005-01	83/12/ 2	3:30:23.292	25.30	85.41	0.60	-0.15	0.04	246.360	80	0000	0	CIR	6.8	500	27.83	INDIA
01-0006-01	83/12/ 2	3:30:28.182	25.56	85.61	0.57	-0.13	0.05	246.420	80	0000	0	CIR	6.8	500	27.79	INDIA
01-0007-01	83/12/ 2	3:30:33.269	25.84	85.82	0.53	-0.12	0.05	246.490	80	0000	0	CIR	6.8	500	27.73	INDIA,NEPAL
01-0008-01	83/12/ 2	3:30:38.155	26.10	86.02	0.48	-0.11	0.04	246.560	80	0000	0	CIR	6.8	500	27.68	INDIA,NEPAL
01-0009-01	83/12/ 2	3:30:43.041	26.37	86.22	0.41	-0.14	0.04	246.620	80	0000	0	CIR	6.8	500	27.63	INDIA,NEPAL
01-0010-01	83/12/ 2	3:30:48.127	26.63	86.43	0.33	-0.11	0.03	246.700	80	0000	0	CIR	6.8	500	27.58	INDIA,NEPAL
01-0011-01	83/12/ 2	3:30:53.019	26.90	86.63	0.27	-0.11	0.03	246.760	80	0000	0	CIR	6.8	500	27.52	NEPAL,INDIA
01-0012-01	83/12/ 2	3:30:58.109	27.17	86.85	0.19	-0.12	0.03	246.830	80	0000	0	CIR	6.8	500	27.46	NEPAL,TIBET,SIKKIM
01-0013-01	83/12/ 2	3:31: 2.996	27.43	87.04	0.13	-0.14	0.02	246.900	80	0300	0	CIR	6.8	500	27.40	NEPAL,TIBET,SIKKIM
01-0014-01	83/12/ 2	3:31: 7.884	27.69	87.25	0.08	-0.13	0.01	246.970	80	0100	0	CIR	6.8	500	27.35	NEPAL,TIBET,SIKKIM
01-0015-01	83/12/ 2	3:31:12.967	27.96	87.47	0.05	-0.11	0.02	247.040	80	0100	1	CIR	6.8	500	27.28	NEPAL,TIBET,SIKKIM
01-0016-01	83/12/ 2	3:31:17.858	28.22	87.68	0.03	-0.07	0.01	247.110	80	0001	1	CIR	6.8	500	27.22	NEPAL,TIBET,SIKKIM
01-0017-01	83/12/ 2	3:31:22.945	28.49	87.99	0.02	-0.02	0.01	247.180	80	0001	2	CIR	6.8	500	27.16	TIBET
01-0018-01	83/12/ 2	3:31:27.839	28.75	88.11	-0.01	0.01	-0.01	247.250	80	0001	2	CIR	6.8	500	27.10	TIBET
01-0019-01	83/12/ 2	3:31:32.723	29.00	88.32	-0.03	0.06	-0.01	247.320	80	0000	1	CIR	6.8	500	27.04	TIBET
01-0020-01	83/12/ 2	3:31:37.813	29.27	88.54	-0.05	0.08	-0.02	247.400	80	0000	0	CIR	6.8	500	26.97	TIBET
01-0021-01	83/12/ 2	3:31:42.594	29.53	88.75	-0.06	0.11	-0.02	247.470	80	0000	0	CIR	6.8	500	26.91	TIBET
01-0022-01	83/12/ 2	3:31:47.731	29.80	88.98	-0.09	0.10	-0.03	247.540	80	0000	0	CIR	6.8	500	26.84	TIBET
01-0023-01	83/12/ 2	3:31:52.675	30.06	89.19	-0.10	0.10	-0.04	247.610	80	0000	0	CIR	6.8	500	26.77	TIBET
01-0024-01	83/12/ 2	3:31:57.754	30.32	89.42	0.06	0.22	-0.03	247.690	80	0000	0	CIR	6.8	500	26.70	TIBET
01-0025-01	83/12/ 2	3:32: 2.640	30.58	89.64	0.16	0.29	-0.03	247.760	80	0000	0	CIR	6.8	500	26.63	TIBET
01-0026-01	83/12/ 2	3:32: 7.529	30.84	89.87	0.02	0.16	-0.03	247.830	80	0000	0	CIR	6.8	500	26.56	TIBET
01-0027-01	83/12/ 2	3:32:12.613	31.10	90.09	-0.13	0.03	-0.03	247.910	80	0000	0	CIR	6.8	500	26.49	TIBET
01-0028-01	83/12/ 2	3:32:17.496	31.35	90.32	-0.27	-0.10	-0.03	247.980	80	0000	0	CIR	6.8	500	26.42	TIBET
01-0029-01	83/12/ 2	3:32:22.591	31.62	90.55	-0.41	-0.24	-0.02	248.060	80	0000	0	CIR	6.8	500	26.34	TIBET
01-0030-01	83/12/ 2	3:32:27.470	31.87	90.78	-0.06	0.04	-0.03	248.130	80	0000	1	CIR	6.8	500	26.28	TIBET
01-0031-01	83/12/ 2	3:32:32.544	32.13	91.01	-0.05	0.00	-0.02	248.210	80	0000	4	CIR	6.8	500	26.20	TIBET
01-0032-01	83/12/ 2	3:32:37.448	32.38	91.24	-0.05	-0.01	-0.02	248.290	80	0000	4	CIR	6.8	500	26.13	TIBET
01-0033-01	83/12/ 2	3:32:42.325	32.64	91.47	-0.03	-0.02	-0.01	248.360	80	0000	4	CIR	6.8	500	26.04	TIBET
01-0034-01	83/12/ 2	3:32:47.422	32.90	91.71	-0.03	0.00	-0.01	248.440	80	0000	4	CIR	6.8	500	25.97	CHINA
01-0035-01	83/12/ 2	3:32:52.308	33.16	91.94	-0.02	-0.03	-0.01	248.520	80	0000	4	CIR	6.8	500	25.89	CHINA
01-0036-01	83/12/ 2	3:32:57.395	33.41	92.19	-0.02	-0.03	-0.01	248.590	80	0000	4	CIR	6.8	500	25.81	CHINA
01-0037-01	83/12/ 2	3:33: 2.286	33.66	92.42	-0.01	-0.04	-0.01	248.670	80	0000	4	CIR	6.8	500	25.73	CHINA
01-0038-01	83/12/ 2	3:33: 7.174	33.91	92.66	-0.01	-0.08	-0.02	248.750	80	0000	1	CIR	6.5	500	25.65	CHINA
01-0039-01	83/12/ 2	3:33:17.127	34.41	93.15	0.00	-0.10	-0.02	248.900	60	0000	0	CIR	6.5	500	25.49	CHINA
01-0040-01	83/12/ 2	3:33:27.081	34.92	93.65	0.02	-0.11	-0.02	249.060	60	0000	0	CIR	6.5	500	25.32	CHINA
01-0041-01	83/12/ 2	3:33:37.033	35.42	94.15	0.02	-0.10	-0.01	249.210	60	0000	1	CIR	6.5	500	25.15	CHINA
01-0042-01	83/12/ 2	3:33:46.965	35.92	94.65	0.05	-0.09	0.00	249.370	60	0000	1	CIR	6.5	500	24.97	CHINA
01-0043-01	83/12/ 2	3:33:56.917	36.41	95.16	0.07	-0.07	0.00	249.530	60	0000	0	CIR	6.5	500	24.79	CHINA
01-0044-01	83/12/ 2	3:34: 6.889	36.91	95.69	0.09	-0.06	-0.01	249.690	60	0000	0	CIR	6.5	500	24.61	CHINA
01-0045-01	83/12/ 2	3:34:16.869	37.40	96.22	0.08	-0.06	-0.01	249.850	60	1000	1	CIR	5.7	500	24.43	CHINA
01-0046-01	83/12/ 2	3:34:26.811	37.88	96.75	0.06	-0.06	0.00	250.000	60	1100	1	CIR	5.7	500	24.24	CHINA
01-0047-01	83/12/ 2	3:34:36.789	38.37	97.29	0.05	-0.07	0.01	250.160	60	0110	4	CIR	5.7	500	24.04	CHINA
01-0048-01	83/12/ 2	3:34:46.746	38.85	97.85	0.03	-0.08	0.02	250.320	60	0002	1	CIR	5.7	500	23.85	CHINA
01-0049-01	83/12/ 2	3:34:56.695	39.33	98.41	0.01	-0.08	0.02	250.480	60	0000	0	CIR	5.7	500	23.66	CHINA
01-0050-01	83/12/ 2	3:35: 6.649	39.80	98.98	-0.01	-0.09	0.03	250.640	60	0000	0	CIR	5.7	500	23.45	CHINA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 1

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0051-01	83/12/ 2	3:35:16.598	40.27	99.55	-0.03	-0.09	0.03	250.790	60	0000	0	CIR	5.7	500	23.25	CHINA
01-0052-01	83/12/ 2	3:35:26.550	40.75	100.14	-0.04	-0.07	0.04	250.950	60	0000	0	CIR	5.7	500	23.04	CHINA
01-0053-01	83/12/ 2	3:35:36.436	41.21	100.73	-0.06	-0.06	0.04	251.100	60	0000	1	CIR	5.7	500	22.83	CHINA
01-0054-01	83/12/ 2	3:35:46.445	41.67	101.33	-0.07	-0.07	0.05	251.260	60	0000	1	CIR	5.7	500	22.62	CHINA
01-0055-01	83/12/ 2	3:35:56.390	42.13	101.94	-0.09	-0.07	0.04	251.420	60	0000	0	CIR	5.7	500	22.41	CHINA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 2

MISS-IM-CP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0056-02	83/12/ 2	4:57: 2.651	16.42	56.61	-0.15	0.10	0.00	244.390	60	2121	X	CIR	6.8	500	28.66	ARAB.SEA/MUSC.&OM.
01-0057-02	83/12/ 2	4:57:12.646	16.97	56.96	-0.17	0.09	0.02	244.490	60	1121	X	CIR	6.8	500	28.62	ARAB.SEA/MUSCAT
01-0058-02	83/12/ 2	4:57:22.633	17.53	57.32	-0.18	0.07	0.04	244.580	60	1111	X	CIR	6.8	500	28.58	ARAB.SEA/MUSCAT
01-0059-02	83/12/ 2	4:57:32.615	18.08	57.68	-0.18	0.07	0.06	244.680	60	0011	3	CIR	6.8	500	28.54	ARAB.SEA/MUSCAT
01-0060-02	83/12/ 2	4:57:42.590	18.64	58.04	-0.16	0.07	0.07	244.780	60	0000	3	CIR	6.8	500	28.49	ARAB.SEA/MUSCAT
01-0061-02	83/12/ 2	4:57:52.550	19.18	58.41	-0.15	0.07	0.08	244.890	60	0000	3	CIR	6.8	500	28.45	ARAB.SEA/MUSCAT
01-0062-02	83/12/ 2	4:58: 2.511	19.74	58.77	-0.15	0.07	0.08	244.990	60	0000	3	CIR	6.8	500	28.39	ARAB.SEA/MUSCAT
01-0063-02	83/12/ 2	4:58:12.474	20.28	59.14	-0.16	0.09	0.06	245.100	60	0000	0	CIR	6.8	500	28.34	ARAB.SEA/MUSCAT
01-0064-02	83/12/ 2	4:58:22.413	20.83	59.52	-0.17	0.10	0.04	245.220	60	2000	0	CIR	6.8	500	28.28	ARAB.SEA/MUSCAT
01-0065-02	83/12/ 2	4:58:32.363	21.37	59.89	-0.18	0.12	0.03	245.330	60	0010	0	CIR	6.8	500	28.21	ARAB.SEA/MUSCAT
01-0066-02	83/12/ 2	4:58:42.323	21.92	60.27	-0.17	0.10	0.02	245.450	60	1100	0	CIR	6.8	500	28.14	ARAB.SEA/MUSCAT
01-0067-02	83/12/ 2	4:58:52.303	22.46	60.65	-0.17	0.10	0.02	245.570	60	0002	0	CIR	6.8	500	28.06	ARAB.SEA/MUSCAT
01-0068-02	83/12/ 2	4:59: 2.281	23.01	61.04	-0.17	0.09	0.01	245.690	60	0010	X	CIR	6.8	500	27.99	ARAB.SEA/MUSCAT
01-0069-02	83/12/ 2	4:59:12.234	23.56	61.43	-0.15	0.09	0.00	245.810	60	0000	X	CIR	6.8	500	27.90	ARAB.SEA/MUSCAT
01-0070-02	83/12/ 2	4:59:22.190	24.09	61.82	-0.16	0.10	0.00	245.940	60	0000	X	CIR	6.8	500	27.81	ARAB.SEA.IRAN
01-0071-02	83/12/ 2	4:59:32.134	24.63	62.21	-0.15	0.11	-0.01	246.070	60	0000	0	CIR	6.8	500	27.72	PAKISTAN
01-0072-02	83/12/ 2	4:59:42.103	25.17	62.62	-0.15	0.09	-0.02	246.200	60	0000	0	CIR	6.8	500	27.63	PAKISTAN
01-0073-02	83/12/ 2	4:59:52.056	25.71	63.02	-0.15	0.05	-0.03	246.330	60	0000	0	CIR	6.8	500	27.53	PAKISTAN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 3

MISS-IM-CP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0074-03	83/12/ 2	6:21: 2.669	-1.70	23.21	-0.08	0.10	-0.03	243.040	60	7999	9	CIR	6.1	500	27.10	ZAIRE
01-0075-03	83/12/ 2	6:21:12.444	-1.15	23.53	-0.08	0.12	-0.05	243.020	60	4379	6	CIR	6.1	500	27.21	ZAIRE
01-0076-03	83/12/ 2	6:21:22.409	-0.58	23.85	-0.07	0.14	-0.06	243.000	60	3254	4	CIR	6.1	500	27.30	REP.OF CONGO
01-0077-03	83/12/ 2	6:21:32.362	0.00	24.17	-0.16	0.06	-0.07	242.980	60	7332	5	CIR	6.8	500	27.39	REP.OF CONGO
01-0078-03	83/12/ 2	6:21:42.147	0.43	24.49	-0.25	0.18	-0.06	242.970	60	9953	6	CIR	6.8	500	27.53	REP.OF CONGO
01-0079-03	83/12/ 2	6:21:52.109	1.10	24.81	-0.19	0.09	-0.05	242.960	60	7799	7	CIR	6.8	500	27.58	REP.OF CONGO
01-0080-03	83/12/ 2	6:22: 2.073	1.66	25.14	-0.19	0.06	-0.05	242.950	60	7988	7	CIR	6.8	500	27.66	REP.OF CONGO
01-0081-03	83/12/ 2	6:22:12.047	2.23	25.46	-0.18	0.04	-0.04	242.950	60	9958	8	CIR	6.8	500	27.74	REP.OF CONGO
01-0082-03	83/12/ 2	6:22:22.016	2.80	25.79	-0.19	0.01	-0.03	242.960	60	9899	9	CIR	6.8	500	27.82	REP.OF CONGO
01-0083-03	83/12/ 2	6:22:32.015	3.37	26.11	-0.19	-0.01	-0.02	242.960	60	9898	9	CIR	6.8	500	27.89	REP.OF CONGO
01-0084-03	83/12/ 2	6:22:41.951	3.92	26.43	-0.18	-0.03	-0.01	242.970	60	9698	9	CIR	6.8	500	27.96	REP.OF CONGO
01-0085-03	83/12/ 2	6:22:51.853	4.49	26.76	-0.18	-0.05	-0.01	242.990	60	9896	9	CIR	6.8	500	28.02	REP.OF CONGO
01-0086-03	83/12/ 2	6:23: 1.872	5.06	27.09	-0.18	-0.05	0.01	243.000	60	9999	X	CIR	6.8	500	28.08	CENTR.AFRICAN REP.
01-0087-03	83/12/ 2	6:23:11.715	5.62	27.40	-0.16	-0.08	0.01	243.020	60	6899	9	CIR	6.8	500	28.13	SUDAN
01-0088-03	83/12/ 2	6:23:21.719	6.18	27.73	-0.17	-0.09	0.02	243.050	60	7369	9	CIR	6.8	500	28.19	SUDAN
01-0089-03	83/12/ 2	6:23:31.750	6.75	28.06	-0.17	-0.08	0.03	243.080	60	8473	8	CIR	6.8	500	28.23	SUDAN
01-0090-03	83/12/ 2	6:23:41.579	7.30	28.38	-0.17	-0.07	0.05	243.110	60	9884	9	CIR	6.8	500	28.27	SUDAN
01-0091-03	83/12/ 2	6:23:51.616	7.88	28.72	-0.17	-0.07	0.05	243.140	60	6897	8	CIR	6.8	500	28.31	SUDAN
01-0092-03	83/12/ 2	6:24: 1.472	8.43	29.04	-0.17	-0.06	0.07	243.180	60	8879	8	CIR	6.8	500	28.34	SUDAN
01-0093-03	83/12/ 2	6:24:11.506	9.00	29.37	-0.18	-0.03	0.08	243.230	60	2277	5	CIR	6.8	500	28.38	SUDAN
01-0094-03	83/12/ 2	6:24:21.551	9.56	29.71	-0.19	-0.02	0.10	243.270	60	0033	3	CIR	6.8	500	28.40	SUDAN
01-0095-03	83/12/ 2	6:24:31.553	10.12	30.04	-0.19	0.00	0.10	243.330	60	0000	3	CIR	6.8	500	28.43	SUDAN
01-0096-03	83/12/ 2	6:24:41.536	10.67	30.37	-0.20	0.02	0.10	243.380	60	0000	3	CIR	6.8	500	28.44	SUDAN
01-0097-03	83/12/ 2	6:24:51.540	11.24	30.71	-0.19	0.01	0.10	243.440	60	0000	3	CIR	6.8	500	28.45	SUDAN
01-0098-03	83/12/ 2	6:25: 1.556	11.80	31.05	-0.18	0.01	0.09	243.500	60	1000	3	CIR	6.8	500	28.47	SUDAN
01-0099-03	83/12/ 2	6:25:11.160	12.35	31.38	-0.17	0.02	0.10	243.560	60	1000	3	CIR	6.8	500	28.47	SUDAN
01-0100-03	83/12/ 2	6:25:21.191	12.92	31.73	-0.15	0.02	0.09	243.630	60	0010	4	CIR	6.8	500	28.47	SUDAN
01-0101-03	83/12/ 2	6:25:31.177	13.48	32.07	-0.14	0.02	0.09	243.700	60	0000	3	CIR	6.8	500	28.47	SUDAN
01-0102-03	83/12/ 2	6:25:41.141	14.03	32.41	-0.14	0.03	0.09	243.780	60	0000	3	CIR	6.8	500	28.46	SUDAN
01-0103-03	83/12/ 2	6:25:51.116	14.59	32.76	-0.12	0.05	0.09	243.860	60	0000	1	CIR	6.8	500	28.45	SUDAN
01-0104-03	83/12/ 2	6:26: 1.075	15.15	33.11	-0.13	0.05	0.09	243.940	60	0000	1	CIR	6.8	500	28.43	SUDAN
01-0105-03	83/12/ 2	6:26:11.050	15.70	33.46	-0.13	0.06	0.07	244.020	60	0000	1	CIR	6.8	500	28.41	SUDAN
01-0106-03	83/12/ 2	6:26:21.013	16.26	33.81	-0.13	0.08	0.06	244.110	60	0000	1	CIR	6.8	500	28.39	SUDAN
01-0107-03	83/12/ 2	6:26:30.978	16.82	34.16	-0.14	0.10	0.05	244.200	60	0000	1	CIR	6.8	500	28.35	SUDAN
01-0108-03	83/12/ 2	6:26:40.990	17.37	34.52	-0.15	0.11	0.04	244.290	60	0000	4	CIR	6.8	500	28.32	SUDAN
01-0109-03	83/12/ 2	6:26:50.951	17.92	34.88	-0.17	0.11	0.03	244.390	60	0000	4	CIR	6.8	500	28.29	SUDAN
01-0110-03	83/12/ 2	6:27: 0.776	18.48	35.24	-0.18	0.11	0.02	244.490	60	0000	1	CIR	6.8	500	28.24	SUDAN
01-0111-03	83/12/ 2	6:27:10.791	19.02	35.60	-0.19	0.09	0.02	244.580	60	0000	0	CIR	6.8	500	28.20	SUDAN
01-0112-03	83/12/ 2	6:27:20.792	19.58	35.97	-0.18	0.08	0.02	244.690	60	0400	2	CIR	6.8	500	28.14	SUDAN
01-0113-03	83/12/ 2	6:27:30.757	20.12	36.34	-0.18	0.06	0.03	244.800	60	0503	2	CIR	6.8	500	28.09	SUDAN
01-0114-03	83/12/ 2	6:27:40.705	20.67	36.71	-0.18	0.06	0.03	244.910	60	3305	2	CIR	6.8	500	28.04	SUDAN
01-0115-03	83/12/ 2	6:27:50.714	21.22	37.09	-0.18	0.05	0.03	245.020	60	1124	2	CIR	6.8	500	27.97	SUDAN
01-0116-03	83/12/ 2	6:28: 0.662	21.77	37.47	-0.17	0.05	0.04	245.140	60	1021	2	CIR	6.8	500	27.90	SUDAN
01-0117-03	83/12/ 2	6:28:10.643	22.31	37.85	-0.18	0.05	0.04	245.250	60	1011	X	CIR	6.8	500	27.84	SAUDI ARABIA
01-0118-03	83/12/ 2	6:28:20.596	22.85	38.23	-0.17	0.06	0.05	245.370	60	0020	2	CIR	6.8	500	27.76	SAUDI ARABIA
01-0119-03	83/12/ 2	6:28:30.551	23.40	38.62	-0.17	0.07	0.05	245.500	60	0000	1	CIR	6.8	500	27.68	SAUDI ARABIA
01-0120-03	83/12/ 2	6:28:40.501	23.93	39.02	-0.18	0.08	0.06	245.620	60	0000	1	CIR	6.8	500	27.60	SAUDI ARABIA
01-0121-03	83/12/ 2	6:28:50.453	24.48	39.41	-0.17	0.10	0.06	245.750	60	0000	1	CIR	6.8	500	27.51	SAUDI ARABIA
01-0122-03	83/12/ 2	6:29: 0.441	25.02	39.81	-0.18	0.11	0.06	245.880	60	2000	2	CIR	6.8	500	27.42	SAUDI ARABIA
01-0123-03	83/12/ 2	6:29:10.391	25.55	40.21	-0.19	0.10	0.04	246.010	60	1010	2	CIR	6.8	500	27.33	SAUDI ARABIA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 3

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVRLAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0124-03	83/12/ 2	6:29:20.404	26.09	40.62	-0.19	0.09	0.03	246.140	60	0010	2	CIR	6.8	500	27.23	SAUDI ARABIA
01-0125-03	83/12/ 2	6:29:30.387	26.62	41.03	-0.18	0.06	0.01	246.280	60	0000	1	CIR	6.8	500	27.12	SAUDI ARABIA
01-0126-03	83/12/ 2	6:29:40.352	27.16	41.44	-0.17	0.06	0.00	246.420	60	2000	1	CIR	6.8	500	27.01	SAUDI ARABIA
01-0127-03	83/12/ 2	6:29:50.145	27.68	41.86	-0.17	0.05	-0.01	246.560	60	3010	1	CIR	6.8	500	26.91	SAUDI ARABIA
01-0128-03	83/12/ 2	6:30: 0.298	28.23	42.30	-0.16	0.06	-0.02	246.700	60	3230	2	CIR	6.8	500	26.79	SAUDI ARABIA
01-0129-03	83/12/ 2	6:30:10.259	28.74	42.72	-0.15	0.06	-0.04	246.840	60	5552	2	CIR	6.8	500	26.67	SAUDI ARABIA
01-0130-03	83/12/ 2	6:30:20.053	29.26	43.15	-0.16	0.07	-0.05	246.990	60	4444	4	CIR	6.8	500	26.56	SAUDI ARABIA
01-0131-03	83/12/ 2	6:30:30.049	29.79	43.58	-0.15	0.07	-0.07	247.120	60	0145	5	CIR	6.7	500	26.43	SAUDI ARABIA,IRAQ
01-0132-03	83/12/ 2	6:30:40.073	30.31	44.03	-0.16	0.04	-0.08	247.270	60	0101	7	CIR	6.7	500	26.30	IRAQ
01-0133-03	83/12/ 2	6:30:50.086	30.84	44.48	-0.16	0.05	-0.09	247.420	60	3501	7	CIR	6.7	500	26.16	IRAQ
01-0134-03	83/12/ 2	6:31: 0.083	31.37	44.95	-0.17	0.02	-0.12	247.580	60	8823	7	CIR	6.7	500	26.03	IRAQ
01-0135-03	83/12/ 2	6:31:10.083	31.88	45.40	-0.17	0.02	-0.12	247.720	60	9988	9	CIR	6.7	500	25.89	IRAQ
01-0136-03	83/12/ 2	6:31:20.045	32.39	45.86	-0.18	0.02	-0.13	247.870	60	9999	X	CIR	6.7	500	25.74	IRAQ
01-0137-03	83/12/ 2	6:31:29.996	32.90	46.33	-0.16	0.01	-0.15	248.030	60	9999	X	CIR	6.5	500	25.60	IRAQ
01-0138-03	83/12/ 2	6:31:39.939	33.42	46.80	-0.16	0.01	-0.14	248.180	60	9099	X	CIR	6.5	500	25.44	IRAN
01-0139-03	83/12/ 2	6:31:49.919	33.92	47.29	-0.16	0.02	-0.13	248.330	60	9699	3	CIR	6.5	500	25.29	IRAN
01-0140-03	83/12/ 2	6:31:59.917	34.44	47.79	-0.16	0.02	-0.12	248.500	60	9597	3	CIR	6.5	500	25.13	IRAN
01-0141-03	83/12/ 2	6:32: 9.869	34.94	48.27	-0.17	0.03	-0.10	248.650	60	6296	1	CIR	6.5	500	24.97	IRAN
01-0142-03	83/12/ 2	6:32:19.350	35.44	48.78	-0.18	0.03	-0.09	248.800	60	5073	1	CIR	6.4	500	24.81	IRAN
01-0143-03	83/12/ 2	6:32:29.842	35.94	49.29	-0.17	0.03	-0.08	248.960	60	5150	1	CIR	6.4	500	24.64	IRAN
01-0144-03	83/12/ 2	6:32:39.791	36.44	49.80	-0.16	0.04	-0.07	249.110	60	0061	2	CIR	6.4	500	24.46	IRAN
01-0145-03	83/12/ 2	6:32:49.747	36.93	50.32	-0.15	0.04	-0.05	249.270	60	0010	1	CIR	6.4	500	24.29	IRAN
01-0146-03	83/12/ 2	6:32:59.712	37.42	50.86	-0.14	0.05	-0.04	249.440	60	1000	2	CIR	6.4	500	24.11	IRAN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 4

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0150-04	83/12/ 2	7:58:13.133	24.56	16.78	-0.16	-0.10	0.02	245.670	60	0000	7	CIR	6.8	500	27.26	LIBYA
01-0151-04	83/12/ 2	7:58:22.985	25.10	17.17	-0.13	-0.11	0.01	245.800	60	0000	5	CIR	6.8	500	27.17	LIBYA
01-0152-04	83/12/ 2	7:58:33.025	25.64	17.58	-0.11	-0.11	0.01	245.930	60	0000	0	CIR	6.8	500	27.08	LIBYA
01-0153-04	83/12/ 2	7:58:42.943	26.17	17.98	-0.10	-0.11	0.00	246.060	60	0000	1	CIR	6.8	500	26.98	LIBYA
01-0154-04	83/12/ 2	7:58:52.898	26.70	18.39	-0.08	-0.13	-0.01	246.200	60	0000	1	CIR	6.8	500	26.88	LIBYA
01-0155-04	83/12/ 2	7:59: 2.777	27.23	18.81	-0.06	-0.11	-0.02	246.340	60	0000	3	CIR	6.8	500	26.78	LIBYA
01-0156-04	83/12/ 2	7:59:12.820	27.76	19.23	-0.05	-0.10	-0.02	246.480	60	0000	3	CIR	6.8	500	26.67	LIBYA
01-0157-04	83/12/ 2	7:59:22.684	28.29	19.65	-0.04	-0.08	-0.03	246.620	60	0000	2	CIR	6.8	500	26.56	LIBYA
01-0158-04	83/12/ 2	7:59:32.744	28.82	20.09	-0.02	-0.08	-0.03	246.760	60	0000	0	CIR	6.8	500	26.44	LIBYA
01-0159-04	83/12/ 2	7:59:42.600	29.34	20.52	-0.01	-0.07	-0.05	246.900	60	0000	0	CIR	6.8	500	26.33	LIBYA
01-0160-04	83/12/ 2	7:59:52.624	29.87	20.96	0.01	-0.05	-0.05	247.050	60	0000	1	CIR	6.8	500	26.20	LIBYA
01-0161-04	83/12/ 2	8: 0: 2.489	30.39	21.39	0.03	-0.05	-0.06	247.190	60	0000	1	CIR	6.8	500	26.07	LIBYA
01-0162-04	83/12/ 2	8: 0:12.491	30.91	21.85	0.04	-0.04	-0.07	247.340	60	0100	1	CIR	6.8	500	25.95	LIBYA
01-0163-04	83/12/ 2	8: 0:22.550	31.44	22.31	0.06	-0.04	-0.07	247.490	60	0101	1	CIR	6.8	500	25.81	LIBYA
01-0164-04	83/12/ 2	8: 0:32.401	31.95	22.76	0.06	-0.04	-0.07	247.640	60	0200	1	CIR	6.8	500	25.67	LIBYA
01-0165-04	83/12/ 2	8: 0:42.453	32.47	23.23	0.04	-0.06	-0.07	247.800	60	2102	1	CIR	6.8	500	25.53	LIBYA
01-0166-04	83/12/ 2	8: 0:52.336	32.98	23.70	0.03	-0.05	-0.09	247.950	60	2013	1	CIR	6.8	500	25.39	LIBYA
01-0167-04	83/12/ 2	8: 1: 2.370	33.49	24.18	0.01	-0.05	-0.09	248.100	60	2431	X	CIR	6.8	500	25.24	MEDITERANIAN SEA
01-0168-04	83/12/ 2	8: 1:12.235	33.99	24.66	0.01	-0.07	-0.09	248.260	60	5732	X	CIR	6.8	500	25.09	GREECE
01-0169-04	83/12/ 2	8: 1:22.307	34.50	25.15	0.00	-0.08	-0.10	248.410	60	9747	X	CIR	6.8	500	24.93	GREECE
01-0170-04	83/12/ 2	8: 1:32.176	35.00	25.64	-0.02	-0.09	-0.11	248.570	60	9997	X	CIR	6.8	500	24.77	GREECE
01-0171-04	83/12/ 2	8: 1:42.249	35.51	26.15	-0.03	-0.11	-0.12	248.730	60	8689	X	CIR	6.8	500	24.61	GREECE
01-0172-04	83/12/ 2	8: 1:52.100	36.00	26.65	-0.04	-0.12	-0.12	248.880	60	5298	X	CIR	6.8	500	24.44	TURKEY
01-0173-04	83/12/ 2	8: 2: 2.180	36.50	27.19	-0.05	-0.14	-0.13	249.040	60	1673	4	CIR	6.8	500	24.28	TURKEY
01-0174-04	83/12/ 2	8: 2:12.048	36.99	27.70	-0.06	-0.15	-0.14	249.190	60	4925	4	CIR	6.8	500	24.11	TURKEY
01-0175-04	83/12/ 2	8: 2:22.099	37.48	28.22	-0.06	-0.13	-0.14	249.350	60	4638	8	CIR	6.8	500	23.93	TURKEY
01-0176-04	83/12/ 2	8: 2:31.975	37.97	28.76	-0.08	-0.13	-0.15	249.510	60	8748	9	CIR	6.8	500	23.75	TURKEY
01-0177-04	83/12/ 2	8: 2:42.040	38.46	29.31	-0.08	-0.12	-0.15	249.670	60	9999	X	CIR	6.8	500	23.57	TURKEY
01-0178-04	83/12/ 2	8: 2:52.046	38.94	29.87	-0.09	-0.13	-0.14	249.830	60	9999	X	CIR	6.8	500	23.39	TURKEY
01-0179-04	83/12/ 2	8: 3: 1.909	39.41	30.42	-0.11	-0.12	-0.12	249.990	60	9999	X	CIR	6.8	500	23.20	TURKEY

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 5

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0180-05	83/12/ 2	9:22: 5.538	6.29	-17.60	-0.20	-0.01	0.08	242.890	60	9999	X	CIR	6.8	500	27.56	ATLANTIC
01-0181-05	83/12/ 2	9:22:15.365	6.84	-17.27	-0.23	-0.03	0.09	242.920	60	9999	X	CIR	6.8	500	27.62	ATLANTIC
01-0182-05	83/12/ 2	9:22:25.226	7.40	-16.95	-0.22	-0.04	0.09	242.950	60	9999	X	CIR	6.8	500	27.66	ATLANTIC
01-0183-05	83/12/ 2	9:22:35.225	7.96	-16.62	-0.21	-0.05	0.11	242.990	60	9999	X	CIR	6.8	500	27.70	ATLANTIC
01-0184-05	83/12/ 2	9:22:45.053	8.51	-16.30	-0.20	-0.06	0.11	243.030	60	9999	X	CIR	6.8	500	27.74	GUINEA BISSAU
01-0185-05	83/12/ 2	9:22:55.078	9.09	-15.96	-0.20	-0.06	0.09	243.080	60	9999	X	CIR	6.8	500	27.77	GUINEA BISSAU
01-0186-05	83/12/ 2	9:23: 5.056	9.65	-15.63	-0.19	-0.06	0.07	243.130	60	9999	X	CIR	6.8	500	27.80	GUINEA BISSAU
01-0187-05	83/12/ 2	9:23:14.874	10.20	-15.30	-0.19	-0.06	0.06	243.170	60	9999	X	CIR	6.8	500	27.83	GUINEA BISSAU
01-0188-05	83/12/ 2	9:23:24.919	10.77	-14.96	-0.19	-0.05	0.05	243.230	60	9999	9	CIR	6.8	500	27.84	GUINEA BISSAU
01-0189-05	83/12/ 2	9:23:34.758	11.32	-14.63	-0.20	-0.05	0.04	243.290	60	9999	8	CIR	6.8	500	27.86	GUINEA BISSAU
01-0190-05	83/12/ 2	9:23:44.796	11.88	-14.29	-0.20	-0.03	0.04	243.350	60	9899	8	CIR	6.8	500	27.88	GUINEA BISSAU
01-0191-05	83/12/ 2	9:23:54.658	12.44	-13.95	-0.20	-0.02	0.02	243.420	60	8897	8	CIR	6.8	500	27.88	GU. BISSAU,SENEGAL
01-0192-05	83/12/ 2	9:24: 4.715	13.00	-13.61	-0.19	0.01	0.01	243.480	60	8787	8	CIR	6.8	500	27.88	SENEGAL,GAMBIA
01-0193-05	83/12/ 2	9:24:14.592	13.56	-13.27	-0.20	0.03	0.01	243.560	60	9987	8	CIR	6.8	500	27.88	SENEGAL,GAMBIA
01-0194-05	83/12/ 2	9:24:24.452	14.11	-12.93	-0.21	0.05	-0.01	243.630	60	9498	7	CIR	6.8	500	27.88	SENEGAL,MALI
01-0195-05	83/12/ 2	9:24:34.515	14.67	-12.58	-0.22	0.08	-0.01	243.710	60	6395	7	CIR	6.8	500	27.87	SENEGAL,MALI
01-0196-05	83/12/ 2	9:24:44.367	15.22	-12.24	-0.21	0.08	-0.01	243.790	60	6363	6	CIR	6.8	500	27.86	MALI,MAURITANIA
01-0197-05	83/12/ 2	9:24:54.402	15.78	-11.88	-0.21	0.06	-0.02	243.880	60	5054	5	CIR	6.8	500	27.84	MAURITANIA
01-0198-05	83/12/ 2	9:25: 4.257	16.33	-11.53	-0.20	0.03	-0.02	243.970	60	2061	4	CIR	6.8	500	27.82	MAURITANIA
01-0199-05	83/12/ 2	9:25:14.315	16.89	-11.17	-0.19	0.01	-0.04	244.060	60	0020	3	CIR	6.8	500	27.80	MAURITANIA
01-0200-05	83/12/ 2	9:25:24.148	17.44	-10.83	-0.19	0.00	-0.05	244.160	60	0000	1	CIR	6.8	500	27.76	MAURITANIA
01-0201-05	83/12/ 2	9:25:34.221	17.99	-10.46	-0.19	0.01	-0.06	244.250	60	0000	1	CIR	6.8	500	27.74	MAURITANIA
01-0202-05	83/12/ 2	9:25:44.052	18.54	-10.10	-0.19	0.00	-0.06	244.350	60	0000	1	CIR	6.8	500	27.70	MAURITANIA
01-0203-05	83/12/ 2	9:25:54.038	19.09	-9.74	-0.19	0.01	-0.07	244.460	60	0000	4	CIR	6.8	500	27.66	MAURITANIA
01-0204-05	83/12/ 2	9:26: 4.100	19.65	-9.37	-0.18	0.01	-0.08	244.570	60	0000	4	CIR	6.8	500	27.61	MAURITANIA
01-0205-05	83/12/ 2	9:26:13.958	20.19	-9.00	-0.18	0.02	-0.07	244.670	60	0000	3	CIR	6.8	500	27.56	MAURITANIA
01-0206-05	83/12/ 2	9:26:24.006	20.74	-8.62	-0.18	0.03	-0.08	244.790	60	0000	2	CIR	6.8	500	27.51	MAURITANIA
01-0207-05	83/12/ 2	9:26:33.861	21.28	-8.25	-0.18	0.05	-0.08	244.900	60	0100	3	CIR	6.8	500	27.45	MAURITANIA
01-0208-05	83/12/ 2	9:26:43.923	21.83	-7.87	-0.18	0.07	-0.08	245.020	60	0001	1	CIR	6.8	500	27.39	MAURITANIA
01-0209-05	83/12/ 2	9:26:53.802	22.37	-7.49	-0.18	0.08	-0.09	245.130	60	0000	1	CIR	6.8	500	27.32	MAURITANIA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 6

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR-LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0210-06	83/12/ 2	10:41: 3.591	-28.45	-62.18	0.05	-0.09	0.03	247.930	60	9663	3	CIR	5.7	500	17.15	ARGENTINA
01-0211-06	83/12/ 2	10:41:13.249	-27.94	-61.77	0.04	-0.06	0.03	247.760	60	9575	3	CIR	5.7	500	17.38	ARGENTINA
01-0212-06	83/12/ 2	10:41:23.321	-27.40	-61.34	0.02	-0.04	0.04	247.600	60	9995	4	CIR	5.7	500	17.64	ARGENTINA
01-0213-06	83/12/ 2	10:41:33.106	-26.88	-60.94	-0.01	-0.01	0.05	247.430	60	9898	5	CIR	5.7	500	17.87	ARGENTINA
01-0214-06	83/12/ 2	10:41:43.160	-26.34	-60.52	-0.06	0.01	0.08	247.270	60	9799	5	CIR	5.7	500	18.12	ARGENTINA
01-0215-06	83/12/ 2	10:41:53.028	-25.81	-60.11	-0.09	0.00	0.12	247.120	60	9998	6	CIR	5.7	500	18.36	ARGENTINA
01-0216-06	83/12/ 2	10:42: 3.053	-25.27	-59.70	-0.04	-0.09	0.07	246.960	60	9969	8	CIR	5.7	500	18.60	ARGENTINA
01-0217-06	83/12/ 2	10:42:12.895	-24.74	-59.31	-0.01	-0.07	0.03	246.800	60	7697	8	CIR	5.7	500	18.84	PARAGUAY,ARGENTINA
01-0218-06	83/12/ 2	10:42:22.925	-24.20	-58.91	0.00	-0.03	0.00	246.650	60	9985	8	CIR	5.7	500	19.07	PARAGUAY
01-0219-06	83/12/ 2	10:42:32.759	-23.66	-58.52	0.01	0.00	-0.02	246.500	60	9989	9	CIR	5.7	500	19.30	PARAGUAY
01-0220-06	83/12/ 2	10:42:42.811	-23.12	-58.13	0.00	0.02	-0.04	246.350	60	9999	X	CIR	5.7	500	19.52	PARAGUAY
01-0221-06	83/12/ 2	10:42:52.678	-22.58	-57.75	-0.04	0.03	-0.04	246.210	60	9899	9	CIR	5.7	500	19.75	PARAGUAY
01-0222-06	83/12/ 2	10:43: 2.555	-22.04	-57.37	-0.09	0.04	-0.04	246.060	60	8898	8	CIR	5.7	500	19.98	BRAZIL
01-0223-06	83/12/ 2	10:43:12.585	-21.49	-56.98	-0.07	0.00	-0.04	245.920	60	3999	5	CIR	5.7	500	20.20	BRAZIL
01-0224-06	83/12/ 2	10:43:22.454	-20.95	-56.61	-0.03	-0.02	-0.01	245.780	60	2849	3	CIR	5.7	500	20.42	BRAZIL
01-0225-06	83/12/ 2	10:43:32.516	-20.40	-56.23	-0.01	-0.07	0.02	245.640	60	8619	3	CIR	5.7	500	20.63	BRAZIL
01-0226-06	83/12/ 2	10:43:42.363	-19.85	-55.87	0.00	-0.09	0.07	245.510	60	9966	5	CIR	5.7	500	20.84	BRAZIL
01-0227-06	83/12/ 2	10:43:52.436	-19.30	-55.50	-0.07	-0.22	0.16	245.370	60	8998	8	CIR	5.7	500	21.06	BRAZIL
01-0228-06	83/12/ 2	10:44: 2.296	-18.75	-55.13	-0.06	-0.25	0.11	245.240	60	9989	9	CIR	5.7	500	21.26	BRAZIL
01-0229-06	83/12/ 2	10:44:12.158	-18.21	-54.78	-0.05	-0.21	0.09	245.120	60	9999	9	CIR	5.7	500	21.47	BRAZIL
01-0230-06	83/12/ 2	10:44:22.225	-17.65	-54.42	-0.03	-0.17	0.06	244.990	60	9999	X	CIR	5.7	500	21.67	BRAZIL
01-0231-06	83/12/ 2	10:44:32.250	-17.09	-54.05	-0.06	-0.15	0.06	244.870	60	9999	X	CIR	5.7	500	21.87	BRAZIL
01-0232-06	83/12/ 2	10:44:42.095	-16.55	-53.70	-0.08	-0.14	0.05	244.750	60	9999	X	CIR	5.7	500	22.07	BRAZIL
01-0233-06	83/12/ 2	10:44:51.973	-16.00	-53.35	-0.13	-0.13	0.06	244.630	60	9999	X	CIR	5.7	500	22.26	BRAZIL
01-0234-06	83/12/ 2	10:45: 2.042	-15.44	-52.99	-0.16	-0.14	0.08	244.520	60	9999	X	CIR	5.7	500	22.46	BRAZIL
01-0235-06	83/12/ 2	10:45:11.893	-14.89	-52.65	-0.11	-0.17	0.09	244.410	60	9999	9	CIR	6.3	500	22.64	BRAZIL
01-0236-06	83/12/ 2	10:45:21.970	-14.32	-52.30	-0.09	-0.23	0.12	244.300	60	7899	9	CIR	6.3	500	22.83	BRAZIL
01-0237-06	83/12/ 2	10:45:31.843	-13.77	-51.95	-0.08	-0.24	0.15	244.200	60	9978	9	CIR	6.3	500	23.01	BRAZIL
01-0238-06	83/12/ 2	10:45:41.916	-13.21	-51.61	-0.08	-0.25	0.11	244.100	60	9999	X	CIR	6.3	500	23.19	BRAZIL
01-0239-06	83/12/ 2	10:45:51.791	-12.66	-51.27	-0.07	-0.24	0.08	244.010	60	9999	X	CIR	6.3	500	23.36	BRAZIL
01-0240-06	83/12/ 2	10:46: 1.681	-12.10	-50.94	-0.05	-0.20	0.06	243.920	60	6999	9	CIR	6.3	500	23.53	BRAZIL
01-0241-06	83/12/ 2	10:46:11.764	-11.53	-50.59	-0.06	-0.17	0.06	243.830	60	4979	7	CIR	6.3	500	23.71	BRAZIL
01-0242-06	83/12/ 2	10:46:21.645	-10.97	-50.26	-0.08	-0.14	0.05	243.740	60	3759	6	CIR	6.3	500	23.87	BRAZIL
01-0243-06	83/12/ 2	10:46:31.539	-10.42	-49.92	-0.10	-0.11	0.05	243.650	60	2937	5	CIR	6.3	500	24.04	BRAZIL
01-0244-06	83/12/ 2	10:46:41.587	-9.86	-49.59	-0.12	-0.10	0.06	243.570	60	3629	5	CIR	6.3	500	24.20	BRAZIL
01-0245-06	83/12/ 2	10:46:51.451	-9.30	-49.26	-0.16	-0.07	0.06	243.500	60	6226	6	CIR	6.3	500	24.35	BRAZIL
01-0246-06	83/12/ 2	10:47: 1.528	-8.72	-48.92	-0.14	-0.07	0.07	243.420	60	3563	4	CIR	6.3	500	24.50	BRAZIL
01-0247-06	83/12/ 2	10:47:11.402	-8.17	-48.60	-0.10	-0.07	0.08	243.350	60	2743	4	CIR	6.3	500	24.65	BRAZIL
01-0248-06	83/12/ 2	10:47:21.433	-7.60	-48.26	-0.09	-0.08	0.09	243.290	60	1328	3	CIR	6.3	500	24.80	BRAZIL
01-0249-06	83/12/ 2	10:47:31.454	-7.04	-47.94	-0.05	-0.08	0.11	243.220	60	1313	3	CIR	6.3	500	24.94	BRAZIL
01-0250-06	83/12/ 2	10:47:41.251	-6.48	-47.61	-0.04	-0.11	0.12	243.170	60	4213	3	CIR	6.6	500	25.09	BRAZIL
01-0251-06	83/12/ 2	10:47:51.267	-5.92	-47.28	-0.04	-0.16	0.10	243.110	60	9841	4	CIR	6.6	500	25.22	BRAZIL
01-0252-06	83/12/ 2	10:48: 1.295	-5.34	-46.96	-0.03	-0.21	0.09	243.060	60	9997	5	CIR	6.6	500	25.35	BRAZIL
01-0253-06	83/12/ 2	10:48:11.131	-4.79	-46.64	-0.04	-0.24	0.06	243.010	60	9999	X	CIR	6.6	500	25.48	BRAZIL
01-0254-06	83/12/ 2	10:48:21.121	-4.23	-46.31	-0.05	-0.24	0.06	242.970	60	9999	X	CIR	6.6	500	25.61	BRAZIL
01-0255-06	83/12/ 2	10:48:31.143	-3.66	-45.99	-0.05	-0.22	0.04	242.930	60	8899	9	CIR	6.6	500	25.72	BRAZIL
01-0256-06	83/12/ 2	10:48:41.192	-3.09	-45.65	-0.08	-0.21	0.05	242.890	60	7988	9	CIR	6.6	500	25.85	BRAZIL
01-0257-06	83/12/ 2	10:48:51.007	-2.53	-45.34	-0.10	-0.21	0.05	242.860	60	4885	8	CIR	6.6	500	25.96	BRAZIL
01-0258-06	83/12/ 2	10:49: 1.019	-1.96	-45.02	-0.14	-0.21	0.07	242.830	60	7948	8	CIR	6.6	500	26.07	BRAZIL

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 7

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0259-07	83/12/ 2	11: 3: 3.626	43.13	-10.14	0.04	-0.11	-0.17	251.250	60	6200	3	CIR	5.7	500	21.36	ATLANTIC/SPAIN
01-0260-07	83/12/ 2	11: 3:13.069	43.55	-9.54	0.05	-0.13	-0.15	251.400	60	7142	3	CIR	5.7	500	21.16	ATLANTIC/SPAIN
01-0261-07	83/12/ 2	11: 3:23.136	43.99	-8.88	0.05	-0.14	-0.16	251.550	60	1030	3	CIR	5.7	500	20.95	ATLANTIC/SPAIN
01-0262-07	83/12/ 2	11: 3:33.000	44.43	-8.22	0.06	-0.16	-0.15	251.700	60	0030	3	CIR	5.7	500	20.74	ATLANTIC/SPAIN
01-0263-07	83/12/ 2	11: 3:43.027	44.87	-7.54	0.05	-0.16	-0.15	251.860	60	0000	X	CIR	5.7	500	20.52	ATLANTIC
01-0264-07	83/12/ 2	11: 3:52.887	45.29	-6.87	0.04	-0.18	-0.15	252.010	60	0000	X	CIR	5.7	500	20.31	ATLANTIC
01-0265-07	83/12/ 2	11: 4: 2.946	45.72	-6.17	0.03	-0.19	-0.15	252.160	60	0000	X	CIR	5.7	500	20.08	ATLANTIC
01-0266-07	83/12/ 2	11: 4:12.815	46.13	-5.46	0.02	-0.22	-0.14	252.310	60	0000	X	CIR	5.7	500	19.86	ATLANTIC
01-0267-07	83/12/ 2	11: 4:22.871	46.55	-4.75	0.02	-0.23	-0.14	252.450	60	0000	X	CIR	5.7	500	19.63	ATLANTIC
01-0268-07	83/12/ 2	11: 4:32.894	46.96	-4.01	0.01	-0.24	-0.15	252.600	60	0000	0	CIR	5.7	500	19.41	FRANCE
01-0269-07	83/12/ 2	11: 4:42.729	47.36	-3.28	0.00	-0.26	-0.15	252.740	60	0000	0	CIR	5.7	500	19.18	FRANCE
01-0270-07	83/12/ 2	11: 4:52.763	47.76	-2.52	0.03	-0.27	-0.14	252.890	60	0000	0	CIR	5.7	500	18.94	FRANCE
01-0271-07	83/12/ 2	11: 5: 2.587	48.15	-1.77	0.05	-0.26	-0.14	253.020	60	0000	0	CIR	5.7	500	18.71	FRANCE
01-0272-07	83/12/ 2	11: 5:12.608	48.53	-0.99	0.07	-0.26	-0.13	253.170	60	0000	0	CIR	5.7	500	18.48	FRANCE
01-0273-07	83/12/ 2	11: 5:22.623	48.92	-0.19	0.08	-0.25	-0.12	253.300	60	0000	1	CIR	5.7	500	18.23	FRANCE
01-0274-07	83/12/ 2	11: 5:32.470	49.29	0.60	-0.07	-0.43	0.10	253.440	60	0000	1	CIR	5.7	500	18.00	FRANCE
01-0275-07	83/12/ 2	11: 5:42.629	49.66	1.43	0.07	-0.21	-0.11	253.580	60	0000	1	CIR	5.7	450	17.75	FRANCE
01-0276-07	83/12/ 2	11: 5:52.527	50.02	2.26	0.06	-0.22	-0.10	253.710	60	1000	1	CIR	5.7	450	17.51	FRANCE
01-0277-07	83/12/ 2	11: 6: 2.434	50.37	3.09	0.06	-0.22	-0.11	253.840	60	0000	1	CIR	5.7	450	17.26	FRANCE
01-0278-07	83/12/ 2	11: 6:12.523	50.73	3.96	0.07	-0.20	-0.10	253.970	60	0000	1	CIR	5.7	450	17.01	BELGIUM
01-0279-07	83/12/ 2	11: 6:22.386	51.07	4.81	0.07	-0.19	-0.08	254.100	60	0000	2	CIR	5.7	450	16.75	BELGIUM
01-0280-07	83/12/ 2	11: 6:32.246	51.40	5.68	0.06	-0.19	-0.09	254.220	60	0000	2	CIR	5.7	450	16.50	NETHERLANDS
01-0281-07	83/12/ 2	11: 6:42.624	51.73	6.61	0.07	-0.18	-0.07	254.340	80	0000	3	CIR	6.7	250	16.24	GERMANY
01-0282-07	83/12/ 2	11: 6:47.460	51.89	7.05	0.07	-0.18	-0.07	254.400	80	0000	3	CIR	6.7	250	16.11	GERMANY
01-0283-07	83/12/ 2	11: 6:52.289	52.05	7.50	0.06	-0.17	-0.06	254.460	80	0010	3	CIR	6.7	250	15.99	GERMANY
01-0284-07	83/12/ 2	11: 6:57.481	52.20	7.97	0.06	-0.17	-0.06	254.520	80	0100	3	CIR	6.7	250	15.86	GERMANY
01-0285-07	83/12/ 2	11: 7: 2.276	52.35	8.42	0.05	-0.16	-0.06	254.580	80	0200	4	CIR	6.7	250	15.73	GERMANY
01-0286-07	83/12/ 2	11: 7: 7.265	52.50	8.88	0.05	-0.16	-0.07	254.640	80	0200	4	CIR	5.7	375	15.60	GERMANY
01-0287-07	83/12/ 2	11: 7:17.213	52.80	9.82	0.04	-0.16	-0.07	254.750	80	0402	4	CIR	5.7	375	15.34	GERMANY
01-0288-07	83/12/ 2	11: 7:27.151	53.10	10.77	0.06	-0.15	-0.04	254.860	60	2303	5	CIR	5.7	375	15.07	GERMANY
01-0289-07	83/12/ 2	11: 7:37.131	53.38	11.74	0.05	-0.16	-0.05	254.970	60	1333	5	CIR	5.7	375	14.81	GERMANY

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 8

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0292-08	83/12/ 2	12:13: 3.477	-19.85	-78.56	0.02	-0.27	0.12	245.450	80	7700	X	CIR	6.1	500	20.53	PACIFIC
01-0293-08	83/12/ 2	12:13: 8.203	-19.58	-78.37	0.02	-0.28	0.11	245.380	80	9912	X	CIR	6.1	500	20.63	PACIFIC
01-0294-08	83/12/ 2	12:13:13.297	-19.30	-78.19	0.03	-0.28	0.12	245.310	80	8955	X	CIR	6.1	500	20.74	PACIFIC
01-0295-08	83/12/ 2	12:13:18.213	-19.03	-78.01	0.03	-0.28	0.12	245.250	80	5989	X	CIR	6.1	500	20.84	PACIFIC
01-0296-08	83/12/ 2	12:13:23.154	-18.76	-77.83	0.03	-0.27	0.12	245.180	80	4899	X	CIR	6.1	500	20.94	PACIFIC
01-0297-08	83/12/ 2	12:13:28.074	-18.48	-77.65	0.04	-0.27	0.12	245.120	80	2879	X	CIR	6.1	500	21.04	PACIFIC
01-0298-08	83/12/ 2	12:13:33.205	-18.20	-77.46	0.03	-0.26	0.12	245.060	80	3749	X	CIR	6.1	500	21.15	PACIFIC
01-0299-08	83/12/ 2	12:13:38.138	-17.93	-77.29	0.03	-0.25	0.11	244.990	80	4928	X	CIR	6.1	500	21.24	PACIFIC
01-0300-08	83/12/ 2	12:13:43.047	-17.66	-77.11	0.03	-0.25	0.11	244.930	80	7927	X	CIR	6.1	500	21.35	PACIFIC
01-0301-08	83/12/ 2	12:13:47.973	-17.38	-76.93	0.03	-0.26	0.11	244.870	80	9939	X	CIR	6.1	500	21.44	PACIFIC
01-0302-08	83/12/ 2	12:13:52.909	-17.11	-76.76	0.02	-0.25	0.11	244.810	80	9959	X	CIR	6.1	500	21.54	PACIFIC
01-0303-08	83/12/ 2	12:13:58.036	-16.83	-76.57	0.01	-0.25	0.12	244.750	80	9979	X	CIR	6.1	500	21.64	PACIFIC
01-0304-08	83/12/ 2	12:14: 2.970	-16.55	-76.40	0.02	-0.25	0.11	244.690	80	9999	X	CIR	6.1	500	21.74	PACIFIC
01-0305-08	83/12/ 2	12:14: 7.879	-16.28	-76.22	0.01	-0.25	0.11	244.630	80	9999	X	CIR	6.1	500	21.83	PACIFIC
01-0306-08	83/12/ 2	12:14:12.803	-16.00	-76.04	0.00	-0.25	0.11	244.580	80	9999	X	CIR	6.1	500	21.93	PACIFIC
01-0307-08	83/12/ 2	12:14:17.744	-15.73	-75.87	0.00	-0.24	0.11	244.530	80	8999	X	CIR	6.1	500	22.03	PACIFIC/PERU
01-0308-08	83/12/ 2	12:14:22.858	-15.44	-75.70	0.00	-0.25	0.10	244.470	80	8999	X	CIR	6.1	500	22.12	PACIFIC/PERU
01-0309-08	83/12/ 2	12:14:27.736	-15.16	-75.52	-0.01	-0.26	0.11	244.420	80	8699	1	CIR	6.1	500	22.22	PERU
01-0310-08	83/12/ 2	12:14:32.712	-14.89	-75.35	-0.01	-0.25	0.11	244.360	80	6389	1	CIR	6.1	500	22.31	PERU
01-0311-08	83/12/ 2	12:14:37.641	-14.61	-75.18	-0.01	-0.25	0.11	244.310	80	1488	1	CIR	6.1	500	22.40	PERU
01-0312-08	83/12/ 2	12:14:42.764	-14.33	-75.00	-0.02	-0.25	0.11	244.250	80	8455	1	CIR	6.1	500	22.50	PERU
01-0313-08	83/12/ 2	12:14:47.691	-14.05	-74.83	-0.02	-0.26	0.11	244.200	80	7862	1	CIR	6.1	500	22.59	PERU
01-0314-08	83/12/ 2	12:14:52.625	-13.77	-74.66	-0.02	-0.26	0.10	244.150	80	9943	1	CIR	6.1	500	22.67	PERU
01-0315-08	83/12/ 2	12:14:57.556	-13.50	-74.49	-0.02	-0.26	0.11	244.100	80	9956	1	CIR	6.1	500	22.76	PERU
01-0316-08	83/12/ 2	12:15: 2.476	-13.22	-74.32	-0.03	-0.27	0.10	244.050	80	9979	9	CIR	6.1	500	22.85	PERU
01-0317-08	83/12/ 2	12:15: 7.619	-12.94	-74.14	-0.04	-0.26	0.10	244.000	60	9999	X	CIR	6.3	500	22.94	PERU
01-0318-08	83/12/ 2	12:15:17.501	-12.38	-73.80	-0.03	-0.29	0.10	243.900	60	9999	X	CIR	6.3	500	23.12	PERU
01-0319-08	83/12/ 2	12:15:27.393	-11.83	-73.47	0.00	-0.29	0.10	243.810	60	9999	X	CIR	6.3	500	23.28	PERU
01-0320-08	83/12/ 2	12:15:37.268	-11.27	-73.13	0.01	-0.28	0.10	243.720	60	9999	X	CIR	6.3	500	23.45	PERU
01-0321-08	83/12/ 2	12:15:47.331	-10.70	-72.79	0.03	-0.28	0.11	243.640	60	9999	X	CIR	6.3	500	23.62	PERU
01-0322-08	83/12/ 2	12:15:57.211	-10.15	-72.46	0.03	-0.27	0.11	243.550	60	9999	X	CIR	6.3	500	23.78	PERU,BRAZIL
01-0323-08	83/12/ 2	12:16: 7.288	-9.58	-72.12	0.03	-0.26	0.11	243.470	60	9999	X	CIR	6.3	500	23.94	BRAZIL
01-0324-08	83/12/ 2	12:16:17.155	-9.03	-71.79	0.03	-0.24	0.11	243.400	60	9999	X	CIR	6.4	500	24.09	BRAZIL
01-0325-08	83/12/ 2	12:16:27.031	-8.47	-71.46	0.02	-0.22	0.12	243.330	60	9999	X	CIR	6.4	500	24.24	BRAZIL
01-0326-08	83/12/ 2	12:16:37.116	-7.90	-71.14	0.02	-0.21	0.12	243.260	60	9999	X	CIR	6.4	500	24.39	BRAZIL
01-0327-08	83/12/ 2	12:16:46.998	-7.34	-70.80	-0.01	-0.20	0.14	243.190	60	8999	9	CIR	6.4	500	24.54	BRAZIL
01-0328-08	83/12/ 2	12:16:56.874	-6.78	-70.48	0.00	-0.20	0.12	243.130	60	9989	9	CIR	6.4	500	24.68	BRAZIL
01-0329-08	83/12/ 2	12:17: 6.948	-6.21	-70.15	-0.01	-0.20	0.11	243.080	60	9999	9	CIR	6.4	500	24.81	BRAZIL
01-0330-08	83/12/ 2	12:17:16.831	-5.65	-69.82	-0.02	-0.21	0.11	243.020	60	9999	9	CIR	6.4	500	24.95	BRAZIL
01-0331-08	83/12/ 2	12:17:26.913	-5.08	-69.49	-0.03	-0.23	0.09	242.970	60	9999	X	CIR	6.4	500	25.08	BRAZIL
01-0332-08	83/12/ 2	12:17:36.806	-4.52	-69.17	-0.03	-0.24	0.08	242.930	60	9899	9	CIR	6.4	500	25.21	BRAZIL
01-0333-08	83/12/ 2	12:17:46.697	-3.96	-68.85	-0.02	-0.26	0.08	242.890	60	7698	6	CIR	6.4	500	25.33	BRAZIL
01-0334-08	83/12/ 2	12:17:56.788	-3.38	-68.53	0.00	-0.25	0.08	242.850	60	9575	6	CIR	6.4	500	25.45	BRAZIL
01-0335-08	83/12/ 2	12:18: 6.679	-2.83	-68.20	0.01	-0.24	0.07	242.820	60	9994	7	CIR	6.4	500	25.57	BRAZIL
01-0336-08	83/12/ 2	12:18:16.561	-2.26	-67.88	0.02	-0.24	0.06	242.780	60	9998	9	CIR	6.4	500	25.68	BRAZIL
01-0337-08	83/12/ 2	12:18:26.648	-1.69	-67.55	0.01	-0.24	0.07	242.760	60	9999	X	CIR	6.4	500	25.79	BRAZIL
01-0338-08	83/12/ 2	12:18:36.541	-1.13	-67.23	-0.01	-0.23	0.06	242.730	60	9999	X	CIR	6.4	500	25.90	BRAZIL
01-0339-08	83/12/ 2	12:18:46.418	-0.57	-66.91	-0.03	-0.23	0.07	242.710	60	9999	X	CIR	6.4	500	26.01	BRAZIL
01-0340-08	83/12/ 2	12:18:56.500	0.00	-66.58	-0.04	-0.23	0.07	242.700	60	9999	X	CIR	6.4	500	26.10	BRAZIL
01-0341-08	83/12/ 2	12:19: 6.336	0.56	-66.27	-0.05	-0.22	0.06	242.680	60	9999	X	CIR	6.4	500	26.19	BRAZIL,VENEZUELA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 8

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0342-08	83/12/ 2	12:19:16.286	1.13	-65.95	-0.07	-0.23	0.05	242.680	60	8999	9	CIR	6.4	500	26.28	VENEZUELA
01-0343-08	83/12/ 2	12:19:26.366	1.70	-65.62	-0.08	-0.24	0.05	242.670	60	5899	8	CIR	6.4	500	26.37	VENEZUELA
01-0344-08	83/12/ 2	12:19:36.265	2.26	-65.30	-0.09	-0.25	0.05	242.670	60	2579	3	CIR	6.4	500	26.45	VENEZUELA
01-0345-08	83/12/ 2	12:19:46.150	2.82	-64.98	-0.12	-0.24	0.05	242.670	60	3824	3	CIR	6.4	500	26.54	VENEZUELA
01-0346-08	83/12/ 2	12:19:56.232	3.39	-64.65	-0.13	-0.26	0.05	242.680	60	2737	2	CIR	6.4	500	26.61	VENEZUELA
01-0347-08	83/12/ 2	12:20: 6.112	3.95	-64.33	-0.13	-0.26	0.05	242.690	60	5627	2	CIR	6.4	500	26.68	VENEZUELA
01-0348-08	83/12/ 2	12:20:16.180	4.52	-64.00	-0.11	-0.26	0.05	242.710	60	8756	2	CIR	6.4	500	26.75	VENEZUELA
01-0349-08	83/12/ 2	12:20:26.073	5.08	-63.68	-0.10	-0.26	0.06	242.730	60	9987	3	CIR	6.4	500	26.81	VENEZUELA
01-0350-08	83/12/ 2	12:20:35.961	5.65	-63.35	-0.10	-0.26	0.06	242.750	60	9999	9	CIR	6.4	500	26.88	VENEZUELA
01-0351-08	83/12/ 2	12:20:46.051	6.21	-63.02	-0.10	-0.26	0.07	242.770	60	9999	9	CIR	6.5	500	26.93	VENEZUELA
01-0352-08	83/12/ 2	12:20:55.931	6.77	-62.70	-0.10	-0.25	0.08	242.800	60	9999	9	CIR	6.4	500	26.98	VENEZUELA
01-0353-08	83/12/ 2	12:21: 5.029	7.35	-62.37	-0.10	-0.25	0.07	242.840	60	9999	9	CIR	6.4	500	27.03	VENEZUELA
01-0354-08	83/12/ 2	12:21:15.908	7.90	-62.04	-0.10	-0.24	0.07	242.870	60	9999	9	CIR	6.4	500	27.08	VENEZUELA
01-0355-08	83/12/ 2	12:21:25.779	8.46	-61.71	-0.09	-0.24	0.07	242.910	60	9988	9	CIR	6.4	500	27.12	VENEZUELA
01-0356-08	83/12/ 2	12:21:35.866	9.03	-61.39	-0.09	-0.25	0.06	242.960	60	9999	X	CIR	6.4	500	27.15	VENEZUELA
01-0357-08	83/12/ 2	12:21:45.757	9.59	-61.05	-0.08	-0.24	0.07	243.000	60	9999	X	CIR	6.4	500	27.18	VENEZUELA
01-0358-08	83/12/ 2	12:21:55.841	10.16	-60.71	-0.08	-0.25	0.07	243.060	60	9999	X	CIR	6.4	500	27.21	VENEZUELA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 11

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0359-11	83/12/ 2	15:22: 3.511	14.97	-103.17	-0.02	-0.19	49.97	243.790	60	0010	X	CIR	6.7	500	26.71	PACIFIC
01-0360-11	83/12/ 2	15:22:13.395	15.53	-102.82	-0.02	-0.20	49.94	243.870	60	0300	X	CIR	6.7	500	26.71	PACIFIC
01-0361-11	83/12/ 2	15:22:23.260	16.08	-102.47	-0.01	-0.20	49.92	243.960	60	4200	X	CIR	6.7	500	26.70	PACIFIC
01-0362-11	83/12/ 2	15:22:33.145	16.63	-102.12	0.00	-0.24	49.93	244.040	60	9757	X	CIR	6.7	500	26.69	PACIFIC
01-0363-11	83/12/ 2	15:22:43.228	17.19	-101.76	0.02	-0.28	49.95	244.140	60	6697	5	CIR	6.7	500	26.67	PACIFIC
01-0364-11	83/12/ 2	15:22:53.102	17.73	-101.41	0.01	-0.28	49.96	244.230	60	9476	5	CIR	6.7	500	26.65	MEXICO
01-0365-11	83/12/ 2	15:23: 2.961	18.28	-101.05	0.00	-0.29	49.96	244.330	60	4466	4	CIR	6.7	500	26.62	MEXICO
01-0366-11	83/12/ 2	15:23:13.036	18.83	-100.68	-0.01	-0.27	49.97	244.430	60	0057	4	CIR	6.7	500	26.59	MEXICO
01-0367-11	83/12/ 2	15:23:22.891	19.39	-100.32	-0.01	-0.28	49.95	244.530	60	0003	3	CIR	6.7	500	26.55	MEXICO
01-0368-11	83/12/ 2	15:23:32.751	19.93	-99.95	-0.01	-0.28	49.94	244.620	60	0101	2	CIR	6.7	500	26.52	MEXICO
01-0369-11	83/12/ 2	15:23:42.831	20.48	-99.58	-0.01	-0.28	49.93	244.730	60	0010	1	CIR	6.7	500	26.48	MEXICO
01-0370-11	83/12/ 2	15:23:52.713	21.02	-99.21	0.00	-0.28	49.92	244.840	60	7310	1	CIR	6.7	500	26.43	MEXICO
01-0371-11	83/12/ 2	15:24: 2.592	21.56	-98.83	-0.01	-0.28	49.91	244.960	60	9881	3	CIR	6.7	500	26.39	MEXICO
01-0372-11	83/12/ 2	15:24:12.652	22.11	-98.45	0.00	-0.28	49.90	245.070	60	6783	6	CIR	6.7	500	26.34	MEXICO
01-0373-11	83/12/ 2	15:24:22.537	22.65	-98.07	0.00	-0.26	49.90	245.190	60	4489	5	CIR	6.7	500	26.28	MEXICO
01-0374-11	83/12/ 2	15:24:32.603	23.20	-97.68	0.00	-0.25	49.91	245.310	60	3236	5	CIR	6.7	500	26.22	GOLF OF MEXICO
01-0375-11	83/12/ 2	15:24:42.460	23.74	-97.29	0.00	-0.23	49.90	245.430	60	2443	4	CIR	6.7	500	26.15	GOLF OF MEXICO
01-0376-11	83/12/ 2	15:24:52.348	24.28	-96.90	0.02	-0.21	49.93	245.560	60	2223	4	CIR	6.7	500	26.09	GOLF OF MEXICO
01-0377-11	83/12/ 2	15:25: 2.427	24.82	-96.50	0.03	-0.21	49.94	245.690	60	5282	X	CIR	6.7	500	26.01	GOLF OF MEXICO
01-0378-11	83/12/ 2	15:25:12.307	25.36	-96.10	0.03	-0.23	49.95	245.810	60	9092	X	CIR	6.7	500	25.93	GOLF OF MEXICO
01-0379-11	83/12/ 2	15:25:22.191	25.39	-95.70	0.04	-0.24	49.95	245.950	60	9997	X	CIR	6.7	500	25.86	GOLF OF MEXICO
01-0380-11	83/12/ 2	15:25:32.264	26.43	-95.28	0.03	-0.25	49.95	246.080	60	9999	X	CIR	6.7	500	25.77	GOLF OF MEXICO
01-0381-11	83/12/ 2	15:25:42.134	26.96	-94.87	0.01	-0.25	49.95	246.220	60	9399	X	CIR	6.7	500	25.69	GOLF OF MEXICO
01-0382-11	83/12/ 2	15:25:52.022	27.48	-94.46	0.00	-0.25	49.94	246.350	60	9999	X	CIR	6.7	500	25.60	GOLF OF MEXICO
01-0383-11	83/12/ 2	15:26: 2.083	28.02	-94.03	0.00	-0.25	49.94	246.490	60	8999	X	CIR	6.7	500	25.50	GOLF OF MEXICO
01-0384-11	83/12/ 2	15:26:11.950	28.54	-93.61	0.00	-0.24	49.92	246.630	60	9899	X	CIR	6.7	500	25.41	GOLF OF MEXICO
01-0385-11	83/12/ 2	15:26:22.037	29.07	-93.18	0.00	-0.23	49.91	246.770	60	9998	X	CIR	6.7	500	25.31	GOLF OF MEXICO
01-0386-11	83/12/ 2	15:26:31.902	29.59	-92.74	0.00	-0.23	49.89	246.910	60	9798	X	CIR	6.7	500	25.20	USA
01-0387-11	83/12/ 2	15:26:41.975	30.12	-92.30	0.02	-0.24	49.90	247.060	60	9999	X	CIR	6.7	500	25.09	USA
01-0388-11	83/12/ 2	15:26:51.859	30.64	-91.85	0.05	-0.24	49.93	247.200	60	9899	X	CIR	6.7	500	24.98	USA
01-0389-11	83/12/ 2	15:27: 1.732	31.15	-91.41	0.05	-0.23	49.94	247.350	60	7999	9	CIR	6.7	500	24.87	USA
01-0390-11	83/12/ 2	15:27:11.806	31.69	-90.94	0.07	-0.22	49.97	247.500	60	8699	8	CIR	6.4	500	24.75	USA
01-0391-11	83/12/ 2	15:27:21.676	32.19	-90.48	0.19	-0.11	49.98	247.650	60	9697	8	CIR	6.4	500	24.63	USA
01-0392-11	83/12/ 2	15:27:31.749	32.72	-90.01	0.15	-0.16	50.00	247.800	60	9999	X	CIR	6.4	500	24.49	USA
01-0393-11	83/12/ 2	15:27:41.621	33.21	-89.54	-0.16	-0.41	50.01	247.950	60	9999	X	CIR	6.4	500	24.37	USA
01-0394-11	83/12/ 2	15:27:51.485	33.72	-89.07	0.01	-0.24	50.02	248.100	60	9999	X	CIR	6.4	500	24.24	USA
01-0395-11	83/12/ 2	15:28: 1.550	34.24	-88.58	0.01	-0.24	50.01	248.260	60	9999	X	CIR	6.4	500	24.10	USA
01-0396-11	83/12/ 2	15:28:11.418	34.73	-88.09	0.00	-0.23	50.00	248.410	60	9999	X	CIR	6.4	500	23.97	USA
01-0397-11	83/12/ 2	15:28:21.491	35.24	-87.58	-0.01	-0.22	50.01	248.560	60	9999	X	CIR	6.4	500	23.82	USA
01-0398-11	83/12/ 2	15:28:31.347	35.74	-87.08	-0.01	-0.21	50.00	248.720	60	9999	X	CIR	6.4	500	23.67	USA
01-0399-11	83/12/ 2	15:28:41.420	36.24	-86.56	-0.01	-0.20	49.99	248.870	60	9999	X	CIR	6.4	500	23.52	USA
01-0400-11	83/12/ 2	15:28:51.292	36.73	-86.05	-0.01	-0.20	49.99	249.030	60	9999	X	CIR	6.4	500	23.37	USA
01-0401-11	83/12/ 2	15:29: 1.369	37.23	-85.52	-0.02	-0.20	49.97	249.190	60	9999	X	CIR	6.4	500	23.21	USA
01-0402-11	83/12/ 2	15:29:11.240	37.71	-84.99	-0.01	-0.19	49.95	249.350	60	9999	X	CIR	6.4	500	23.06	USA
01-0403-11	83/12/ 2	15:29:21.315	38.20	-84.45	0.00	-0.17	49.92	249.500	60	9999	X	CIR	6.4	500	22.89	USA
01-0404-11	83/12/ 2	15:29:31.190	38.68	-83.90	0.00	-0.20	49.89	249.660	60	9999	X	CIR	6.4	500	22.73	USA
01-0405-11	83/12/ 2	15:29:41.065	39.16	-83.34	-0.01	-0.20	49.86	249.820	60	9999	X	CIR	6.4	500	22.56	USA
01-0406-11	83/12/ 2	15:29:51.139	39.64	-82.77	0.00	-0.23	49.84	249.970	60	9999	X	CIR	6.4	500	22.39	USA
01-0407-11	83/12/ 2	15:30: 1.018	40.11	-82.20	0.03	-0.25	49.85	250.130	60	9999	X	CIR	6.4	500	22.22	USA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 12

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0408-12	83/12/ 3	3:23: 3.675	35.31	90.97	-0.05	-0.21	0.06	246.970	80	0001	1	CIR	6.1	500	22.34	TIBET
01-0409-12	83/12/ 3	3:23: 8.389	35.55	91.20	-0.05	-0.18	0.07	247.040	80	0000	1	CIR	6.1	500	22.28	TIBET
01-0410-12	83/12/ 3	3:23:13.310	35.79	91.45	-0.02	-0.15	0.07	247.120	80	0000	0	CIR	6.1	500	22.22	TIBET
01-0411-12	83/12/ 3	3:23:18.236	36.04	91.70	-0.01	-0.13	0.06	247.190	80	0000	0	CIR	6.1	500	22.16	CHINA
01-0412-12	83/12/ 3	3:23:23.158	36.28	91.96	0.02	-0.09	0.06	247.270	80	0000	0	CIR	6.1	500	22.10	CHINA
01-0413-12	83/12/ 3	3:23:28.273	36.53	92.23	0.03	-0.06	0.06	247.350	80	0000	0	CIR	6.1	500	22.04	CHINA
01-0414-12	83/12/ 3	3:23:33.184	36.78	92.49	0.06	-0.04	0.05	247.420	80	0000	0	CIR	6.1	500	21.98	CHINA
01-0415-12	83/12/ 3	3:23:38.103	37.02	92.74	0.08	-0.01	0.05	247.500	80	0000	0	CIR	6.1	500	21.91	CHINA
01-0416-12	83/12/ 3	3:23:43.023	37.27	93.00	0.10	0.01	0.05	247.570	80	0000	0	CIR	6.1	500	21.85	CHINA
01-0417-12	83/12/ 3	3:23:48.139	37.52	93.29	0.10	0.04	0.05	247.660	80	0000	0	CIR	6.1	500	21.78	CHINA
01-0418-12	83/12/ 3	3:23:53.056	37.76	93.55	0.10	0.05	0.05	247.730	80	0000	0	CIR	6.1	500	21.72	CHINA
01-0419-12	83/12/ 3	3:23:57.981	38.00	93.81	0.10	0.06	0.04	247.800	80	0000	0	CIR	6.1	500	21.65	CHINA
01-0420-12	83/12/ 3	3:24: 2.906	38.24	94.08	0.10	0.04	0.04	247.880	80	0000	0	CIR	6.1	500	21.58	CHINA
01-0421-12	83/12/ 3	3:24: 8.021	38.48	94.36	0.09	0.04	0.04	247.960	80	0000	0	CIR	6.1	500	21.52	CHINA
01-0422-12	83/12/ 3	3:24:12.933	38.72	94.63	0.09	0.02	0.04	248.040	80	1100	0	CIR	6.1	500	21.45	CHINA
01-0423-12	83/12/ 3	3:24:17.862	38.96	94.91	0.08	0.01	0.04	248.110	80	2200	1	CIR	6.1	500	21.38	CHINA
01-0424-12	83/12/ 3	3:24:22.782	39.20	95.18	0.08	0.01	0.03	248.190	80	2300	1	CIR	6.1	500	21.31	CHINA
01-0425-12	83/12/ 3	3:24:27.891	39.45	95.47	0.08	-0.01	0.03	248.270	80	2222	1	CIR	6.1	500	21.23	CHINA
01-0426-12	83/12/ 3	3:24:32.811	39.68	95.76	0.07	-0.02	0.03	248.350	80	5133	4	CIR	6.1	500	21.16	CHINA
01-0427-12	83/12/ 3	3:24:37.733	39.91	96.04	0.06	-0.03	0.02	248.420	80	5023	5	CIR	6.1	500	21.10	CHINA
01-0428-12	83/12/ 3	3:24:42.658	40.14	96.32	0.06	-0.03	0.02	248.500	80	4232	5	CIR	6.1	500	21.02	CHINA
01-0429-12	83/12/ 3	3:24:47.782	40.39	96.62	0.06	-0.05	0.01	248.570	80	4551	6	CIR	6.1	500	20.95	CHINA
01-0430-12	83/12/ 3	3:24:52.701	40.62	96.91	0.07	-0.06	0.01	248.650	80	6651	7	CIR	6.1	500	20.87	CHINA
01-0431-12	83/12/ 3	3:24:57.619	40.85	97.20	0.05	-0.07	0.01	248.730	80	9754	7	CIR	6.1	500	20.80	CHINA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 13

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0432-13	83/12/ 3	4:34: 3.462	-25.40	27.90	0.08	-0.01	0.00	245.790	60	9999	X	CIR	5.7	450	14.87	SOUTH AFRICA
01-0433-13	83/12/ 3	4:34:13.336	-24.87	28.30	0.08	-0.02	0.00	245.630	60	9999	X	CIR	5.7	450	15.09	SOUTH AFRICA
01-0434-13	83/12/ 3	4:34:23.205	-24.33	28.69	0.06	-0.04	0.02	245.470	60	9999	X	CIR	5.7	450	15.30	SOUTH AFRICA
01-0435-13	83/12/ 3	4:34:33.308	-23.79	29.09	0.03	-0.03	0.03	245.310	60	4699	3	CIR	5.7	450	15.52	SOUTH AFRICA
01-0436-13	83/12/ 3	4:34:43.170	-23.25	29.48	0.02	-0.04	0.02	245.160	60	2656	3	CIR	5.7	450	15.74	SOUTH AFRICA
01-0437-13	83/12/ 3	4:34:53.040	-22.71	29.87	-0.01	-0.04	0.03	245.010	60	1526	1	CIR	5.7	450	15.95	SOUTH AFRICA
01-0438-13	83/12/ 3	4:35: 2.919	-22.18	30.25	-0.03	-0.03	0.04	244.860	60	5415	1	CIR	5.7	450	16.15	ZIMBABWE
01-0439-13	83/12/ 3	4:35:13.009	-21.63	30.63	-0.05	-0.02	0.04	244.720	60	2344	3	CIR	5.7	450	16.36	ZIMBABWE
01-0440-13	83/12/ 3	4:35:22.868	-21.08	31.00	-0.07	-0.01	0.05	244.580	60	0333	1	CIR	5.7	450	16.57	ZIMBABWE
01-0441-13	83/12/ 3	4:35:32.936	-20.53	31.39	-0.09	0.00	0.06	244.430	60	0002	1	CIR	5.7	450	16.77	ZIMBABWE
01-0442-13	83/12/ 3	4:35:42.807	-19.99	31.75	-0.11	0.02	0.07	244.290	60	0001	1	CIR	5.7	450	16.97	ZIMBABWE
01-0443-13	83/12/ 3	4:35:52.681	-19.44	32.12	-0.11	0.02	0.08	244.160	60	7500	1	CIR	5.7	450	17.17	ZIMBABWE
01-0444-13	83/12/ 3	4:36: 2.768	-18.88	32.49	-0.11	0.02	0.09	244.020	60	9853	2	CIR	5.7	450	17.37	ZIMBABWE
01-0445-13	83/12/ 3	4:36:12.635	-18.34	32.85	-0.11	0.02	0.10	243.890	60	9999	9	CIR	5.7	450	17.56	MOCAMBIQUE
01-0446-13	83/12/ 3	4:36:22.502	-17.80	33.20	-0.10	0.03	0.11	243.760	60	9999	X	CIR	5.7	450	17.75	MOCAMBIQUE
01-0447-13	83/12/ 3	4:36:32.605	-17.23	33.57	-0.10	0.04	0.11	243.640	60	9999	X	CIR	5.7	450	17.95	MOCAMBIQUE
01-0448-13	83/12/ 3	4:36:42.464	-16.68	33.92	-0.11	0.05	0.10	243.510	60	8999	7	CIR	5.7	450	18.13	MOCAMBIQUE
01-0449-13	83/12/ 3	4:36:52.342	-16.13	34.27	-0.11	0.06	0.08	243.390	60	9989	8	CIR	5.7	450	18.31	MOCAMBIQUE,MALAWI
01-0450-13	83/12/ 3	4:37: 2.435	-15.57	34.63	-0.09	0.04	0.08	243.270	60	9999	X	CIR	5.7	450	18.50	MALAWI,MOCAMBIQUE
01-0451-13	83/12/ 3	4:37:12.311	-15.02	34.98	-0.08	0.03	0.08	243.160	60	8699	8	CIR	5.7	450	18.68	MALAWI
01-0452-13	83/12/ 3	4:37:22.181	-14.47	35.32	-0.06	0.02	0.08	243.050	60	3388	6	CIR	5.7	450	18.86	MALAWI
01-0453-13	83/12/ 3	4:37:32.280	-13.90	35.67	-0.04	0.03	0.08	242.940	60	2432	5	CIR	5.7	450	19.03	MALAWI,MOCAMBIQUE
01-0454-13	83/12/ 3	4:37:42.151	-13.35	36.01	0.00	0.01	0.07	242.830	60	0114	5	CIR	5.7	450	19.21	MALAWI,MOCAMBIQUE
01-0455-13	83/12/ 3	4:37:52.026	-12.80	36.35	0.00	0.02	0.08	242.730	60	0012	2	CIR	5.7	450	19.38	MOCAMBIQUE
01-0456-13	83/12/ 3	4:38: 2.129	-12.23	36.69	0.02	0.04	0.08	242.630	60	0000	2	CIR	5.7	450	19.55	MOCAMBIQUE
01-0457-13	83/12/ 3	4:38:12.006	-11.67	37.03	0.05	0.04	0.08	242.540	60	0100	2	CIR	5.7	450	19.71	MOCAMBIQUE
01-0458-13	83/12/ 3	4:38:21.871	-11.12	37.36	0.08	0.06	0.08	242.440	60	1200	2	CIR	5.7	450	19.87	MOCAMBIQUE,TANZA.
01-0459-13	83/12/ 3	4:38:31.966	-10.55	37.71	0.08	0.05	0.08	242.350	60	4512	2	CIR	5.7	450	20.04	TANZANIA
01-0460-13	83/12/ 3	4:38:41.836	-10.00	38.04	0.07	0.02	0.07	242.280	60	9655	2	CIR	5.7	450	20.19	TANZANIA
01-0461-13	83/12/ 3	4:38:51.934	-9.43	38.37	0.06	0.00	0.08	242.190	60	7596	3	CIR	5.7	450	20.35	TANZANIA
01-0462-13	83/12/ 3	4:39: 1.799	-8.87	38.70	0.05	-0.01	0.08	242.120	60	3286	3	CIR	5.7	450	20.50	TANZANIA
01-0463-13	83/12/ 3	4:39:11.674	-8.31	39.03	0.03	-0.02	0.08	242.040	60	3343	2	CIR	5.7	450	20.65	TANZANIA
01-0464-13	83/12/ 3	4:39:21.765	-7.74	39.37	0.02	-0.02	0.08	241.970	60	1532	2	CIR	5.7	450	20.80	TANZANIA
01-0465-13	83/12/ 3	4:39:31.618	-7.18	39.69	0.02	-0.02	0.09	241.900	60	3324	2	CIR	5.7	450	20.94	ZANZIBAR
01-0466-13	83/12/ 3	4:39:41.717	-6.61	40.02	0.02	-0.02	0.09	241.830	60	3323	2	CIR	5.7	450	21.08	ZANZIBAR
01-0467-13	83/12/ 3	4:39:51.579	-6.06	40.35	0.00	-0.02	0.09	241.770	60	2433	4	CIR	5.7	450	21.22	ZANZIBAR
01-0468-13	83/12/ 3	4:40: 1.451	-5.50	40.67	0.00	0.00	0.09	241.720	60	4434	X	CIR	5.7	450	21.35	PEMBA ISLAND
01-0469-13	83/12/ 3	4:40:11.422	-4.93	40.99	-0.01	0.01	0.08	241.660	60	3333	X	CIR	6.1	500	21.48	PEMBA ISLAND
01-0470-13	83/12/ 3	4:40:21.486	-4.36	41.33	-0.02	0.03	0.09	241.610	60	3333	X	CIR	6.2	500	21.61	INDIAN OCEAN
01-0471-13	83/12/ 3	4:40:31.333	-3.80	41.65	-0.03	0.05	0.09	241.570	60	3233	X	CIR	6.2	500	21.74	INDIAN OCEAN
01-0472-13	83/12/ 3	4:40:41.407	-3.23	41.97	-0.04	0.05	0.09	241.520	60	2231	X	CIR	6.2	500	21.86	INDIAN OCEAN
01-0473-13	83/12/ 3	4:40:51.268	-2.67	42.30	-0.06	0.03	0.09	241.480	60	0021	X	CIR	6.2	500	21.99	INDIAN OCEAN
01-0474-13	83/12/ 3	4:41: 1.314	-2.10	42.62	-0.07	0.02	0.09	241.450	60	0010	X	CIR	6.2	500	22.10	INDIAN OCEAN
01-0475-13	83/12/ 3	4:41:11.181	-1.54	42.93	-0.08	0.03	0.08	241.420	60	1100	X	CIR	6.2	500	22.21	IND.OCEAN/SOMALIA
01-0476-13	83/12/ 3	4:41:21.244	-0.97	43.27	-0.08	0.00	0.09	241.390	60	2221	X	CIR	6.2	500	22.33	IND.OCEAN/SOMALIA
01-0477-13	83/12/ 3	4:41:31.109	0.00	43.58	0.11	-0.32	0.09	241.370	60	0033	7	CIR	6.2	500	22.26	IND.OCEAN/SOMALIA
01-0478-13	83/12/ 3	4:41:41.148	0.00	43.91	-0.20	0.15	0.09	241.350	60	1011	4	CIR	6.2	500	22.60	SOMALIA
01-0479-13	83/12/ 3	4:41:51.016	0.72	44.23	-0.12	0.03	0.09	241.330	60	2120	4	CIR	6.2	500	22.64	SOMALIA
01-0480-13	83/12/ 3	4:42: 1.081	1.29	44.56	-0.12	0.04	0.09	241.320	60	2120	5	CIR	6.2	500	22.74	SOMALIA
01-0481-13	83/12/ 3	4:42:10.928	1.85	44.88	-0.11	0.06	0.09	241.310	60	8121	4	CIR	6.2	500	22.83	SOMALIA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 13

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0482-13	83/12/ 3	4:42:20.994	2.42	45.20	-0.12	0.04	0.08	241.310	60	9261	4	CIR	6.2	500	22.92	SOMALIA
01-0483-13	83/12/ 3	4:42:30.858	2.98	45.52	-0.11	0.01	0.08	241.310	60	9895	5	CIR	6.2	500	23.01	SOMALIA
01-0484-13	83/12/ 3	4:42:40.927	3.55	45.85	-0.09	-0.02	0.07	241.310	60	9898	5	CIR	6.2	500	23.10	SOMALIA
01-0485-13	83/12/ 3	4:42:50.790	4.11	46.17	-0.10	-0.02	0.08	241.320	60	9999	5	CIR	6.2	500	23.18	SOMALIA
01-0486-13	83/12/ 3	4:43: 0.857	4.69	46.50	-0.07	-0.04	0.07	241.330	60	9999	5	CIR	6.2	500	23.26	SOMALIA
01-0487-13	83/12/ 3	4:43:10.732	5.24	46.82	-0.07	-0.05	0.08	241.340	60	9999	5	CIR	6.4	500	23.33	SOMALIA
01-0488-13	83/12/ 3	4:43:20.796	5.81	47.15	-0.07	-0.04	0.08	241.360	60	9989	5	CIR	6.4	500	23.40	SOMALIA
01-0489-13	83/12/ 3	4:43:30.671	6.37	47.47	-0.05	-0.04	0.07	241.390	60	8999	6	CIR	6.4	500	23.47	SOMALIA
01-0490-13	83/12/ 3	4:43:40.758	6.94	47.80	-0.05	-0.03	0.08	241.410	60	2699	4	CIR	6.4	500	23.54	SOMALIA
01-0491-13	83/12/ 3	4:43:50.634	7.50	48.13	-0.03	-0.03	0.08	241.440	60	0037	1	CIR	6.4	500	23.60	SOMALIA,ETHIOPIA
01-0492-13	83/12/ 3	4:44: 0.699	8.08	48.47	-0.04	-0.01	0.09	241.470	60	0001	0	CIR	6.4	500	23.66	SOMALIA,ETHIOPIA
01-0493-13	83/12/ 3	4:44:10.573	8.63	48.79	-0.01	0.00	0.09	241.510	60	0000	0	CIR	6.4	500	23.71	SOMALIA
01-0494-13	83/12/ 3	4:44:20.641	9.20	49.13	0.00	0.03	0.08	241.550	60	0000	0	CIR	6.4	500	23.77	SOMALIA
01-0495-13	83/12/ 3	4:44:30.524	9.75	49.45	0.01	0.05	0.09	241.590	60	0000	0	CIR	6.4	500	23.81	SOMALIA
01-0496-13	83/12/ 3	4:44:40.580	10.32	49.79	-0.01	0.04	0.10	241.640	60	0000	0	CIR	6.4	500	23.86	SOMALIA
01-0497-13	83/12/ 3	4:44:50.463	10.88	50.12	0.00	0.03	0.11	241.690	60	0000	0	CIR	6.4	500	23.90	SOMALIA
01-0498-13	83/12/ 3	4:45: 0.540	11.46	50.47	-0.01	0.01	0.11	241.740	60	1100	0	CIR	6.4	500	23.94	SOMALIA
01-0499-13	83/12/ 3	4:45:10.418	12.00	50.80	0.00	0.01	0.11	241.800	60	1111	0	CIR	6.4	500	23.97	SOMALIA
01-0500-13	83/12/ 3	4:45:20.300	12.55	51.14	-0.01	0.02	0.12	241.860	60	2111	1	CIR	6.4	500	24.01	G.OF ADEN/SOMALIA
01-0501-13	83/12/ 3	4:45:30.370	13.12	51.48	-0.01	0.03	0.11	241.930	60	1121	X	CIR	6.4	500	24.03	G.OF ADEN
01-0502-13	83/12/ 3	4:45:40.245	13.67	51.83	-0.02	0.03	0.09	241.990	60	0111	X	CIR	6.4	500	24.06	G.OF ADEN
01-0503-13	83/12/ 3	4:45:50.329	14.24	52.18	-0.04	0.05	0.07	242.070	60	0101	X	CIR	6.4	500	24.08	G.OF ADEN
01-0504-13	83/12/ 3	4:46: 0.208	14.80	52.52	-0.05	0.06	0.06	242.140	60	0000	X	CIR	6.4	500	24.09	G.OF ADEN/YEMEN
01-0505-13	83/12/ 3	4:46:10.277	15.35	52.87	-0.07	0.06	0.05	242.220	60	0000	X	CIR	6.4	500	24.11	G.OF ADEN/YEMEN
01-0506-13	83/12/ 3	4:46:20.156	15.90	53.21	-0.08	0.05	0.02	242.300	60	0000	0	CIR	6.4	500	24.12	G.OF ADEN/YEMEN
01-0507-13	83/12/ 3	4:46:30.230	16.47	53.57	-0.07	0.04	0.00	242.380	60	0000	0	CIR	6.4	500	24.12	MUSCAT,OMAN
01-0508-13	83/12/ 3	4:46:40.107	17.02	53.92	-0.09	0.05	-0.02	242.470	60	0000	0	CIR	6.4	500	24.12	MUSCAT,OMAN
01-0509-13	83/12/ 3	4:46:50.184	17.58	54.29	-0.10	0.03	-0.03	242.560	60	0000	0	CIR	6.4	500	24.13	MUSCAT,OMAN
01-0510-13	83/12/ 3	4:47: 0.058	18.14	54.65	-0.11	0.02	-0.01	242.660	60	0000	0	CIR	6.4	500	24.12	MUSCAT,OMAN
01-0511-13	83/12/ 3	4:47:10.143	18.68	55.01	-0.09	-0.03	-0.02	242.750	60	0000	1	CIR	6.4	500	24.11	MUSCAT,OMAN
01-0512-13	83/12/ 3	4:47:20.007	19.22	55.37	-0.09	-0.05	-0.01	242.850	60	0000	1	CIR	6.4	500	24.10	MUSCAT,OMAN
01-0513-13	83/12/ 3	4:47:30.071	19.78	55.75	-0.06	-0.05	-0.01	242.950	60	0000	3	CIR	6.4	500	24.09	MUSCAT,OMAN
01-0514-13	83/12/ 3	4:47:39.948	20.33	56.12	-0.04	-0.04	0.00	243.060	60	0000	3	CIR	6.4	500	24.08	MUSCAT,OMAN
01-0515-13	83/12/ 3	4:47:50.023	20.89	56.50	-0.02	-0.02	0.01	243.160	60	0000	4	CIR	6.4	500	24.05	MUSCAT,OMAN
01-0516-13	83/12/ 3	4:47:59.892	21.43	56.88	0.00	0.00	0.01	243.270	60	0000	4	CIR	6.4	500	24.03	MUSCAT,OMAN
01-0517-13	83/12/ 3	4:48: 9.962	21.98	57.27	0.00	0.00	0.02	243.390	60	0000	1	CIR	6.4	500	24.01	MUSCAT,OMAN
01-0518-13	83/12/ 3	4:48:19.828	22.52	57.65	0.01	0.00	0.02	243.500	60	0000	0	CIR	6.4	500	23.98	MUSCAT,OMAN
01-0519-13	83/12/ 3	4:48:29.899	23.07	58.04	0.01	-0.01	0.02	243.620	60	1000	0	CIR	6.4	500	23.94	MUSCAT,OMAN
01-0520-13	83/12/ 3	4:48:39.779	23.61	58.42	0.01	0.00	0.02	243.740	60	0110	1	CIR	6.4	500	23.90	MUSCAT,OMAN
01-0521-13	83/12/ 3	4:48:49.855	24.15	58.82	0.01	0.00	0.01	243.860	60	0001	1	CIR	6.4	500	23.85	MUSCAT,OMAN
01-0522-13	83/12/ 3	4:48:59.739	24.69	59.20	0.01	0.00	0.01	243.980	60	0000	0	CIR	6.4	500	23.80	IRAN
01-0523-13	83/12/ 3	4:49: 9.627	25.22	59.60	-0.02	0.01	0.02	244.110	60	0000	0	CIR	6.4	500	23.76	IRAN
01-0524-13	83/12/ 3	4:49:19.710	25.76	60.02	-0.04	0.02	0.03	244.240	60	0000	0	CIR	6.4	500	23.71	IRAN
01-0525-13	83/12/ 3	4:49:29.592	26.29	60.42	-0.07	0.03	0.04	244.370	60	0000	0	CIR	6.4	500	23.66	IRAN
01-0526-13	83/12/ 3	4:49:39.680	26.83	60.84	-0.10	0.04	0.05	244.500	60	0000	0	CIR	6.4	500	23.60	IRAN
01-0527-13	83/12/ 3	4:49:49.567	27.36	61.24	-0.12	0.04	0.06	244.630	60	0000	0	CIR	6.4	500	23.52	IRAN
01-0528-13	83/12/ 3	4:49:59.647	27.90	61.67	-0.12	0.01	0.08	244.760	60	0000	0	CIR	6.4	500	23.46	IRAN
01-0529-13	83/12/ 3	4:50: 9.525	28.42	62.09	-0.11	-0.01	0.09	244.900	60	0000	0	CIR	6.2	500	23.39	IRAN,PAKISTAN
01-0530-13	83/12/ 3	4:50:19.598	28.96	62.52	-0.10	-0.01	0.10	245.040	60	0000	0	CIR	6.2	500	23.31	PAKISTAN
01-0531-13	83/12/ 3	4:50:29.465	29.47	62.95	-0.10	-0.02	0.11	245.180	60	0000	0	CIR	6.2	500	23.24	PAKISTAN,AFGHAN.

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 13

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0532-13	83/12/ 3	4:50:39.519	30.00	63.40	-0.11	-0.01	0.09	245.320	60	0000	0	CIR	6.2	500	23.16	AFGHANISTAN
01-0533-13	83/12/ 3	4:50:49.397	30.52	63.84	-0.11	-0.01	0.07	245.460	60	0000	0	CIR	6.2	500	23.07	AFGHANISTAN
01-0534-13	83/12/ 3	4:50:59.460	31.05	64.30	-0.11	0.00	0.06	245.610	60	0000	0	CIR	6.2	500	22.99	AFGHANISTAN
01-0535-13	83/12/ 3	4:51: 9.309	31.56	64.74	-0.09	0.01	0.05	245.750	60	0000	0	CIR	6.2	500	22.90	AFGHANISTAN
01-0536-13	83/12/ 3	4:51:19.366	32.08	65.21	-0.09	0.01	0.04	245.900	60	0000	0	CIR	6.2	500	22.81	AFGHANISTAN
01-0537-13	83/12/ 3	4:51:29.247	32.59	65.67	-0.08	0.04	0.04	246.050	60	0000	0	CIR	6.2	500	22.71	AFGHANISTAN
01-0538-13	83/12/ 3	4:51:39.317	33.10	66.15	-0.07	0.05	0.03	246.200	60	0000	0	CIR	6.2	500	22.62	AFGHANISTAN
01-0539-13	83/12/ 3	4:51:49.375	33.62	66.63	-0.07	0.04	0.01	246.350	60	0000	0	CIR	6.2	500	22.51	AFGHANISTAN
01-0540-13	83/12/ 3	4:51:59.262	34.12	67.11	-0.07	0.05	0.00	246.500	60	0000	0	CIR	6.2	500	22.41	AFGHANISTAN
01-0541-13	83/12/ 3	4:52: 9.323	34.64	67.61	-0.07	0.02	0.00	246.650	60	0000	0	CIR	6.2	500	22.29	AFGHANISTAN
01-0542-13	83/12/ 3	4:52:19.172	35.13	68.10	-0.08	0.00	-0.02	246.800	60	2000	0	CIR	6.2	500	22.19	AFGHANISTAN
01-0543-13	83/12/ 3	4:52:29.240	35.64	68.61	-0.08	-0.02	-0.03	246.960	60	1110	1	CIR	6.2	500	22.07	AFGHANISTAN
01-0544-13	83/12/ 3	4:52:39.121	36.13	69.12	-0.10	-0.05	-0.05	247.110	60	1210	1	CIR	6.2	500	21.96	AFGHANISTAN
01-0545-13	83/12/ 3	4:52:49.193	36.63	69.65	-0.11	-0.07	-0.05	247.260	60	0002	1	CIR	6.2	500	21.84	AFGHANISTAN
01-0546-13	83/12/ 3	4:52:59.051	37.12	70.16	-0.11	-0.08	-0.06	247.420	60	5300	1	CIR	6.2	500	21.71	AFGHANISTAN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 14

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0548-14	83/12/ 3	6:11: 2.475	0.00	21.30	-1.07	-0.38	-0.09	241.350	60	9978	X	B/W	5.7	950	22.36	REP.OF CONGO
01-0549-14	83/12/ 3	6:11:12.351	0.86	21.63	-0.94	-0.63	-0.07	241.340	60	8788	X	B/W	5.7	975	22.34	REP.OF CONGO
01-0550-14	83/12/ 3	6:11:22.322	1.43	21.95	-0.97	-0.63	-0.04	241.330	60	8898	X	B/W	5.7	950	22.43	REP.OF CONGO
01-0551-14	83/12/ 3	6:11:32.202	1.99	22.27	-1.00	-0.63	-0.02	241.320	60	7288	8	B/W	5.7	975	22.53	REP.OF CONGO
01-0552-14	83/12/ 3	6:11:42.257	2.56	22.60	-1.02	-0.62	0.00	241.320	60	9572	8	B/W	5.7	950	22.63	REP.OF CONGO
01-0553-14	83/12/ 3	6:11:52.186	3.12	22.92	-1.01	-0.60	0.03	241.320	60	8695	9	B/W	5.7	1000	22.71	REP.OF CONGO
01-0554-14	83/12/ 3	6:12: 2.140	3.69	23.24	-1.01	-0.58	0.05	241.320	60	6486	8	B/W	5.7	1000	22.79	REP.OF CONGO
01-0555-14	83/12/ 3	6:12:12.183	4.26	23.57	-1.00	-0.55	0.08	241.330	60	0075	5	B/W	5.7	1000	22.87	R.O CONGO,C.AF.REP
01-0556-14	83/12/ 3	6:12:22.139	4.82	23.89	-1.00	-0.52	0.11	241.340	60	0011	2	B/W	5.7	1000	22.96	R.O CONGO,C.AF.REP
01-0557-14	83/12/ 3	6:12:32.086	5.38	24.22	-1.00	-0.50	0.13	241.350	60	0000	1	B/W	5.7	1000	23.04	R.O CONGO,C.AF.REP
01-0558-14	83/12/ 3	6:12:42.045	5.95	24.55	-0.99	-0.46	0.16	241.370	60	0100	3	B/W	5.7	1000	23.11	R.O CONGO,C.AF.REP
01-0559-14	83/12/ 3	6:12:52.002	6.51	24.87	-0.99	-0.41	0.19	241.400	60	0001	5	B/W	5.7	1000	23.17	C.AFR.REP.
01-0560-14	83/12/ 3	6:13: 1.960	7.07	25.20	-0.99	-0.37	0.22	241.420	60	3100	7	B/W	5.7	1000	23.24	C.AFR.REP.
01-0561-14	83/12/ 3	6:13:11.914	7.64	25.53	-0.98	-0.32	0.25	241.450	60	1231	8	B/W	5.7	975	23.30	C.AFR.REP.,SUDAN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 22

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0596-22	83/12/ 5	4:26: 2.572	24.52	53.40	0.41	-0.54	0.22	239.640	60	2400	4	B/W	5.7	650	15.35	UN.ARAB.EMIRATES
01-0597-22	83/12/ 5	4:26:12.209	25.04	53.79	0.20	-0.67	0.15	239.740	60	6825	3	B/W	5.7	650	15.39	UN.ARAB.EMIRATES
01-0598-22	83/12/ 5	4:26:22.289	25.58	54.20	0.20	-0.61	0.09	239.840	60	8848	X	B/W	5.7	650	15.42	PERSIAN GULF
01-0599-22	83/12/ 5	4:26:32.215	26.12	54.60	0.22	-0.54	0.04	239.950	60	0788	5	B/W	5.7	650	15.44	PERSIAN GULF.IRAN
01-0600-22	83/12/ 5	4:26:42.122	26.65	55.01	0.21	-0.54	0.02	240.060	60	0017	1	B/W	5.7	650	15.47	PERSIAN GULF.IRAN
01-0601-22	83/12/ 5	4:26:52.058	27.18	55.42	0.18	-0.44	0.01	240.160	60	0000	1	B/W	5.7	650	15.49	IRAN
01-0602-22	83/12/ 5	4:27: 1.983	27.72	55.84	0.14	-0.34	0.01	240.280	60	0000	0	B/W	5.7	650	15.51	IRAN
01-0603-22	83/12/ 5	4:27:11.906	28.24	56.26	0.11	-0.25	0.01	240.390	60	0000	0	B/W	5.7	650	15.53	IRAN
01-0604-22	83/12/ 5	4:27:21.957	28.78	56.70	0.07	-0.16	0.00	240.500	60	0000	0	B/W	5.7	650	15.55	IRAN
01-0605-22	83/12/ 5	4:27:31.865	29.30	57.13	0.02	-0.06	0.01	240.620	60	0000	0	B/W	5.7	650	15.56	IRAN
01-0606-22	83/12/ 5	4:27:41.780	29.82	57.56	-0.03	0.01	0.01	240.730	60	0000	0	B/W	5.7	650	15.57	IRAN
01-0607-22	83/12/ 5	4:27:51.704	30.35	58.01	-0.07	-0.02	0.00	240.850	60	0000	0	B/W	5.7	650	15.58	IRAN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 23

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0608-23	83/12/ 5	5:49: 2.488	3.58	17.51	-0.08	-0.03	0.05	237.920	60	6555	7	B/W	5.7	525	12.37	REP.OF CONGO
01-0609-23	83/12/ 5	5:49:12.429	4.14	17.83	-0.08	-0.05	0.03	237.900	60	3465	7	B/W	5.7	525	12.47	C.AFR.REP.
01-0610-23	83/12/ 5	5:49:22.378	4.71	18.16	-0.09	-0.07	0.03	237.880	60	9535	7	B/W	5.7	525	12.58	C.AFR.REP.
01-0611-23	83/12/ 5	5:49:32.315	5.26	18.49	-0.12	-0.08	0.01	237.870	60	9995	7	B/W	5.7	525	12.69	C.AFR.REP.
01-0612-23	83/12/ 5	5:49:42.237	5.83	18.81	-0.09	-0.06	0.05	237.860	60	6999	7	B/W	5.7	550	12.79	C.AFR.REP.
01-0613-23	83/12/ 5	5:49:52.066	6.39	19.13	-0.13	-0.09	0.00	237.850	60	0178	7	B/W	5.7	550	12.88	C.AFR.REP.
01-0614-23	83/12/ 5	5:50: 2.057	6.96	19.46	-0.14	-0.10	-0.01	237.850	60	0002	7	B/W	5.7	550	12.97	C.AFR.REP.
01-0615-23	83/12/ 5	5:50:12.056	7.52	19.79	-0.14	-0.09	-0.02	237.850	60	0000	7	B/W	5.7	550	13.07	C.AFR.REP.
01-0616-23	83/12/ 5	5:50:21.072	8.03	20.09	-0.13	-0.08	-0.03	237.860	60	0000	7	B/W	5.7	550	13.16	C.AFR.REP.
01-0617-23	83/12/ 5	5:50:31.873	8.64	20.45	-0.12	-0.05	-0.03	237.870	60	1000	5	B/W	5.7	550	13.25	C.AFR.REP.
01-0618-23	83/12/ 5	5:50:41.842	9.21	20.78	-0.12	-0.02	-0.04	237.880	60	2010	5	B/W	5.7	575	13.35	C.AFR.REP.
01-0619-23	83/12/ 5	5:50:51.743	9.76	21.11	-0.12	-0.01	-0.04	237.900	60	0020	5	B/W	5.7	575	13.44	C.AFR.REP.,CHAD
01-0620-23	83/12/ 5	5:51: 1.796	10.33	21.45	-0.13	-0.02	-0.05	237.920	60	0000	5	B/W	5.7	575	13.52	C.AFR.REP.,CHAD
01-0621-23	83/12/ 5	5:51:11.698	10.89	21.79	-0.13	-0.03	-0.05	237.940	60	0000	4	B/W	5.7	575	13.61	C.AFR.REP.,CHAD
01-0622-23	83/12/ 5	5:51:21.575	11.45	22.12	-0.13	-0.04	-0.06	237.970	60	0000	3	B/W	5.7	575	13.69	CHAD
01-0623-23	83/12/ 5	5:51:31.620	12.01	22.46	-0.12	-0.04	-0.05	238.000	60	0000	3	B/W	5.7	575	13.77	CHAD,SUDAN
01-0624-23	83/12/ 5	5:51:41.514	12.57	22.80	-0.12	-0.03	-0.05	238.030	60	0000	3	B/W	5.7	575	13.85	SUDAN
01-0625-23	83/12/ 5	5:51:51.429	13.13	23.13	-0.10	-0.03	-0.06	238.070	60	0000	3	B/W	5.7	575	13.92	SUDAN
01-0626-23	83/12/ 5	5:52: 1.467	13.69	23.49	-0.10	-0.01	-0.06	238.110	60	0000	3	B/W	5.7	600	14.01	SUDAN
01-0627-23	83/12/ 5	5:52:11.434	14.25	23.83	-0.09	-0.01	-0.06	238.160	60	0000	3	B/W	5.7	600	14.08	SUDAN
01-0628-23	83/12/ 5	5:52:21.379	14.80	24.17	-0.09	-0.01	-0.06	238.210	60	0000	3	B/W	5.7	600	14.15	SUDAN
01-0629-23	83/12/ 5	5:52:31.331	15.36	24.53	-0.09	-0.02	-0.07	238.260	60	0000	5	B/W	5.7	600	14.22	SUDAN
01-0630-23	83/12/ 5	5:52:41.290	15.91	24.88	-0.08	-0.04	-0.07	238.310	60	0000	5	B/W	5.7	600	14.29	SUDAN
01-0631-23	83/12/ 5	5:52:51.251	16.47	25.23	-0.08	-0.06	-0.07	238.370	60	0000	5	B/W	5.7	600	14.35	SUDAN
01-0632-23	83/12/ 5	5:53: 1.221	17.03	25.59	-0.08	-0.06	-0.08	238.430	60	0000	5	B/W	5.7	600	14.41	SUDAN
01-0633-23	83/12/ 5	5:53:11.188	17.58	25.94	-0.08	-0.07	-0.08	238.490	60	0000	5	B/W	5.7	600	14.48	SUDAN
01-0634-23	83/12/ 5	5:53:21.119	18.13	26.30	-0.09	-0.08	-0.08	238.560	60	0000	5	B/W	5.7	600	14.54	SUDAN
01-0635-23	83/12/ 5	5:53:31.065	18.68	26.66	-0.08	-0.08	-0.08	238.630	60	0000	5	B/W	5.7	600	14.59	SUDAN
01-0636-23	83/12/ 5	5:53:41.003	19.23	27.03	-0.07	-0.10	-0.08	238.710	60	0000	5	B/W	5.7	625	14.65	SUDAN
01-0637-23	83/12/ 5	5:53:50.862	19.78	27.39	-0.07	-0.11	-0.08	238.770	60	0000	5	B/W	5.7	625	14.70	SUDAN
01-0638-23	83/12/ 5	5:54: 0.870	20.34	27.77	-0.08	-0.12	-0.08	238.860	60	0000	5	B/W	5.7	625	14.75	SUDAN
01-0639-23	83/12/ 5	5:54:10.860	20.88	28.14	-0.07	-0.12	-0.09	238.930	60	1000	5	B/W	5.7	625	14.80	SUDAN
01-0640-23	83/12/ 5	5:54:20.866	21.43	28.52	-0.08	-0.12	-0.08	239.030	60	2200	7	B/W	5.7	625	14.85	SUDAN
01-0641-23	83/12/ 5	5:54:30.739	21.97	28.89	-0.08	-0.11	-0.08	239.110	60	9620	8	B/W	5.7	625	14.89	SUDAN,EGYPT
01-0642-23	83/12/ 5	5:54:40.761	22.52	29.28	-0.09	-0.10	-0.07	239.190	60	9987	X	B/W	5.7	625	14.94	EGYPT
01-0643-23	83/12/ 5	5:54:50.629	23.06	29.67	-0.08	-0.09	-0.07	239.290	60	9999	X	B/W	5.7	625	14.98	EGYPT
01-0644-23	83/12/ 5	5:55: 0.660	23.61	30.07	-0.08	-0.06	-0.06	239.390	60	9899	X	B/W	5.7	625	15.02	EGYPT
01-0645-23	83/12/ 5	5:55:10.679	24.15	30.46	-0.08	-0.03	-0.06	239.480	60	9998	X	B/W	5.7	625	15.06	EGYPT
01-0646-23	83/12/ 5	5:55:20.547	24.69	30.85	-0.07	-0.01	-0.06	239.580	60	9999	X	B/W	5.7	625	15.09	EGYPT
01-0647-23	83/12/ 5	5:55:30.572	25.23	31.25	-0.07	0.03	-0.05	239.680	60	9999	X	B/W	5.7	625	15.12	EGYPT
01-0648-23	83/12/ 5	5:55:40.435	25.76	31.65	-0.09	0.00	-0.05	239.780	60	9999	X	B/W	5.7	625	15.16	EGYPT
01-0649-23	83/12/ 5	5:55:50.472	26.30	32.06	-0.09	-0.03	-0.06	239.890	60	9999	X	B/W	5.7	625	15.18	EGYPT
01-0650-23	83/12/ 5	5:56: 0.504	26.84	32.49	-0.11	-0.04	-0.05	240.000	60	9999	X	B/W	5.7	625	15.21	EGYPT
01-0651-23	83/12/ 5	5:56:10.381	27.37	32.90	-0.12	-0.06	-0.05	240.110	60	9999	X	B/W	5.7	625	15.24	EGYPT
01-0652-23	83/12/ 5	5:56:20.389	27.90	33.32	-0.13	-0.07	-0.05	240.220	60	9999	X	B/W	5.7	625	15.26	EGYPT
01-0653-23	83/12/ 5	5:56:30.262	28.42	33.74	-0.14	-0.07	-0.05	240.340	60	9999	X	B/W	5.7	625	15.28	EGYPT
01-0654-23	83/12/ 5	5:56:40.282	28.95	34.18	-0.15	-0.07	-0.04	240.450	60	9999	X	B/W	5.7	625	15.30	EGYPT
01-0655-23	83/12/ 5	5:56:50.317	29.48	34.62	-0.14	-0.06	-0.03	240.570	60	9999	X	B/W	5.7	625	15.31	EGYPT
01-0656-23	83/12/ 5	5:57: 0.191	30.01	35.07	-0.14	-0.05	-0.03	240.690	60	9999	X	B/W	5.7	625	15.33	ISRAEL,JORDAN
01-0657-23	83/12/ 5	5:57:10.220	30.53	35.50	-0.13	-0.03	-0.02	240.810	60	6999	5	B/W	5.7	625	15.34	ISRAEL,JORDAN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 23

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0658-23	83/12/ 5	5:57:20.099	31.05	35.95	-0.11	-0.02	0.00	240.930	60	5979	5	B/W	5.7	625	15.35	JORDAN
01-0659-23	83/12/ 5	5:57:30.138	31.57	36.41	-0.12	0.01	-0.01	241.060	60	6949	5	B/W	5.7	625	15.36	JORDAN
01-0660-23	83/12/ 5	5:57:40.007	32.09	36.86	-0.13	-0.01	0.00	241.180	60	6969	5	B/W	5.7	625	15.35	JORDAN
01-0661-23	83/12/ 5	5:57:50.045	32.60	37.33	-0.14	-0.02	0.00	241.300	60	2669	7	B/W	5.7	625	15.36	JORDAN,SYRIA
01-0662-23	83/12/ 5	5:58: 0.074	33.13	37.82	-0.13	-0.03	0.01	241.430	60	5999	7	B/W	5.7	625	15.36	SYRIA
01-0663-23	83/12/ 5	5:58: 9.939	33.62	38.29	-0.13	-0.04	0.01	241.560	60	5778	8	B/W	5.7	625	15.36	SYRIA
01-0664-23	83/12/ 5	5:58:19.976	34.13	38.78	-0.12	-0.04	0.02	241.690	60	1567	7	B/W	5.7	625	15.36	SYRIA,IRAQ
01-0665-23	83/12/ 5	5:58:29.861	34.64	39.26	-0.11	-0.05	0.03	241.820	60	3116	5	B/W	5.7	625	15.35	SYRIA,IRAQ
01-0666-23	83/12/ 5	5:58:39.888	35.14	39.77	-0.11	-0.03	0.04	241.950	60	0222	3	B/W	5.7	625	15.34	SYRIA,IRAQ
01-0667-23	83/12/ 5	5:58:49.924	35.65	40.27	-0.10	-0.03	0.05	242.080	60	4211	3	B/W	5.7	625	15.33	SYRIA,IRAQ
01-0668-23	83/12/ 5	5:58:59.791	36.15	40.79	-0.11	-0.02	0.04	242.220	60	3033	3	B/W	5.7	625	15.32	SYRIA,IRAQ

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 24

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/ STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0669-24	83/12/ 5	7:19: 2.619	6.16	-3.67	-0.04	-0.02	0.01	237.840	60	4978	X	B/W	5.7	525	12.51	IVORY COAST
01-0670-24	83/12/ 5	7:19:12.369	6.71	-3.35	-0.16	-0.08	0.01	237.850	60	6949	9	B/W	5.7	525	12.61	IVORY COAST,GHANA
01-0671-24	83/12/ 5	7:19:22.317	7.27	-3.02	-0.23	-0.10	0.00	237.850	60	7769	9	B/W	5.7	525	12.71	IVORY COAST,GHANA
01-0672-24	83/12/ 5	7:19:32.212	7.83	-2.69	-0.25	-0.10	0.00	237.860	60	1278	9	B/W	5.7	550	12.81	GHANA,IVORY COAST
01-0673-24	83/12/ 5	7:19:42.231	8.40	-2.36	-0.21	-0.08	0.00	237.860	60	4224	9	B/W	5.7	550	12.90	GHANA,IVORY COAST
01-0674-24	83/12/ 5	7:19:52.251	8.96	-2.03	-0.11	-0.04	0.01	237.870	60	8113	9	B/W	5.7	550	12.99	GHANA
01-0675-24	83/12/ 5	7:20: 2.078	9.52	-1.71	-0.01	-0.01	0.02	237.880	60	7282	9	B/W	5.7	550	13.07	GHANA
01-0676-24	83/12/ 5	7:20:12.080	10.08	-1.41	-0.06	-0.02	0.02	237.900	60	6461	7	B/W	5.7	550	13.13	GHANA
01-0677-24	83/12/ 5	7:20:21.926	10.64	-1.12	-0.08	-0.01	0.02	237.920	60	3165	7	B/W	5.7	550	13.18	GHANA
01-0678-24	83/12/ 5	7:20:31.928	11.20	-0.83	-0.05	0.01	0.02	237.950	60	1654	6	B/W	5.7	550	13.22	GHANA,BURKINA FASO
01-0679-24	83/12/ 5	7:20:41.901	11.76	-0.53	0.01	0.05	0.03	237.970	60	1215	6	B/W	5.7	575	13.27	BURKINA FASO
01-0680-24	83/12/ 5	7:20:51.785	12.32	-0.24	0.10	0.09	0.05	238.000	60	0122	5	B/W	5.7	575	13.31	BURKINA FASO
01-0681-24	83/12/ 5	7:21: 1.888	12.89	0.09	0.17	0.13	0.06	238.030	60	1101	5	B/W	5.7	575	13.38	BURKINA FASO
01-0682-24	83/12/ 5	7:21:11.808	13.43	0.59	-0.06	0.08	0.02	238.060	60	4111	4	B/W	5.7	575	13.60	BURKINA FASO
01-0683-24	83/12/ 5	7:21:21.728	13.98	1.00	-0.15	0.06	0.00	238.100	60	1020	4	B/W	5.7	575	13.73	BURKINA FASO,NIGER
01-0684-24	83/12/ 5	7:21:31.662	14.54	1.34	-0.15	0.07	0.01	238.150	60	1623	4	B/W	5.7	575	13.81	NIGER
01-0685-24	83/12/ 5	7:21:41.552	15.09	1.69	-0.15	0.08	0.02	238.200	60	9925	9	B/W	5.7	575	13.88	NIGER
01-0686-24	83/12/ 5	7:21:51.645	15.66	2.04	-0.15	0.06	0.04	238.250	60	9983	X	B/W	5.7	575	13.95	NIGER,MALI
01-0687-24	83/12/ 5	7:22: 1.559	16.21	2.40	-0.15	0.02	0.05	238.300	60	8999	X	B/W	5.7	600	14.02	MALI
01-0688-24	83/12/ 5	7:22:11.503	16.76	2.75	-0.15	0.02	0.06	238.360	60	9989	X	B/W	5.7	600	14.08	MALI
01-0689-24	83/12/ 5	7:22:21.463	17.32	3.11	-0.15	0.01	0.07	238.420	60	8799	9	B/W	5.7	600	14.15	MALI
01-0690-24	83/12/ 5	7:22:31.422	17.88	3.46	-0.15	0.02	0.08	238.490	60	5176	9	B/W	5.7	600	14.21	MALI
01-0691-24	83/12/ 5	7:22:41.361	18.43	3.82	-0.14	0.00	0.08	238.560	60	2251	7	B/W	5.7	600	14.26	MALI
01-0692-24	83/12/ 5	7:22:51.310	18.98	4.19	-0.14	0.01	0.07	238.630	60	7112	7	B/W	5.7	600	14.33	MALI,NIGER,ALGERIA
01-0693-24	83/12/ 5	7:23: 1.260	19.53	4.56	-0.14	0.00	0.06	238.700	60	9776	9	B/W	5.7	600	14.38	ALGERIA
01-0694-24	83/12/ 5	7:23:11.221	20.08	4.93	-0.13	0.01	0.06	238.780	60	0288	5	B/W	5.7	600	14.44	ALGERIA
01-0695-24	83/12/ 5	7:23:21.181	20.62	5.30	-0.13	0.03	0.04	238.850	60	1023	4	B/W	5.7	600	14.49	ALGERIA
01-0696-24	83/12/ 5	7:23:31.136	21.18	5.67	-0.11	0.03	0.05	238.940	60	0020	4	B/W	5.7	600	14.54	ALGERIA
01-0697-24	83/12/ 5	7:23:41.107	21.72	6.05	-0.11	0.05	0.05	239.020	60	0000	3	B/W	5.7	600	14.59	ALGERIA
01-0698-24	83/12/ 5	7:23:51.076	22.27	6.44	-0.10	0.07	0.04	239.110	60	0000	3	B/W	5.7	600	14.64	ALGERIA
01-0699-24	83/12/ 5	7:24: 1.031	22.82	6.82	-0.08	0.10	0.04	239.200	60	0000	1	B/W	5.7	600	14.68	ALGERIA
01-0700-24	83/12/ 5	7:24:11.008	23.35	7.21	-0.09	0.10	0.04	239.290	60	0000	1	B/W	5.7	600	14.72	ALGERIA
01-0701-24	83/12/ 5	7:24:20.965	23.90	7.60	-0.08	0.08	0.04	239.390	60	0000	1	B/W	5.7	625	14.76	ALGERIA
01-0702-24	83/12/ 5	7:24:30.824	24.43	7.99	-0.08	0.08	0.03	239.470	60	0000	3	B/W	5.7	625	14.80	ALGERIA
01-0703-24	83/12/ 5	7:24:40.850	24.97	8.39	-0.08	0.07	0.03	239.580	60	0000	3	B/W	5.7	625	14.83	ALGERIA
01-0704-24	83/12/ 5	7:24:50.857	25.51	8.80	-0.07	0.08	0.03	239.680	60	0000	1	B/W	5.7	625	14.87	ALGERIA
01-0705-24	83/12/ 5	7:25: 0.734	26.05	9.21	-0.07	0.08	0.02	239.790	60	0000	1	B/W	5.7	625	14.91	ALGERIA,LYBIA
01-0706-24	83/12/ 5	7:25:10.732	26.58	9.61	-0.06	0.03	0.03	239.890	60	0000	1	B/W	5.7	625	14.93	ALGERIA,LYBIA
01-0707-24	83/12/ 5	7:25:20.742	27.12	10.04	-0.05	0.08	0.02	239.990	60	0000	1	B/W	5.7	625	14.96	ALGERIA,LYBIA
01-0708-24	83/12/ 5	7:25:30.610	27.65	10.45	-0.04	0.10	0.03	240.100	60	0000	1	B/W	5.7	625	14.98	ALGERIA,LYBIA
01-0709-24	83/12/ 5	7:25:40.647	28.18	10.87	-0.05	0.09	0.03	240.220	60	0000	1	B/W	5.7	625	15.01	LYBIA
01-0710-24	83/12/ 5	7:25:50.661	28.72	11.31	-0.05	0.06	0.02	240.330	60	0000	4	B/W	5.7	625	15.03	LYBIA
01-0711-24	83/12/ 5	7:26: 0.517	29.24	11.75	-0.05	0.04	0.02	240.450	60	0000	4	B/W	5.7	625	15.05	LYBIA
01-0712-24	83/12/ 5	7:26:10.526	29.76	12.18	-0.05	0.03	0.03	240.560	60	0000	4	B/W	5.7	625	15.06	LYBIA
01-0713-24	83/12/ 5	7:26:20.552	30.29	12.62	-0.05	0.02	0.03	240.680	60	0000	4	B/W	5.7	625	15.08	LYBIA
01-0714-24	83/12/ 5	7:26:30.395	30.81	13.07	-0.04	0.01	0.03	240.800	60	2000	3	B/W	5.7	625	15.09	LYBIA
01-0715-24	83/12/ 5	7:26:40.401	31.32	13.52	-0.04	0.02	0.03	240.920	60	3010	3	B/W	5.7	625	15.11	LYBIA
01-0716-24	83/12/ 5	7:26:50.420	31.84	13.98	-0.04	0.04	0.03	241.050	60	2020	1	B/W	5.7	625	15.11	LYBIA
01-0717-24	83/12/ 5	7:27: 0.281	32.37	14.46	-0.04	0.03	0.03	241.170	60	3120	1	B/W	5.7	625	15.12	LYBIA
01-0718-24	83/12/ 5	7:27:10.281	32.87	14.91	-0.03	0.06	0.04	241.300	60	7742	2	B/W	5.7	625	15.13	LYBIA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 24

MISS-IM-GP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0719-24	83/12/ 5	7:27:20.277	33.38	15.40	-0.03	0.06	0.03	241.430	60	9999	X	B/W	5.7	625	15.13	MEDITERANEAN SEA
01-0720-24	83/12/ 5	7:27:30.306	33.90	15.88	-0.02	0.09	0.05	241.550	60	9999	X	B/W	5.7	625	15.13	MEDITERANEAN SEA
01-0721-24	83/12/ 5	7:27:40.150	34.40	16.36	-0.02	0.09	0.05	241.680	60	9999	X	B/W	5.7	625	15.12	MEDITERANEAN SEA
01-0722-24	83/12/ 5	7:27:50.158	34.91	16.86	-0.02	0.08	0.05	241.810	60	9999	X	B/W	5.7	625	15.12	MEDITERANEAN SEA
01-0723-24	83/12/ 5	7:28: 0.178	35.43	17.38	-0.02	0.06	0.06	241.940	60	9999	X	B/W	5.7	625	15.11	MEDITERANEAN SEA
01-0724-24	83/12/ 5	7:28:10.192	35.91	17.88	-0.05	0.05	0.03	242.080	60	9999	X	B/W	5.7	625	15.11	MEDITERANEAN SEA
01-0725-24	83/12/ 5	7:28:20.034	36.41	18.39	-0.03	0.05	0.05	242.210	60	9999	X	B/W	5.7	600	15.09	MEDITERANEAN SEA
01-0726-24	83/12/ 5	7:28:29.992	36.90	18.91	-0.02	0.06	0.03	242.340	60	9999	X	B/W	5.7	600	15.08	MEDITERANEAN SEA
01-0727-24	83/12/ 5	7:28:40.105	37.40	19.45	-0.04	0.06	0.00	242.480	60	8999	X	B/W	5.7	600	15.07	JONIAN SEA
01-0728-24	83/12/ 5	7:28:50.057	37.89	19.99	-0.05	0.07	0.00	242.610	60	9999	X	B/W	5.7	600	15.05	JONIAN SEA
01-0729-24	83/12/ 5	7:29: 0.016	38.39	20.55	-0.06	0.08	-0.03	242.740	60	7999	X	B/W	5.7	600	15.04	GREECE
01-0730-24	83/12/ 5	7:29: 9.931	38.85	21.08	-0.07	0.09	-0.04	242.870	60	7989	X	B/W	5.7	600	15.02	GREECE
01-0731-24	83/12/ 5	7:29:19.882	39.33	21.64	-0.07	0.09	-0.05	243.010	60	9999	X	B/W	5.7	600	14.99	GREECE
01-0732-24	83/12/ 5	7:29:29.804	39.81	22.21	-0.07	0.06	-0.04	243.140	60	9989	X	B/W	5.7	600	14.97	GREECE
01-0733-24	83/12/ 5	7:29:39.913	40.29	22.79	-0.06	0.05	-0.02	243.280	60	9989	X	B/W	5.7	600	14.94	GREECE
01-0734-24	83/12/ 5	7:29:49.863	40.76	23.38	-0.05	0.03	-0.02	243.410	60	9999	X	B/W	5.7	600	14.91	GREECE
01-0735-24	83/12/ 5	7:29:59.935	41.23	23.99	-0.04	0.01	0.00	243.550	60	9999	X	B/W	5.7	600	14.88	GREECE

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 25

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0742-25	83/12/ 5	8:50: 3.556	12.14	-22.80	0.06	-0.13	-0.02	237.890	80	2235	X	B/W	5.7	550	13.16	ATLANTIC OCEAN
01-0743-25	83/12/ 5	8:50: 8.199	12.39	-22.64	0.05	-0.12	-0.02	237.910	80	3123	X	B/W	5.7	550	13.20	ATLANTIC OCEAN
01-0744-25	83/12/ 5	8:50:13.192	12.68	-22.47	0.06	-0.13	-0.03	237.930	80	3123	X	B/W	5.7	550	13.24	ATLANTIC OCEAN
01-0745-25	83/12/ 5	8:50:18.192	12.96	-22.30	0.06	-0.14	-0.03	237.940	80	3121	X	B/W	5.7	550	13.28	ATLANTIC OCEAN
01-0746-25	83/12/ 5	8:50:23.187	13.23	-22.13	0.07	-0.13	-0.04	237.960	80	2141	X	B/W	5.7	550	13.32	ATLANTIC OCEAN
01-0747-25	83/12/ 5	8:50:28.179	13.52	-21.96	0.06	-0.14	-0.04	237.980	80	1241	X	B/W	5.7	550	13.36	ATLANTIC OCEAN
01-0748-25	83/12/ 5	8:50:33.180	13.80	-21.78	0.08	-0.13	-0.04	238.010	80	1421	X	B/W	5.7	550	13.40	ATLANTIC OCEAN
01-0749-25	83/12/ 5	8:50:38.006	14.07	-21.61	0.07	-0.12	-0.05	238.030	80	1321	X	B/W	5.7	550	13.44	ATLANTIC OCEAN
01-0750-25	83/12/ 5	8:50:43.009	14.35	-21.44	0.08	-0.11	-0.05	238.050	80	2323	X	B/W	5.7	550	13.47	ATLANTIC OCEAN
01-0751-25	83/12/ 5	8:50:48.012	14.63	-21.27	0.08	-0.10	-0.04	238.070	80	2223	X	B/W	5.7	550	13.51	ATLANTIC OCEAN
01-0752-25	83/12/ 5	8:50:53.012	14.91	-21.10	0.08	-0.10	-0.05	238.100	80	3122	X	B/W	5.7	550	13.54	ATLANTIC OCEAN
01-0753-25	83/12/ 5	8:50:58.011	15.19	-20.92	0.07	-0.09	-0.06	238.130	80	3122	X	B/W	5.7	550	13.58	ATLANTIC OCEAN
01-0754-25	83/12/ 5	8:51: 3.010	15.47	-20.74	0.06	-0.10	-0.05	238.150	80	2231	X	B/W	5.7	550	13.62	ATLANTIC OCEAN
01-0755-25	83/12/ 5	8:51: 7.832	15.73	-20.58	0.07	-0.10	-0.06	238.170	80	2331	X	B/W	5.7	550	13.65	ATLANTIC OCEAN
01-0756-25	83/12/ 5	8:51:12.836	16.02	-20.40	0.06	-0.10	-0.06	238.210	80	4731	X	B/W	5.7	550	13.69	ATLANTIC OCEAN
01-0757-25	83/12/ 5	8:51:17.834	16.29	-20.22	0.05	-0.09	-0.07	238.230	80	7622	X	B/W	5.7	550	13.72	ATLANTIC OCEAN
01-0758-25	83/12/ 5	8:51:22.829	16.58	-20.04	0.05	-0.10	-0.07	238.260	80	7655	X	B/W	5.7	550	13.75	ATLANTIC OCEAN
01-0759-25	83/12/ 5	8:51:27.818	16.85	-19.87	0.03	-0.09	-0.06	238.290	80	3666	X	B/W	5.7	550	13.79	ATLANTIC OCEAN
01-0760-25	83/12/ 5	8:51:32.809	17.13	-19.68	0.03	-0.10	-0.07	238.330	80	4677	X	B/W	5.7	550	13.82	ATLANTIC OCEAN
01-0761-25	83/12/ 5	8:51:37.630	17.40	-19.51	0.02	-0.10	-0.07	238.350	80	4546	X	B/W	5.7	550	13.85	ATLANTIC OCEAN
01-0762-25	83/12/ 5	8:51:42.629	17.67	-19.33	0.01	-0.10	-0.07	238.390	80	5545	X	B/W	5.7	550	13.89	ATLANTIC OCEAN
01-0763-25	83/12/ 5	8:51:47.630	17.96	-19.15	0.02	-0.11	-0.07	238.420	80	5544	X	B/W	5.7	550	13.92	ATLANTIC OCEAN
01-0764-25	83/12/ 5	8:51:52.630	18.23	-18.97	0.00	-0.12	-0.07	238.450	80	3445	X	B/W	5.7	550	13.95	ATLANTIC OCEAN
01-0765-25	83/12/ 5	8:51:57.623	18.50	-18.79	0.00	-0.11	-0.07	238.490	80	1056	X	B/W	5.7	550	13.98	ATLANTIC OCEAN
01-0766-25	83/12/ 5	8:52: 2.618	18.79	-18.60	-0.01	-0.12	-0.08	238.520	80	0044	X	B/W	5.7	550	14.01	ATLANTIC OCEAN
01-0767-25	83/12/ 5	8:52: 7.614	19.06	-18.42	-0.02	-0.12	-0.08	238.560	80	0011	X	B/W	5.7	550	14.04	ATLANTIC OCEAN
01-0768-25	83/12/ 5	8:52:12.441	19.33	-18.24	-0.02	-0.12	-0.08	238.600	80	0000	X	B/W	5.7	550	14.07	ATLANTIC OCEAN
01-0769-25	83/12/ 5	8:52:17.436	19.60	-18.06	-0.03	-0.12	-0.07	238.630	80	0000	X	B/W	5.7	550	14.10	ATLANTIC OCEAN
01-0770-25	83/12/ 5	8:52:22.438	19.88	-17.88	-0.04	-0.13	-0.08	238.670	80	0000	X	B/W	5.7	550	14.12	ATLANTIC OCEAN
01-0771-25	83/12/ 5	8:52:27.469	20.16	-17.69	-0.03	-0.13	-0.08	238.710	80	0000	X	B/W	5.7	600	14.15	ATLANTIC OCEAN
01-0772-25	83/12/ 5	8:52:32.365	20.43	-17.51	-0.03	-0.12	-0.07	238.750	80	0000	2	B/W	5.7	600	14.18	ATLANTIC,MAURETANI
01-0773-25	83/12/ 5	8:52:37.426	20.70	-17.31	-0.03	-0.12	-0.07	238.790	80	0000	2	B/W	5.7	600	14.21	ATLANTIC,MAURETANI
01-0774-25	83/12/ 5	8:52:42.320	20.97	-17.13	-0.03	-0.11	-0.08	238.830	80	0000	2	B/W	5.7	600	14.23	WESTERN SAHARA
01-0775-25	83/12/ 5	8:52:47.373	21.25	-16.94	-0.02	-0.11	-0.08	238.880	80	0000	2	B/W	5.7	600	14.26	WESTERN SAHARA
01-0776-25	83/12/ 5	8:52:52.276	21.52	-16.75	-0.01	-0.11	-0.07	238.920	80	0000	2	B/W	5.7	600	14.29	WESTERN SAHARA
01-0777-25	83/12/ 5	8:52:57.334	21.80	-16.56	-0.02	-0.11	-0.08	238.960	80	0000	2	B/W	5.7	600	14.31	WESTERN SAHARA
01-0778-25	83/12/ 5	8:53: 2.225	22.06	-16.38	0.00	-0.11	-0.06	239.010	80	0000	2	B/W	5.7	600	14.33	WESTERN SAHARA
01-0779-25	83/12/ 5	8:53: 7.278	22.34	-16.18	0.01	-0.12	-0.07	239.050	80	0000	2	B/W	5.7	600	14.35	WESTERN SAHARA
01-0780-25	83/12/ 5	8:53:12.172	22.61	-15.99	0.01	-0.10	-0.06	239.100	80	0000	2	B/W	5.7	600	14.38	WESTERN SAHARA
01-0781-25	83/12/ 5	8:53:17.071	22.88	-15.80	0.02	-0.12	-0.07	239.140	80	0000	2	B/W	5.7	600	14.40	WESTERN SAHARA
01-0782-25	83/12/ 5	8:53:22.132	23.15	-15.60	0.03	-0.12	-0.06	239.190	80	0000	4	B/W	5.7	600	14.42	WESTERN SAHARA
01-0783-25	83/12/ 5	8:53:27.020	23.42	-15.41	0.04	-0.11	-0.06	239.240	80	0200	4	B/W	5.7	600	14.44	WESTERN SAHARA
01-0784-25	83/12/ 5	8:53:32.085	23.70	-15.21	0.04	-0.12	-0.07	239.280	80	0500	5	B/W	5.7	600	14.47	WESTERN SAHARA
01-0785-25	83/12/ 5	8:53:36.983	23.96	-15.02	0.05	-0.11	-0.07	239.330	80	0700	5	B/W	5.7	600	14.49	WESTERN SAHARA
01-0786-25	83/12/ 5	8:53:42.041	24.23	-14.82	0.05	-0.11	-0.07	239.380	80	0703	5	B/W	5.7	600	14.51	WESTERN SAHARA
01-0787-25	83/12/ 5	8:53:46.926	24.50	-14.62	0.05	-0.09	-0.05	239.430	80	0707	3	B/W	5.7	600	14.53	WESTERN SAHARA
01-0788-25	83/12/ 5	8:53:51.981	24.78	-14.42	0.06	-0.10	-0.06	239.480	80	0607	3	B/W	5.7	600	14.54	WESTERN SAHARA
01-0789-25	83/12/ 5	8:53:56.877	25.04	-14.23	0.07	-0.08	-0.05	239.530	80	0607	3	B/W	5.7	600	14.56	WESTERN SAHARA
01-0790-25	83/12/ 5	8:54: 1.936	25.31	-14.02	0.07	-0.08	-0.05	239.580	80	0606	1	B/W	5.7	600	14.58	WESTERN SAHARA
01-0791-25	83/12/ 5	8:54: 6.833	25.58	-13.92	0.08	-0.09	-0.06	239.630	80	0605	1	B/W	5.7	600	14.60	WESTERN SAHARA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 25

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0792-25	83/12/ 5	8:54:11.892	25.85	-13.62	0.09	-0.08	-0.06	239.690	80	0705	1	B/W	5.7	600	14.62	WESTERN SAHARA
01-0793-25	83/12/ 5	8:54:16.787	26.12	-13.41	0.10	-0.10	-0.06	239.730	80	0706	1	B/W	5.7	600	14.64	WESTERN SAHARA
01-0794-25	83/12/ 5	8:54:21.842	26.38	-13.20	0.10	-0.09	-0.06	239.790	80	0506	1	B/W	5.7	600	14.65	WESTERN SAHARA
01-0795-25	83/12/ 5	8:54:26.737	26.65	-13.01	0.11	-0.10	-0.05	239.840	80	0407	1	B/W	5.7	600	14.66	WESTERN SAHARA
01-0796-25	83/12/ 5	8:54:31.790	26.92	-12.79	0.10	-0.09	-0.06	239.890	80	0206	1	B/W	5.7	600	14.68	WESTERN SAHARA
01-0797-25	83/12/ 5	8:54:36.701	27.19	-12.58	0.10	-0.10	-0.06	239.950	80	0004	1	B/W	5.7	600	14.70	WESTERN SAHARA
01-0798-25	83/12/ 5	8:54:41.773	27.45	-12.37	0.10	-0.10	-0.05	240.000	80	0002	1	B/W	5.7	600	14.71	WESTERN SAHARA
01-0799-25	83/12/ 5	8:54:46.658	27.71	-12.17	0.10	-0.10	-0.05	240.060	80	0000	1	B/W	5.7	600	14.72	W-SAHARA,MOROCCO
01-0800-25	83/12/ 5	8:54:51.722	27.99	-11.95	0.10	-0.10	-0.05	240.120	80	0000	1	B/W	5.7	600	14.73	W-SAHARA,MOROCCO
01-0801-25	83/12/ 5	8:54:56.613	28.25	-11.74	0.10	-0.11	-0.06	240.170	80	0000	1	B/W	5.7	600	14.75	MOROCCO
01-0802-25	83/12/ 5	8:55: 1.666	28.51	-11.52	0.09	-0.11	-0.05	240.230	80	2000	0	B/W	5.7	600	14.76	MOROCCO
01-0803-25	83/12/ 5	8:55: 6.567	28.77	-11.31	0.10	-0.10	-0.05	240.290	80	2010	0	B/W	5.7	600	14.77	MOROCCO
01-0804-25	83/12/ 5	8:55:11.619	29.04	-11.09	0.08	-0.11	-0.05	240.350	80	1020	0	B/W	5.7	600	14.79	MOROCCO
01-0805-25	83/12/ 5	8:55:16.520	29.29	-10.88	0.09	-0.11	-0.05	240.400	80	1020	0	B/W	5.7	600	14.80	MOROCCO
01-0806-25	83/12/ 5	8:55:21.583	29.57	-10.66	0.09	-0.13	-0.04	240.470	80	1020	0	B/W	5.7	600	14.80	MOROCCO
01-0807-25	83/12/ 5	8:55:26.478	29.82	-10.44	0.08	-0.13	-0.04	240.520	80	1020	1	B/W	5.7	600	14.82	MOROCCO
01-0808-25	83/12/ 5	8:55:31.540	30.09	-10.21	0.08	-0.13	-0.04	240.580	80	1020	1	B/W	5.7	600	14.83	MOROCCO
01-0809-25	83/12/ 5	8:55:36.441	30.34	-9.99	0.10	-0.13	-0.04	240.640	80	2120	1	B/W	5.7	600	14.83	MOROCCO
01-0810-25	83/12/ 5	8:55:41.507	30.61	-9.77	0.11	-0.11	-0.02	240.700	80	3320	1	B/W	5.7	600	14.84	MOROCCO
01-0811-25	83/12/ 5	8:55:46.401	30.87	-9.55	0.13	-0.13	-0.03	240.760	80	6321	1	B/W	5.7	600	14.84	MOROCCO
01-0812-25	83/12/ 5	8:55:51.455	31.13	-9.32	0.13	-0.12	-0.03	240.830	80	5122	4	B/W	5.7	600	14.85	MOROCCO
01-0813-25	83/12/ 5	8:55:56.353	31.39	-9.09	0.13	-0.12	-0.03	240.890	80	3053	4	B/W	5.7	600	14.86	MOROCCO
01-0814-25	83/12/ 5	8:56: 1.413	31.65	-8.86	0.14	-0.10	-0.02	240.950	80	4052	4	B/W	5.7	600	14.87	MOROCCO
01-0815-25	83/12/ 5	8:56: 6.303	31.91	-8.63	0.13	-0.10	-0.02	241.010	80	5141	4	B/W	5.7	600	14.87	MOROCCO
01-0816-25	83/12/ 5	8:56:11.363	32.16	-8.40	0.11	-0.09	-0.02	241.070	80	6340	4	B/W	5.7	600	14.88	MOROCCO
01-0817-25	83/12/ 5	8:56:16.259	32.42	-8.16	0.09	-0.09	-0.01	241.140	80	7451	4	B/W	5.7	600	14.88	MOROCCO
01-0818-25	83/12/ 5	8:56:21.314	32.68	-7.93	0.08	-0.08	-0.01	241.200	80	5153	4	B/W	5.7	600	14.89	MOROCCO
01-0819-25	83/12/ 5	8:56:26.216	32.94	-7.70	0.06	-0.08	0.00	241.270	80	2064	5	B/W	5.7	600	14.89	MOROCCO
01-0820-25	83/12/ 5	8:56:31.272	33.19	-7.45	0.03	-0.06	0.01	241.330	80	1073	3	B/W	5.7	600	14.89	MOROCCO
01-0821-25	83/12/ 5	8:56:36.333	33.46	-7.21	0.01	-0.06	0.02	241.390	80	3041	3	B/W	5.7	600	14.89	MOROCCO
01-0822-25	83/12/ 5	8:56:41.223	33.70	-6.97	-0.01	-0.05	0.02	241.460	80	4220	3	B/W	5.7	600	14.90	MOROCCO
01-0823-25	83/12/ 5	8:56:46.270	33.96	-6.73	-0.03	-0.04	0.02	241.520	80	1130	3	B/W	5.7	600	14.90	MOROCCO
01-0824-25	83/12/ 5	8:56:51.169	34.21	-6.49	-0.04	-0.05	0.03	241.590	80	0042	3	B/W	5.7	660	14.90	MOROCCO
01-0825-25	83/12/ 5	8:56:56.223	34.46	-6.24	-0.04	-0.06	0.02	241.650	80	0011	2	B/W	5.7	600	14.90	MOROCCO
01-0826-25	83/12/ 5	8:57: 1.111	34.71	-6.00	-0.06	-0.07	0.03	241.720	80	1001	1	B/W	5.7	600	14.90	MOROCCO
01-0827-25	83/12/ 5	8:57: 6.171	34.97	-5.74	-0.07	-0.08	0.03	241.780	80	0010	1	B/W	5.7	600	14.90	MOROCCO
01-0828-25	83/12/ 5	8:57:11.064	35.22	-5.50	-0.05	-0.08	0.03	241.850	80	2010	1	B/W	5.7	600	14.90	MOROCCO
01-0829-25	83/12/ 5	8:57:16.117	35.47	-5.24	-0.04	-0.09	0.03	241.920	80	3100	1	B/W	5.7	600	14.89	MOROCCO,SPAIN
01-0830-25	83/12/ 5	8:57:21.011	35.72	-4.99	-0.02	-0.10	0.04	241.980	80	3200	1	B/W	5.7	600	14.89	MOROCCO,SPAIN
01-0831-25	83/12/ 5	8:57:26.074	35.97	-4.73	-0.02	-0.11	0.04	242.040	80	3420	3	B/W	5.7	600	14.89	MOROCCO,SPAIN
01-0832-25	83/12/ 5	8:57:30.967	36.21	-4.48	-0.02	-0.10	0.05	242.110	80	1442	1	B/W	5.7	600	14.89	SPAIN
01-0833-25	83/12/ 5	8:57:38.022	36.56	-4.11	0.00	-0.11	0.05	242.200	80	0144	1	B/W	5.7	600	14.88	SPAIN
01-0834-25	83/12/ 5	8:57:40.918	36.71	-3.96	0.01	-0.11	0.05	242.250	80	0024	1	B/W	5.7	600	14.88	SPAIN
01-0835-25	83/12/ 5	8:57:45.979	36.96	-3.69	0.02	-0.13	0.04	242.310	80	0102	1	B/W	5.7	600	14.87	SPAIN
01-0836-25	83/12/ 5	8:57:50.883	37.20	-3.43	0.04	-0.12	0.03	242.380	80	0300	1	B/W	5.7	600	14.87	SPAIN
01-0837-25	83/12/ 5	8:57:55.957	37.45	-3.16	0.05	-0.10	0.05	242.450	80	0401	1	B/W	5.7	600	14.86	SPAIN
01-0838-25	83/12/ 5	8:58: 0.854	37.70	-2.90	0.07	-0.12	0.04	242.510	80	1602	1	B/W	5.7	600	14.85	SPAIN
01-0839-25	83/12/ 5	8:58: 5.912	37.94	-2.63	0.09	-0.11	0.04	242.580	80	2803	1	B/W	5.7	600	14.84	SPAIN
01-0840-25	83/12/ 5	8:58:10.808	38.18	-2.36	0.10	-0.11	0.04	242.640	80	4904	1	B/W	5.7	600	14.84	SPAIN
01-0841-25	83/12/ 5	8:58:15.872	38.42	-2.08	0.10	-0.10	0.04	242.720	80	7917	2	B/W	5.7	600	14.83	SPAIN

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 25

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVRLAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0842-25	83/12/ 5	8:58:20.771	38.66	-1.81	0.11	-0.10	0.05	242.780	80	9928	2	B/W	5.7	600	14.82	SPAIN
01-0843-25	83/12/ 5	8:58:25.829	38.91	-1.53	0.12	-0.11	0.05	242.850	80	8969	5	B/W	5.7	600	14.81	SPAIN
01-0844-25	83/12/ 5	8:58:30.885	39.15	-1.24	0.11	-0.12	0.03	242.920	80	8989	9	B/W	5.7	600	14.80	SPAIN
01-0845-25	83/12/ 5	8:58:35.785	39.39	-0.96	0.11	-0.12	0.03	242.980	80	8989	5	B/W	5.7	600	14.79	SPAIN
01-0846-25	83/12/ 5	8:58:40.703	39.62	-0.69	0.11	-0.11	0.03	243.050	80	6989	5	B/W	5.7	600	14.78	SPAIN
01-0847-25	83/12/ 5	8:58:45.768	39.86	-0.39	0.11	-0.10	0.01	243.120	80	5899	4	B/W	5.7	600	14.77	SPAIN
01-0848-25	83/12/ 5	8:58:50.666	40.09	-0.11	0.10	-0.09	0.02	243.190	80	6579	5	B/W	5.7	600	14.76	SPAIN
01-0849-25	83/12/ 5	8:58:55.727	40.34	0.00	0.10	-0.09	0.29	243.250	80	8249	5	B/W	5.7	600	14.65	SPAIN
01-0850-25	83/12/ 5	8:59: 0.785	40.58	0.31	0.19	0.01	0.10	243.330	80	7346	5	B/W	5.7	600	14.64	SPAIN
01-0851-25	83/12/ 5	8:59: 5.683	40.81	0.77	0.09	-0.09	-0.01	243.390	80	7674	5	B/W	5.7	600	14.72	SPAIN
01-0852-25	83/12/ 5	8:59:10.744	41.04	1.07	0.09	-0.09	-0.02	243.460	80	4773	5	B/W	5.7	600	14.70	SPAIN
01-0853-25	83/12/ 5	8:59:15.648	41.27	1.37	0.09	-0.08	-0.05	243.530	80	3575	4	B/W	5.7	600	14.69	SPAIN
01-0854-25	83/12/ 5	8:59:20.716	41.51	1.67	0.09	-0.09	-0.05	243.590	80	3357	4	B/W	5.7	600	14.68	SPAIN
01-0855-25	83/12/ 5	8:59:25.613	41.74	1.97	0.08	-0.08	-0.05	243.660	80	2427	4	B/W	5.7	600	14.66	SPAIN
01-0856-25	83/12/ 5	8:59:30.668	41.97	2.29	0.07	-0.08	-0.07	243.730	80	1434	4	B/W	5.7	600	14.65	SPAIN,FRANCE
01-0857-25	83/12/ 5	8:59:35.560	42.19	2.59	0.07	-0.08	-0.08	243.790	80	1124	4	B/W	5.7	600	14.63	SPAIN,FRANCE
01-0858-25	83/12/ 5	8:59:40.621	42.42	2.90	0.08	-0.09	-0.08	243.860	80	2014	4	B/W	5.7	600	14.61	FRANCE,SPAIN
01-0859-25	83/12/ 5	8:59:45.512	42.64	3.21	0.07	-0.09	-0.09	243.930	80	0013	4	B/W	5.7	600	14.60	FRANCE
01-0860-25	83/12/ 5	8:59:50.566	42.88	3.53	0.07	-0.10	-0.09	244.000	80	0021	3	B/W	5.7	600	14.57	FRANCE
01-0861-25	83/12/ 5	8:59:55.463	43.10	3.85	0.06	-0.11	-0.10	244.060	80	0020	1	B/W	5.7	600	14.56	FRANCE
01-0862-25	83/12/ 5	9: 0: 0.526	43.33	4.18	0.06	-0.10	-0.10	244.130	80	0000	1	B/W	5.7	600	14.54	FRANCE
01-0863-25	83/12/ 5	9: 0: 5.549	43.54	4.50	0.05	-0.11	-0.13	244.200	80	0000	1	B/W	5.7	550	14.52	FRANCE
01-0864-25	83/12/ 5	9: 0:10.552	43.77	4.82	0.06	-0.11	-0.13	244.260	80	0000	1	B/W	5.7	550	14.50	FRANCE
01-0865-25	83/12/ 5	9: 0:15.554	43.99	5.15	0.05	-0.10	-0.10	244.330	80	0000	1	B/W	5.7	550	14.48	FRANCE
01-0866-25	83/12/ 5	9: 0:20.368	44.20	5.47	0.06	-0.08	-0.09	244.400	80	0000	0	B/W	5.7	550	14.46	FRANCE
01-0867-25	83/12/ 5	9: 0:25.368	44.43	5.81	0.10	-0.09	-0.14	244.460	80	0000	0	B/W	5.7	550	14.44	FRANCE
01-0868-25	83/12/ 5	9: 0:30.369	44.64	6.15	0.11	-0.08	-0.16	244.530	80	0000	2	B/W	5.7	550	14.42	FRANCE
01-0869-25	83/12/ 5	9: 0:35.368	44.86	6.48	0.12	-0.07	-0.14	244.600	80	0000	2	B/W	5.7	550	14.39	FRANCE,ITALY
01-0870-25	83/12/ 5	9: 0:40.369	45.07	6.82	0.10	-0.04	-0.11	244.660	80	0000	2	B/W	5.7	550	14.37	FRANCE,SWITZ,ITALY
01-0871-25	83/12/ 5	9: 0:45.373	45.29	7.18	0.10	-0.04	-0.12	244.730	80	0000	2	B/W	5.7	550	14.35	FRANCE,SWITZ,ITALY
01-0872-25	83/12/ 5	9: 0:50.365	45.50	7.52	0.11	-0.02	-0.12	244.790	80	0000	2	B/W	5.7	550	14.33	FRANCE,SWITZ,ITALY
01-0873-25	83/12/ 5	9: 0:55.375	45.71	7.87	0.10	-0.03	-0.12	244.860	80	0000	2	B/W	5.7	550	14.30	ITALY,SWITZERL.
01-0874-25	83/12/ 5	9: 1: 0.380	45.93	8.24	0.11	-0.03	-0.10	244.920	80	0000	2	B/W	5.7	550	14.28	ITALY,SWITZERL.
01-0875-25	83/12/ 5	9: 1: 5.374	46.14	8.58	0.11	-0.03	-0.10	244.990	80	1000	2	B/W	5.7	550	14.25	ITALY,SWITZERL.
01-0876-25	83/12/ 5	9: 1:10.369	46.34	8.94	0.10	-0.03	-0.09	245.050	80	1000	2	B/W	5.7	550	14.23	ITALY,SWITZERL.
01-0877-25	83/12/ 5	9: 1:15.193	46.55	9.29	0.11	-0.03	-0.09	245.120	80	1000	2	B/W	5.7	550	14.20	ITALY,SWITZERL.
01-0878-25	83/12/ 5	9: 1:20.189	46.75	9.65	0.08	-0.03	-0.08	245.180	80	1010	2	B/W	5.7	550	14.17	ITA,SWITZ,FRA,AUS
01-0879-25	83/12/ 5	9: 1:25.184	46.96	10.02	0.08	-0.05	-0.08	245.240	80	0020	1	B/W	5.7	550	14.14	ITALY,AUSTRIA,SWIT
01-0880-25	83/12/ 5	9: 1:30.193	47.16	10.40	0.07	-0.06	-0.07	245.310	80	0020	1	B/W	5.7	550	14.11	AUS,SWITZ,GERM,FRA
01-0881-25	83/12/ 5	9: 1:35.191	47.36	10.77	0.06	-0.07	-0.06	245.370	80	0010	1	B/W	5.7	550	14.08	GERM,ITALY,FRANCE
01-0882-25	83/12/ 5	9: 1:40.192	47.57	11.14	0.04	-0.08	-0.04	245.430	80	0000	1	B/W	5.7	550	14.05	GERMANY,AUSTRIA
01-0883-25	83/12/ 5	9: 1:45.197	47.76	11.52	0.02	-0.08	-0.05	245.490	80	0000	1	B/W	5.7	550	14.03	GERMANY,AUSTRIA
01-0884-25	83/12/ 5	9: 1:50.186	47.96	11.90	0.02	-0.09	-0.04	245.560	80	0100	1	B/W	5.7	550	14.00	GERMANY,AUSTRIA
01-0885-25	83/12/ 5	9: 1:55.181	48.15	12.30	0.01	-0.09	-0.03	245.620	80	0101	1	B/W	5.7	550	13.97	GERMANY,AUSTRIA
01-0886-25	83/12/ 5	9: 2: 0.180	48.36	12.70	0.02	-0.07	-0.03	245.680	80	0001	1	B/W	5.7	550	13.94	GERMANY,AUSTRIA
01-0887-25	83/12/ 5	9: 2: 5.169	48.55	13.07	0.03	-0.07	-0.01	245.740	80	0000	1	B/W	5.7	550	13.90	GERMANY,AUSTRIA
01-0888-25	83/12/ 5	9: 2:10.160	48.73	13.47	0.03	-0.07	-0.02	245.800	80	0000	1	B/W	5.7	550	13.88	GERMANY,AUSTRIA
01-0889-25	83/12/ 5	9: 2:14.994	48.92	13.85	0.05	-0.06	0.00	245.860	80	0000	1	B/W	5.7	550	13.84	GERMANY,AUSTRIA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 29

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0899-29	83/12/ 5	13:19: 2.530	16.32	-88.21	0.01	-0.15	-0.07	238.260	60	5271	5	B/W	5.7	525	12.81	HONDURAS,BELIZE
01-0900-29	83/12/ 5	13:19:12.310	16.87	-87.86	0.02	-0.13	-0.07	238.320	60	3162	5	B/W	5.7	525	12.88	HONDURAS,BELIZE
01-0901-29	83/12/ 5	13:19:22.205	17.42	-87.50	0.03	-0.12	-0.07	238.390	60	6321	5	B/W	5.7	550	12.95	MEXICO
01-0902-29	83/12/ 5	13:19:32.217	17.98	-87.14	0.05	-0.12	-0.06	238.450	60	2141	4	B/W	5.7	550	13.02	MEXICO
01-0903-29	83/12/ 5	13:19:42.065	18.52	-86.78	0.08	-0.12	-0.06	238.520	60	1211	4	B/W	5.7	550	13.09	MEXICO
01-0904-29	83/12/ 5	13:19:52.088	19.08	-86.42	0.07	-0.11	-0.05	238.590	60	1221	X	B/W	5.7	550	13.15	MEXICO
01-0905-29	83/12/ 5	13:20: 2.105	19.63	-86.05	0.07	-0.09	-0.04	238.670	60	1211	X	B/W	5.7	550	13.21	MEXICO
01-0906-29	83/12/ 5	13:20:11.955	20.17	-85.68	0.07	-0.11	-0.04	238.740	60	1222	X	B/W	5.7	550	13.27	CARIBBIAN SEA
01-0907-29	83/12/ 5	13:20:21.902	20.72	-85.31	0.06	-0.11	-0.04	238.820	60	3222	X	B/W	5.7	550	13.33	CARIBBIAN SEA
01-0908-29	83/12/ 5	13:20:31.029	21.22	-84.96	0.06	-0.12	-0.04	238.900	60	3232	5	B/W	5.7	550	13.39	CUBA
01-0909-29	83/12/ 5	13:20:41.045	21.77	-84.59	0.07	-0.12	-0.04	238.980	60	0543	4	B/W	5.7	550	13.44	CUBA
01-0910-29	83/12/ 5	13:20:51.858	22.36	-84.17	0.07	-0.13	-0.04	239.080	60	0304	3	B/W	5.7	550	13.50	CUBA
01-0911-29	83/12/ 5	13:21: 1.683	22.90	-83.79	0.06	-0.14	-0.03	239.160	60	0303	3	B/W	5.7	550	13.55	CUBA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 32

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0912-32	83/12/ 6	22:22:55.743	54.63	-128.36	-2.53	9.67	15.14	246.690	60	0217	2	B/W	5.8	450	9.36	CANADA
01-0913-32	83/12/ 6	22:23: 5.599	54.39	-127.34	-2.25	9.75	13.40	246.660	60	0112	2	B/W	5.8	450	9.31	CANADA
01-0914-32	83/12/ 6	22:23:15.657	54.15	-126.31	-1.95	9.82	11.64	246.640	60	1010	2	B/W	5.8	450	9.24	CANADA
01-0915-32	83/12/ 6	22:23:25.476	53.89	-125.32	-1.65	9.89	9.92	246.610	60	1220	1	B/W	5.8	450	9.18	CANADA
01-0916-32	83/12/ 6	22:23:35.591	53.62	-124.31	-1.33	9.94	8.18	246.570	60	1040	1	B/W	5.8	450	9.12	CANADA
01-0917-32	83/12/ 6	22:23:45.458	53.35	-123.33	-1.05	9.99	6.52	246.540	60	4051	1	B/W	5.8	450	9.05	CANADA
01-0918-32	83/12/ 6	22:23:55.324	53.07	-122.37	-0.77	10.04	4.89	246.500	60	9280	1	B/W	5.8	450	8.98	CANADA
01-0919-32	83/12/ 6	22:25:26.105	50.12	-114.18	1.55	9.86	-8.76	246.050	60	0402	1	B/W	5.8	450	8.32	CANADA
01-0920-32	83/12/ 6	22:25:35.878	49.76	-113.36	1.76	9.82	-10.09	245.990	60	0701	2	B/W	5.8	450	8.24	CANADA
01-0921-32	83/12/ 6	22:25:45.830	49.40	-112.54	2.00	9.78	-11.39	245.930	60	2402	2	B/W	5.8	450	8.16	CANADA
01-0922-32	83/12/ 6	22:25:55.811	49.02	-111.73	2.21	9.75	-12.68	245.870	60	3331	1	B/W	5.8	450	8.08	CANADA,USA
01-0923-32	83/12/ 6	22:26: 5.590	48.65	-110.96	2.43	9.70	-13.91	245.800	60	0071	1	B/W	5.8	450	8.00	CANADA,USA
01-0924-32	83/12/ 6	22:26:15.583	48.26	-110.17	2.64	9.67	-15.14	245.740	60	0040	1	B/W	5.8	450	7.92	CANADA,USA
01-0925-32	83/12/ 6	22:26:25.582	47.87	-109.40	2.82	9.62	-16.32	245.670	60	0520	1	B/W	5.8	450	7.83	CANADA,USA
01-0926-32	83/12/ 6	22:26:35.564	47.47	-108.64	3.02	9.58	-17.51	245.600	60	2501	4	B/W	5.8	450	7.75	USA
01-0927-32	83/12/ 6	22:26:45.549	47.07	-107.89	3.26	9.52	-18.71	245.530	60	4702	5	B/W	5.8	450	7.66	USA
01-0928-32	83/12/ 6	22:27:46.142	44.51	-103.61	4.15	8.82	-25.38	245.060	60	0000	1	B/W	5.8	450	7.12	USA
01-0929-32	83/12/ 6	22:27:57.824	44.01	-102.82	4.49	9.00	-26.58	244.970	60	0000	1	B/W	5.8	450	7.00	USA
01-0930-32	83/12/ 6	22:28: 7.769	43.57	-102.17	4.63	8.95	-27.56	244.890	60	0000	1	B/W	5.8	450	6.91	USA
01-0931-32	83/12/ 6	22:28:58.275	41.26	-99.01	5.30	8.58	-32.11	244.470	60	0000	1	B/W	5.8	450	6.42	USA
01-0932-32	83/12/ 6	22:29:13.556	40.55	-98.10	5.49	8.46	-33.37	244.330	60	0000	0	B/W	5.8	350	6.27	USA
01-0933-32	83/12/ 6	22:29:23.570	40.07	-97.51	5.61	8.38	-34.16	244.220	60	0000	0	B/W	5.8	325	6.17	USA
01-0934-32	83/12/ 6	22:29:33.581	39.60	-96.93	5.73	8.31	-34.93	244.100	60	0000	0	B/W	5.8	325	6.06	USA
01-0935-32	83/12/ 6	22:29:43.296	39.13	-96.38	5.84	8.24	-35.66	243.990	60	0000	4	B/W	5.8	325	5.96	USA
01-0936-32	83/12/ 6	22:29:53.291	38.65	-95.82	5.94	8.16	-36.40	243.880	60	0000	5	B/W	5.8	350	5.86	USA
01-0937-32	83/12/ 6	22:30: 3.288	38.16	-95.27	6.02	8.08	-37.12	243.780	60	0200	4	B/W	5.8	325	5.76	USA
01-0938-32	83/12/ 6	22:30:13.291	37.68	-94.73	6.09	8.01	-37.82	243.660	60	0000	4	B/W	5.8	350	5.65	USA
01-0939-32	83/12/ 6	22:30:23.297	37.18	-94.19	6.17	7.94	-38.52	243.590	60	0000	4	B/W	5.8	350	5.55	USA
01-0940-32	83/12/ 6	22:30:33.311	36.68	-93.66	6.26	7.86	-39.19	243.510	60	0000	4	B/W	5.8	350	5.44	USA
01-0941-32	83/12/ 6	22:30:43.305	36.19	-93.14	6.37	7.78	-39.85	243.430	60	0000	4	B/W	5.8	350	5.33	USA
01-0942-32	83/12/ 6	22:30:53.293	35.69	-92.63	6.48	7.66	-40.52	243.350	60	0000	4	B/W	5.8	350	5.22	USA
01-0943-32	83/12/ 6	22:31: 3.009	35.20	-92.14	6.60	7.56	-41.15	243.260	60	0000	4	B/W	5.8	325	5.12	USA
01-0944-32	83/12/ 6	22:31:13.026	34.69	-91.63	6.72	7.48	-41.80	243.190	60	0000	4	B/W	5.8	325	5.01	USA
01-0945-32	83/12/ 6	22:31:23.050	34.18	-91.14	6.83	7.38	-42.42	243.090	60	0000	4	B/W	5.8	350	4.90	USA
01-0946-32	83/12/ 6	22:31:33.072	33.63	-90.65	6.89	7.32	-43.00	243.000	60	0000	4	B/W	5.8	325	4.79	USA
01-0947-32	83/12/ 6	22:31:43.103	33.16	-90.16	6.96	7.26	-43.60	242.920	60	0000	4	B/W	5.8	325	4.67	USA
01-0948-32	83/12/ 6	22:31:52.037	32.70	-89.74	7.03	7.21	-44.11	242.840	60	0000	4	B/W	5.8	325	4.58	USA
01-0949-32	83/12/ 6	22:32: 2.072	32.19	-89.27	7.10	7.14	-44.66	242.760	60	0000	4	B/W	5.8	325	4.46	USA
01-0950-32	83/12/ 6	22:32:12.909	31.62	-88.77	7.18	7.10	-45.25	242.670	60	0000	7	B/W	5.8	350	4.34	USA
01-0951-32	83/12/ 6	22:32:22.934	31.10	-88.31	7.25	7.04	-45.77	242.580	60	1200	7	B/W	5.8	325	4.23	USA
01-0952-32	83/12/ 6	22:32:32.662	30.59	-87.87	7.30	6.97	-46.26	242.510	60	3700	7	B/W	5.8	350	4.12	USA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 33

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0953-33	83/12/ 7	8:33:16.624	38.19	-7.52	0.09	0.02	0.00	239.090	60	9597	3	B/W	5.8	325	7.83	PORTUGAL
01-0954-33	83/12/ 7	8:33:26.332	38.66	-6.99	0.07	0.01	0.02	239.240	60	9995	3	B/W	5.8	325	7.90	PORTUGAL, SPAIN
01-0955-33	83/12/ 7	8:33:36.286	39.15	-6.43	0.05	0.00	0.02	239.380	60	9889	3	B/W	5.8	325	7.98	SPAIN, PORTUGAL
01-0956-33	83/12/ 7	8:33:46.271	39.63	-5.87	0.05	-0.01	0.04	239.520	60	4699	3	B/W	5.3	325	8.05	SPAIN
01-0957-33	83/12/ 7	8:33:56.194	40.10	-5.29	0.02	-0.02	0.05	239.670	60	0656	1	B/W	5.8	325	8.13	SPAIN
01-0958-33	83/12/ 7	8:34: 6.103	40.57	-4.71	0.01	-0.02	0.06	239.810	60	0406	1	B/W	5.8	325	8.20	SPAIN
01-0959-33	83/12/ 7	8:34:16.005	41.03	-4.12	-0.02	-0.02	0.06	239.950	60	0004	1	B/W	5.8	325	8.27	SPAIN
01-0960-33	83/12/ 7	8:34:25.893	41.50	-3.53	-0.02	-0.03	0.08	240.100	60	0001	1	B/W	5.8	325	8.34	SPAIN
01-0961-33	83/12/ 7	8:34:36.097	41.97	-2.90	-0.04	-0.03	0.09	240.250	60	5000	1	B/W	5.8	325	8.41	SPAIN
01-0962-33	83/12/ 7	8:34:46.030	42.43	-2.28	-0.06	-0.02	0.07	240.390	60	7040	1	B/W	5.8	325	8.48	SPAIN
01-0963-33	83/12/ 7	8:34:55.953	42.88	-1.65	-0.08	-0.01	0.06	240.530	60	9170	1	B/W	5.8	325	8.55	SPAIN, FRANCE
01-0964-33	83/12/ 7	8:35: 5.060	43.23	-1.07	-0.09	0.01	0.05	240.670	60	8790	1	B/W	5.8	325	8.61	SPAIN, FRANCE
01-0965-33	83/12/ 7	8:35:15.791	43.76	-0.37	-0.07	0.03	0.03	240.810	60	1796	3	B/W	5.8	325	8.68	FRANCE, SPAIN
01-0966-33	83/12/ 7	8:35:25.679	44.20	0.00	-0.07	0.06	0.44	240.960	60	0258	3	B/W	5.8	325	8.60	FRANCE
01-0967-33	83/12/ 7	8:35:35.882	44.65	0.97	-0.05	0.06	0.02	241.110	60	2303	3	B/W	5.8	325	8.81	FRANCE
01-0968-33	83/12/ 7	8:35:45.757	45.07	1.64	-0.04	0.09	0.01	241.240	60	8423	3	B/W	5.8	325	8.87	FRANCE
01-0969-33	83/12/ 7	8:35:55.595	45.50	2.33	-0.01	0.08	0.01	241.380	60	9983	3	B/W	5.8	325	8.93	FRANCE
01-0970-33	83/12/ 7	8:36: 5.753	45.93	3.04	-0.01	0.07	-0.01	241.520	60	7998	9	B/W	5.8	325	8.99	FRANCE
01-0971-33	83/12/ 7	8:36:15.610	46.34	3.75	0.00	0.07	-0.02	241.660	60	7989	9	B/W	5.8	325	9.05	FRANCE
01-0972-33	83/12/ 7	8:37:15.125	48.72	8.26	0.08	0.05	-0.08	242.470	60	9998	7	B/W	5.8	325	9.37	FRANCE, GERMANY
01-0973-33	83/12/ 7	8:37:24.663	49.09	9.02	0.10	0.06	-0.09	242.590	60	9998	7	B/W	5.8	325	9.42	GERMANY
01-0974-33	83/12/ 7	8:37:34.813	49.46	9.84	0.09	0.06	-0.10	242.720	60	6999	7	B/W	5.8	325	9.47	GERMANY
01-0975-33	83/12/ 7	8:37:44.648	49.82	10.66	0.09	0.07	-0.11	242.850	60	9969	7	B/W	5.8	325	9.51	GERMANY
01-0976-33	83/12/ 7	8:37:54.772	50.19	11.51	0.08	0.08	-0.12	242.980	60	7789	7	B/W	5.8	325	9.56	GERMANY

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 34

MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-0983-34	83/12/ 7	12:58:16.131	30.31	-83.18	-0.94	0.92	0.50	236.960	60	0000	4	B/W	5.8	325	5.67	USA
01-0984-34	83/12/ 7	12:58:25.066	30.78	-82.78	-0.93	0.91	0.46	237.080	60	0000	4	B/W	5.8	325	5.76	USA
01-0985-34	83/12/ 7	12:58:35.096	31.30	-82.32	-0.92	0.93	0.43	237.210	60	0000	4	B/W	5.8	325	5.86	USA
01-0986-34	83/12/ 7	12:58:45.597	31.85	-81.84	-0.93	0.93	0.39	237.350	60	0000	4	B/W	5.8	325	5.96	USA
01-0987-34	83/12/ 7	12:58:55.594	32.37	-81.37	-0.93	0.94	0.34	237.480	60	0000	4	B/W	5.8	325	6.06	USA
01-0988-34	83/12/ 7	12:59: 5.558	32.88	-80.90	-0.93	0.96	0.31	237.610	60	0000	4	B/W	5.8	325	6.15	USA
01-0989-34	83/12/ 7	12:59:15.522	33.40	-80.42	-0.94	0.97	0.28	237.750	60	0000	4	B/W	5.8	325	6.25	USA
01-0990-34	83/12/ 7	12:59:25.488	33.90	-79.94	-0.95	1.00	0.22	237.890	60	0000	4	B/W	5.8	325	6.35	USA
01-0991-34	83/12/ 7	12:59:35.449	34.40	-79.45	-0.93	0.97	0.19	238.030	60	0000	4	B/W	5.8	325	6.44	USA
01-0992-34	83/12/ 7	12:59:45.404	34.92	-78.95	-0.90	0.89	0.14	238.170	60	0000	4	B/W	5.8	325	6.53	USA
01-0993-34	83/12/ 7	12:59:55.348	35.41	-78.45	-0.86	0.83	0.10	238.310	60	0000	4	B/W	5.8	325	6.63	USA
01-0994-34	83/12/ 7	13: 0: 5.297	35.91	-77.94	-0.83	0.74	0.06	238.450	60	0000	4	B/W	5.8	325	6.72	USA
01-0995-34	83/12/ 7	13: 0:15.223	36.41	-77.43	-0.81	0.69	0.00	238.600	60	0000	4	B/W	5.8	325	6.81	USA
01-0996-34	83/12/ 7	13: 0:25.159	36.90	-76.91	-0.77	0.62	-0.04	238.740	60	0000	4	B/W	5.8	325	6.90	USA
01-0997-34	83/12/ 7	13: 0:35.079	37.39	-76.38	-0.74	0.57	-0.08	238.880	60	0100	4	B/W	5.8	325	6.98	USA
01-0998-34	83/12/ 7	13: 0:44.985	37.88	-75.85	-0.69	0.49	-0.12	239.030	60	4510	4	B/W	5.8	325	7.07	USA
01-0999-34	83/12/ 7	13: 0:54.093	38.32	-75.35	-0.65	0.43	-0.16	239.160	60	1534	4	B/W	5.8	325	7.15	USA
01-1000-34	83/12/ 7	13: 1: 4.802	38.84	-74.75	-0.61	0.38	-0.20	239.320	60	4825	4	B/W	5.8	325	7.24	USA
01-1001-34	83/12/ 7	13: 1:14.701	39.32	-74.19	-0.58	0.32	-0.25	239.460	60	5938	4	B/W	5.8	325	7.32	USA
01-1002-34	83/12/ 7	13: 1:24.584	39.79	-73.63	-0.55	0.28	-0.29	239.610	60	1679	5	B/W	5.8	325	7.41	USA
01-1003-34	83/12/ 7	13: 1:34.757	40.29	-73.04	-0.51	0.22	-0.33	239.760	60	2815	5	B/W	5.8	325	7.49	USA
01-1004-34	83/12/ 7	13: 1:44.626	40.74	-72.45	-0.48	0.17	-0.38	239.900	60	5628	5	B/W	5.8	325	7.58	USA
01-1005-34	83/12/ 7	13: 1:54.488	41.20	-71.86	-0.45	0.12	-0.42	240.050	60	3477	5	B/W	5.8	325	7.66	USA
01-1006-34	83/12/ 7	13: 2: 4.353	41.66	-71.27	-0.40	0.08	-0.46	240.190	60	4244	4	B/W	5.8	325	7.73	USA
01-1007-34	83/12/ 7	13: 2:14.500	42.14	-70.64	-0.36	0.03	-0.49	240.340	60	3352	4	B/W	5.8	325	7.81	USA
01-1008-34	83/12/ 7	13: 2:24.329	42.58	-70.03	-0.33	0.00	-0.54	240.490	60	5633	5	B/W	5.8	325	7.89	USA
01-1009-34	83/12/ 7	13: 2:34.185	43.03	-69.40	-0.28	-0.05	-0.57	240.630	60	9646	X	B/W	5.8	325	7.96	USA
01-1010-34	83/12/ 7	13: 2:44.339	43.48	-68.75	-0.25	-0.08	-0.62	240.780	60	9786	X	B/W	5.8	325	8.04	USA
01-1011-34	83/12/ 7	13: 2:54.189	43.92	-68.10	-0.21	-0.13	-0.66	240.930	60	9997	X	B/W	5.8	325	8.11	USA
01-1012-34	83/12/ 7	13: 3: 4.038	44.36	-67.45	-0.18	-0.16	-0.70	241.070	60	9899	X	B/W	5.8	325	8.19	USA

METRIC-CAMERA / SPACELAB 1
OPERATION NO. 35

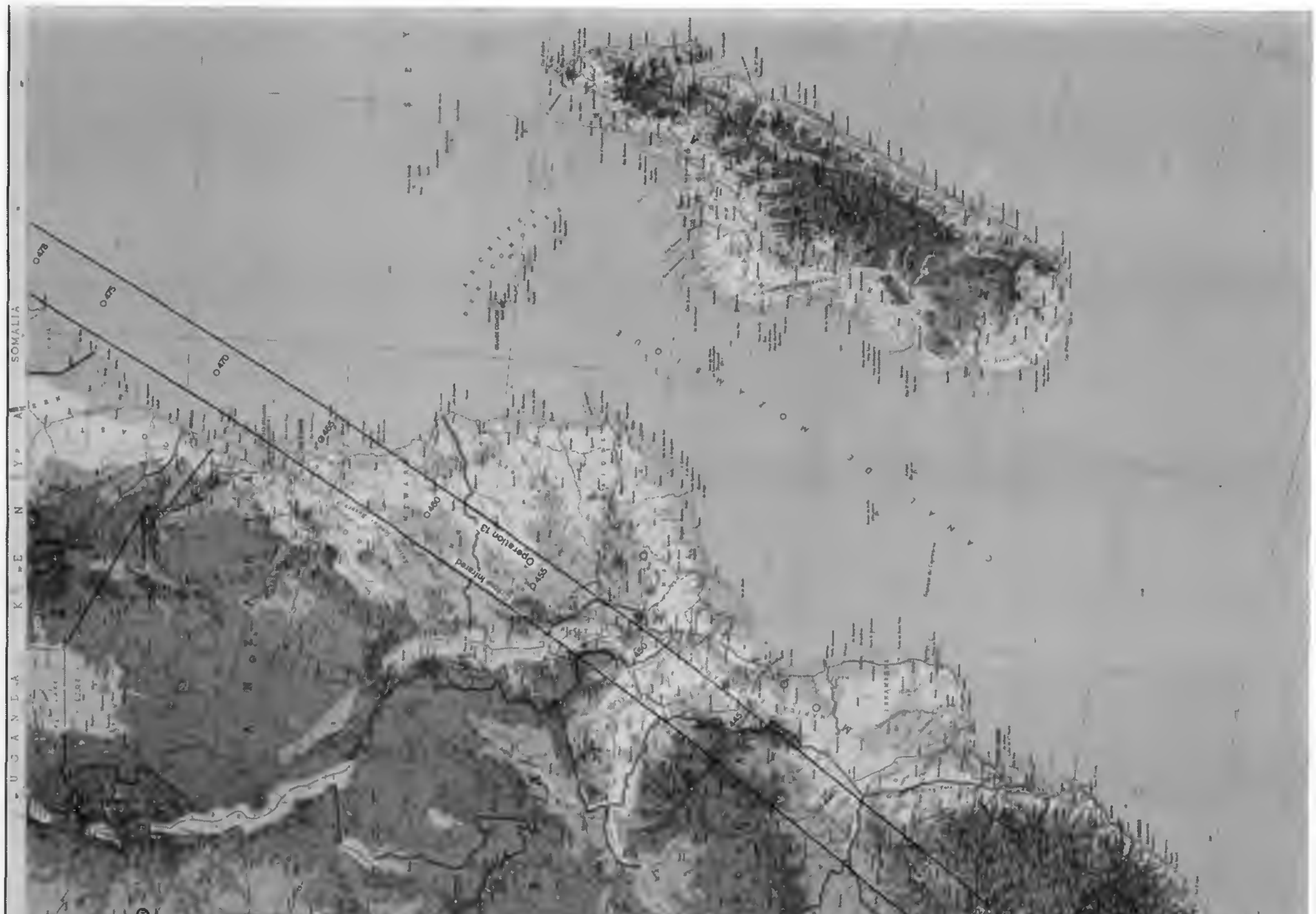
MISS-IM-OP NO.	DATE YY/MM/DD	TIME HH:MM:SEC	NADIR LAT.	NADIR LONG.	ATTITUDE ROLL	ATTITUDE PITCH	ATTITUDE YAW	ALTITUDE [KM]	OVR-LAP [%]	CLOUD COVER X/10	QUALITY	FILM	EXPOSURE F/STOP	EXPOSURE 1/T [SEC]	SUNEL [DEG]	COUNTRY
01-1013-35	83/12/ 7	14:25: 6.237	22.72	-111.73	-0.12	-0.23	-0.64	235.360	60	6269	X	B/W	5.8	325	3.88	MEXICO
01-1014-35	83/12/ 7	14:25:16.265	23.27	-111.33	-0.09	-0.30	-0.62	235.460	60	7261	X	B/W	5.8	325	3.99	MEXICO
01-1015-35	83/12/ 7	14:25:26.276	23.81	-110.94	-0.07	-0.36	-0.60	235.560	60	3571	5	B/W	5.8	325	4.10	MEXICO
01-1016-35	83/12/ 7	14:25:36.277	24.36	-110.55	-0.05	-0.41	-0.58	235.670	60	4545	5	B/W	5.8	325	4.21	MEXICO
01-1017-35	83/12/ 7	14:25:46.262	24.90	-110.14	-0.03	-0.46	-0.57	235.770	60	2036	4	B/W	5.8	325	4.32	MEXICO
01-1018-35	83/12/ 7	14:25:55.934	25.42	-109.75	0.00	-0.53	-0.55	235.870	60	0032	3	B/W	5.8	325	4.43	MEXICO
01-1019-35	83/12/ 7	14:26: 5.099	25.92	-109.37	0.01	-0.57	-0.53	235.980	60	0000	3	B/W	5.8	325	4.53	MEXICO
01-1020-35	83/12/ 7	14:26:15.075	26.45	-108.96	0.03	-0.62	-0.52	236.090	60	0000	3	B/W	5.8	325	4.64	MEXICO
01-1021-35	83/12/ 7	14:26:25.047	26.98	-108.55	0.05	-0.65	-0.50	236.210	60	0000	4	B/W	5.8	325	4.74	MEXICO
01-1022-35	83/12/ 7	14:26:35.703	27.56	-108.10	0.07	-0.69	-0.48	236.330	60	0000	4	B/W	5.8	325	4.85	MEXICO
01-1023-35	83/12/ 7	14:26:45.741	28.09	-107.67	0.08	-0.74	-0.46	236.450	60	0000	4	B/W	5.8	325	4.96	MEXICO
01-1024-35	83/12/ 7	14:26:55.670	28.62	-107.25	0.09	-0.77	-0.44	236.570	60	0000	1	B/W	5.8	325	5.06	MEXICO
01-1025-35	83/12/ 7	14:27: 5.595	29.15	-106.82	0.11	-0.82	-0.42	236.690	60	0000	1	B/W	5.8	325	5.16	MEXICO
01-1026-35	83/12/ 7	14:27:15.825	29.69	-106.37	0.12	-0.85	-0.40	236.820	60	0000	1	B/W	5.8	325	5.27	MEXICO
01-1027-35	83/12/ 7	14:27:25.754	30.21	-105.92	0.14	-0.88	-0.38	236.950	60	0000	1	B/W	5.8	325	5.38	MEXICO, USA
01-1028-35	83/12/ 7	14:27:35.667	30.72	-105.48	0.15	-0.91	-0.37	237.070	60	0000	1	B/W	5.8	325	5.48	MEXICO, USA
01-1029-35	83/12/ 7	14:27:45.548	31.24	-105.03	0.16	-0.94	-0.35	237.200	60	2600	5	B/W	5.8	325	5.58	MEXICO, USA
01-1030-35	83/12/ 7	14:27:55.383	31.75	-104.58	0.17	-0.96	-0.32	237.330	60	4416	5	B/W	5.8	325	5.68	USA
01-1031-35	83/12/ 7	14:28: 5.516	32.29	-104.10	0.20	-0.99	-0.31	237.470	60	9445	5	B/W	5.8	325	5.78	USA
01-1032-35	83/12/ 7	14:28:15.370	32.80	-103.64	0.22	-0.92	-0.29	237.600	60	9582	7	B/W	5.8	325	5.87	USA
01-1033-35	83/12/ 7	14:28:25.514	33.32	-103.15	0.22	-0.85	-0.27	237.740	60	7995	7	B/W	5.8	325	5.97	USA
01-1034-35	83/12/ 7	14:28:35.367	33.82	-102.68	0.24	-0.76	-0.25	237.870	60	4989	9	B/W	5.8	325	6.07	USA
01-1035-35	83/12/ 7	14:28:45.228	34.32	-102.19	0.24	-0.67	-0.25	238.010	60	8949	9	B/W	5.8	325	6.17	USA
01-1036-35	83/12/ 7	14:28:55.384	34.83	-101.69	0.23	-0.59	-0.24	238.150	60	3789	9	B/W	5.8	325	6.27	USA
01-1037-35	83/12/ 7	14:29: 5.236	35.33	-101.19	0.24	-0.50	-0.23	238.290	60	5039	6	B/W	5.8	325	6.36	USA
01-1038-35	83/12/ 7	14:29:15.079	35.83	-100.68	0.25	-0.43	-0.20	238.430	60	9230	4	B/W	5.8	325	6.45	USA
01-1039-35	83/12/ 7	14:29:25.193	36.33	-100.16	0.25	-0.33	-0.20	238.580	60	9892	4	B/W	5.8	325	6.55	USA
01-1040-35	83/12/ 7	14:29:35.021	36.82	-99.65	0.26	-0.25	-0.17	238.720	60	7998	9	B/W	5.8	325	6.64	USA
01-1041-35	83/12/ 7	14:29:45.138	37.32	-99.12	0.28	-0.15	-0.15	238.860	60	0989	4	B/W	5.8	325	6.73	USA
01-1042-35	83/12/ 7	14:29:54.957	37.81	-98.58	0.29	-0.06	-0.14	239.000	60	0619	4	B/W	5.8	325	6.82	USA
01-1043-35	83/12/ 7	14:30: 5.063	38.30	-98.03	0.24	0.00	-0.11	239.150	60	7407	4	B/W	5.8	325	6.91	USA
01-1044-35	83/12/ 7	14:30:14.871	38.77	-97.49	-0.42	-0.19	0.08	239.290	60	9755	7	B/W	5.8	325	7.00	USA
01-1045-35	83/12/ 7	14:30:25.002	39.26	-96.92	-1.71	-0.41	0.74	239.440	60	9996	7	B/W	5.8	325	7.09	USA
01-1046-35	83/12/ 7	14:30:34.829	39.73	-96.36	-3.55	-0.61	1.64	239.580	60	9999	X	B/W	5.8	325	7.17	USA
01-1047-35	83/12/ 7	14:30:44.942	40.22	-95.77	-5.50	-0.87	2.56	239.730	60	9999	X	B/W	5.8	325	7.26	USA
01-1048-35	83/12/ 7	14:30:54.765	40.68	-95.20	-7.36	-1.19	3.43	239.870	60	9999	X	B/W	5.8	325	7.34	USA
01-1049-35	83/12/ 7	14:31:35.311	42.56	-92.72	-15.08	-2.92	6.73	240.460	60	7887	7	B/W	5.8	325	7.67	USA
01-1051-35	83/12/ 7	14:31:49.552	43.20	-91.81	-17.60	-3.55	7.75	240.660	60	2078	4	B/W	5.8	325	7.79	USA
01-1052-35	83/12/ 7	14:32: 0.235	43.69	-91.10	-19.56	-4.08	8.50	240.820	60	0010	1	B/W	5.8	325	7.88	USA
01-1053-35	83/12/ 7	14:32:28.036	44.90	-89.26	-24.50	-5.65	10.27	241.220	60	0603	1	B/W	5.8	325	8.09	USA
01-1054-35	83/12/ 7	14:32:38.979	45.37	-88.50	-26.53	-5.91	10.75	241.380	60	1908	2	B/W	5.8	350	8.17	USA

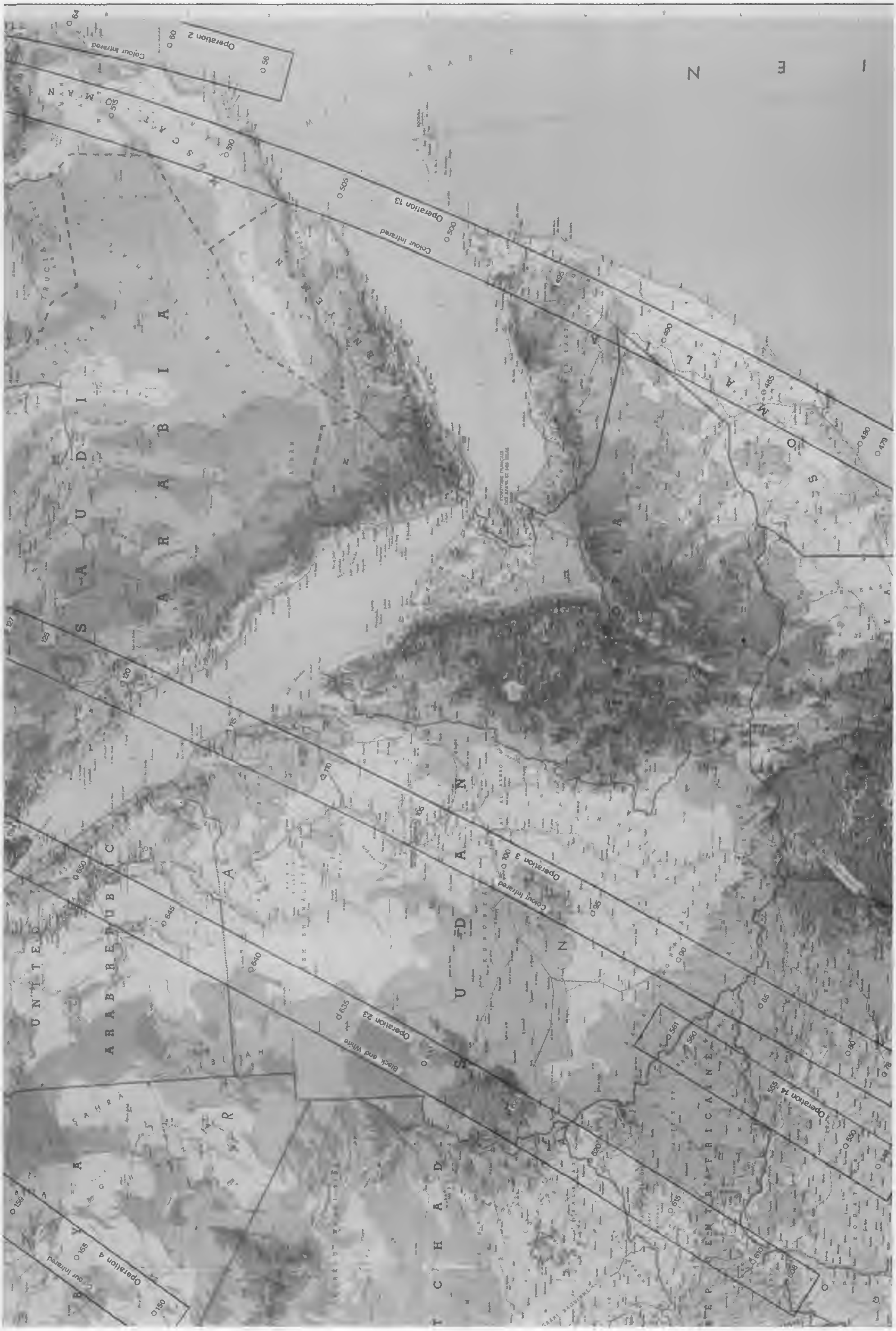
6.2 Geographical Reference

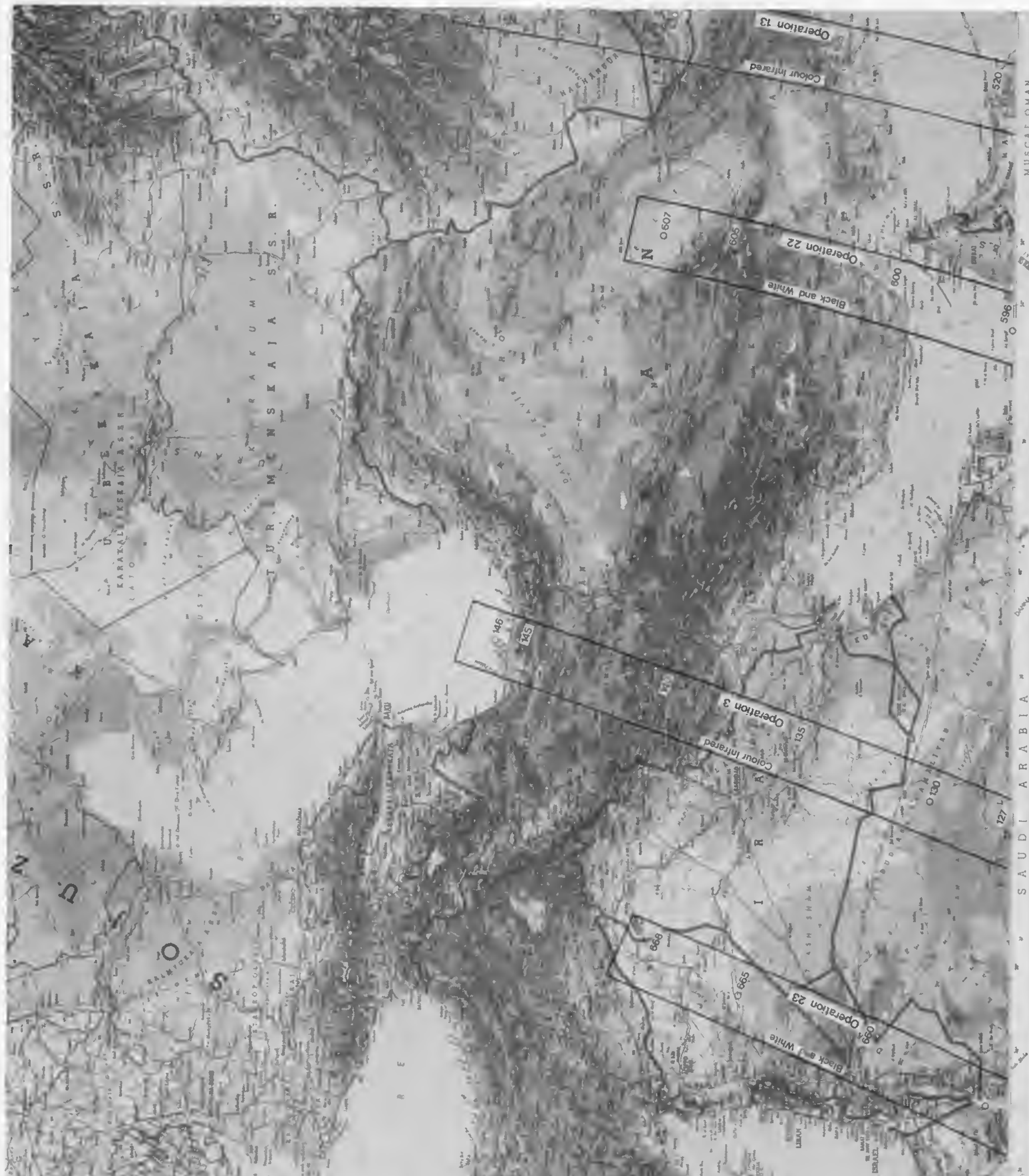
In the following 10 map sheets, the photographed ground strips are drawn as follows; each strip is characterized by the operation no. and the film type used for this operation (Colour Infrared or Black and White). The center of every fifth image frame is indicated inside each strip by a small circle and the corresponding image no; in the same manner, the first and the last image of each strip are also marked.

These maps can be used for easy identification of the geographical location belonging to a certain image no.

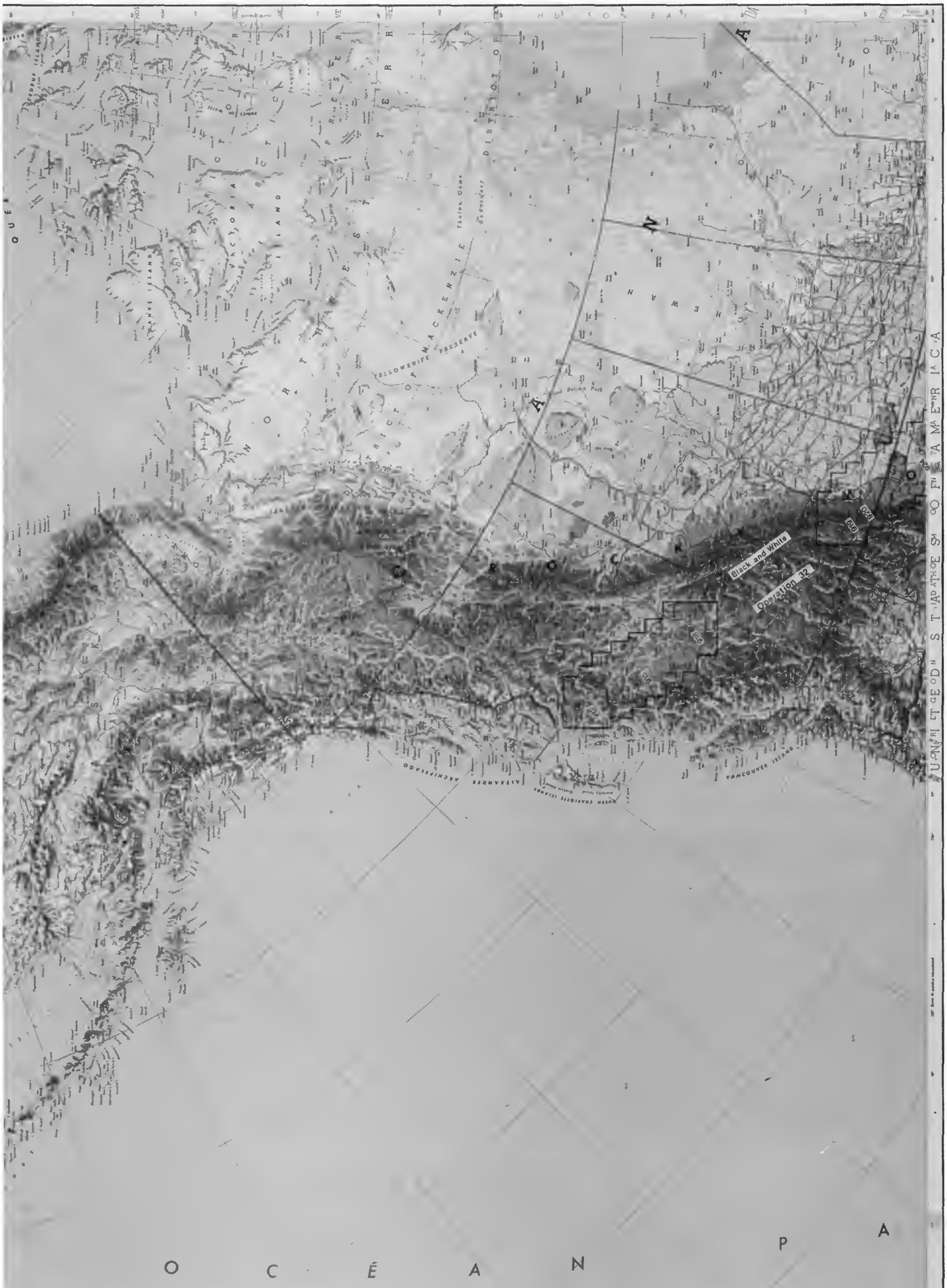
Remark: Image No. 74-76 of Operation No. 3 are not displayed.


SOMALIA
Operation 13


Operation 2
Colour Infrared
Operation 13
Colour Infrared
Operation 3
Colour Infrared
Operation 23
Black and White
Operation 14
Operation 4
Colour Infrared

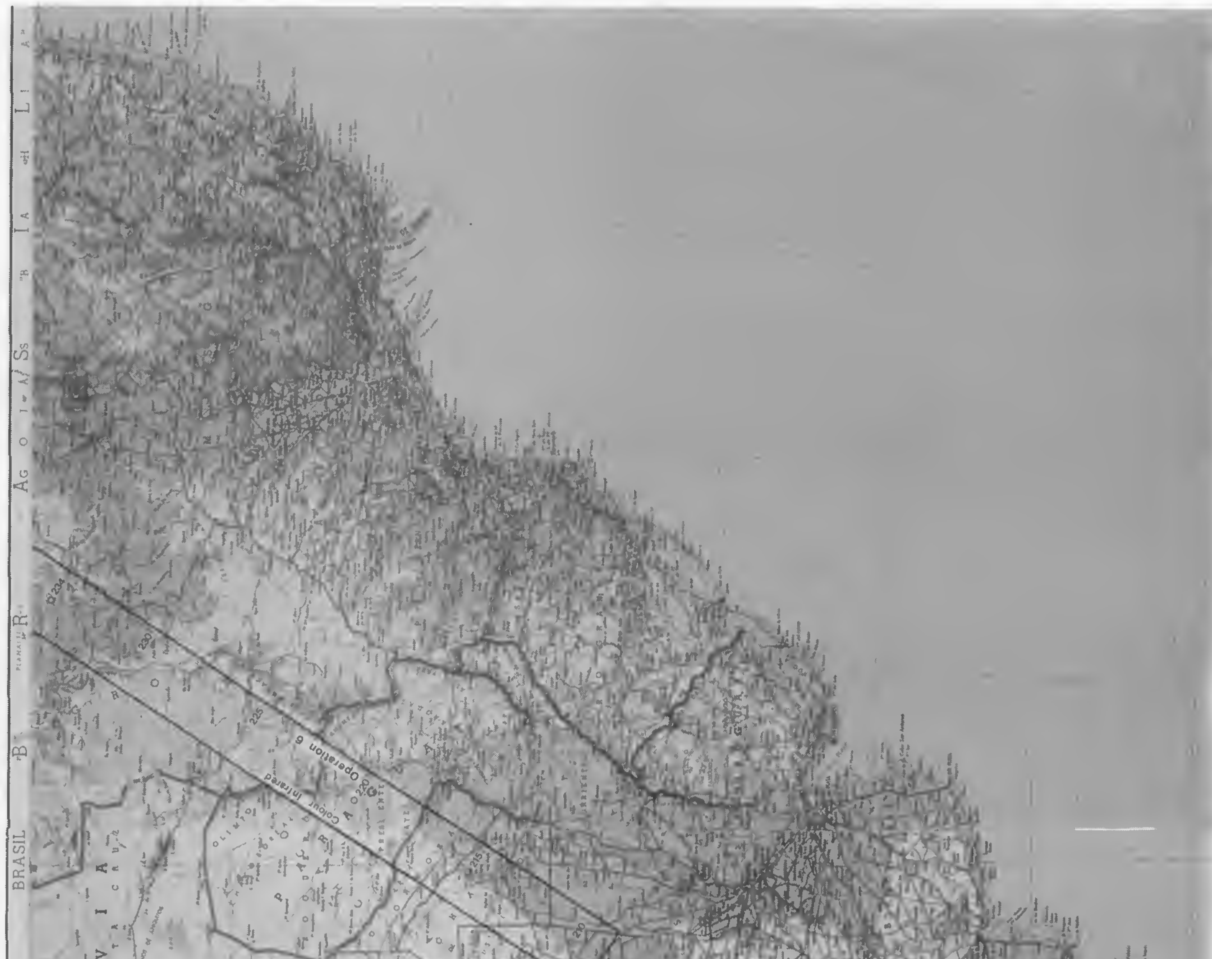

Operation 13
Colour Infrared
Operation 22
Black and White
Operation 3
Colour Infrared
Operation 23
Black and White
Operation 4
Colour Infrared
Operation 24
Black and White
SAUDI ARABIA
UNITED ARAB REPUBLIC
MUSCAT OMAN
LIBYA


Operation 1
Colour infrared
Operation 12
Operation 13
Colour infrared
Operation 2
Colour infrared


Black and White
Operation 32
O C É A N P A


Operation 34
Black and White
Operation 29
Operation 17
Colour infrared
Operation 32
Black and White
Operation 35


OCÉAN ATLAN
PETITES ANTILLES
Operation B
Colour Infrared
Operation B
Colour Infrared
BRASIL
COLOMBIA


BRASIL
Operation 6
Colour Infrared
Operation 8
Colour Infrared