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WITHDRAWAL SHEET

Ronald Reagan Library

Collection Name DOBRIANSKY, PAULA: FILES

Withdrawer

CAS 5/3/2012

File Folder ROMANIA - LANDSAT (2)

FOIA

M11-438

Box Number 5

DAVID

9

ID	Doc Type	Document Description	No of Pages	Doc Date	Restrictions
135641	MEMO	JACK MATLOCK TO DON FORTIER ET AL RE BALDRIDGE TO CLARK MEMO (SAME AS 135562)	1	7/15/1983	B1
135642	MEMO	SEC BALDRIDGE TO WILLIAM CLARK RE ROMANIA (SAME AS 135616)	3	7/12/1983	B1
135643	LETTER	SEC BALDRIDGE TO SEC WEINBERGER RE ROMANIA (SAME AS 135617)	2	7/12/1983	B1
135644	LETTER	SEC SHULTZ TO SEC BALDRIDGE RE ROMANIA (SAME AS 135618)	2	7/11/1983	B1
135645	PAPER	RE ROMANIA (SAME AS 135619)	3	ND	B1
135646	MEMO	TO SEC BALDRIDGE RE CASES (SAME AS 135620)	3	7/11/1983	B1
135647	LETTER	KENNETH PEDERSEN TO LIONEL OLMER RE ROMANIA (SAME AS 135589)	4	7/11/1983	B1
135648	MEMO	SAME AS 135646 AND 135620	3	7/11/1983	B1

Freedom of Information Act - [5 U.S.C. 552(b)]

B-1 National security classified information [(b)(1) of the FOIA]

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135649	MEMO	FRANKLIN VARGO TO UNDERSECRETARY OLMER RE CASE (SAME AS 135539)	1	7/9/1983	B1
135650	LETTER	KENNETH PEDERSEN TO LIONEL OLMER RE ROMANIA (SAME AS 135589)	4	7/11/1983	B1

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135641 MEMO

1 7/15/1983 B1

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NSC/S PROFILE

~~TOP SECRET~~

ID 8304800

RECEIVED 13 JUL 83 11

TO CLARK FROM BALDRIGE, M

DOCDATE 12 JUL 83

UNCLASSIFIED
OF CLASSIFIED ENCLOSURE(S)

(11 5/3/12

KEYWORDS: EXPORT CONTROLS ROMANIA

SUBJECT: EXPORT LICENSING CASES FOR ROMANIA

ACTION: PREPARE MEMO FOR CLARK DUE: 15 JUL 83 STATUS S FILES

FOR ACTION

FOR CONCURRENCE

FOR INFO

FORTIER

ROBINSON

DOBRIANSKY

MATLOCK

COMMENTS

REF#

LOG 8304622

NSCIFID NSDD0054 (C /)

ACTION OFFICER (S)	ASSIGNED	ACTION REQUIRED	DUE	COPIES TO

DISPATCH

W/ATTCH FILE

(C)

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135642 MEMO

3 7/12/1983 B1

SEC BALDRIDGE TO WILLIAM CLARK RE
ROMANIA (SAME AS 135616)

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135643 LETTER

2 7/12/1983 B1

SEC BALDRIDGE TO SEC WEINBERGER RE
ROMANIA (SAME AS 135617)

Freedom of Information Act - [5 U.S.C. 552(b)]

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135644 LETTER

2 7/11/1983 B1

SEC SHULTZ TO SEC BALDRIDGE RE ROMANIA
(SAME AS 135618)

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135645	PAPER RE ROMANIA (SAME AS 135619)	3	ND	B1

Freedom of Information Act - [5 U.S.C. 552(b)]

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135646 MEMO

3 7/11/1983 B1

TO SEC BALDRIDGE RE CASES (SAME AS 135620)

Freedom of Information Act - [5 U.S.C. 552(b)]

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135647 LETTER

4 7/11/1983 B1

KENNETH PEDERSEN TO LIONEL OLMER RE
ROMANIA (SAME AS 135589)

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U.S. DEPARTMENT OF COMMERCE

July 13, 1983

Ambassador Matlock

From

Frank Vargo *FV*

Materials on Daedalus: Licensing cases

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135648 MEMO

3 7/11/1983 B1

SAME AS 135646 AND 135620

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135649 MEMO

1 7/9/1983

B1

FRANKLIN VARGO TO UNDERSECRETARY
OLMER RE CASE (SAME AS 135539)

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135650 LETTER

4 7/11/1983 B1

KENNETH PEDERSEN TO LIONEL OLMER RE
ROMANIA (SAME AS 135589)

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33

UNITED NATIONS REGIONAL SEMINAR ON REMOTE SENSING APPLICATIONS
AND SATELLITE COMMUNICATIONS FOR EDUCATION AND DEVELOPMENT

USSR Remote Sensing Activities

COMISION NACIONAL DE INVESTIGACIONES ESPACIALES
BUENOS AIRES, ARGENTINA

7 - 14 APRIL 1961

Introduction

The remote sensing activities of the Soviet Union are based on two satellite systems.

1. Photographic cameras in the Salyut manned spacecraft.
2. Multispectral scanners in the METEOR meteorological satellites.

The SOYUS-SALYUT spacecraft use the multispectral camera MSP 6, a set of 6 photographic systems working simultaneously in 4 visible and 2 infrared spectral bands. The camera system uses 70 mm black and white film. Film resolution in the visible range is 160 lines/mm. At orbital heights of 300 km as in the case of the Salyut space station that means a ground resolution of 15 m.

Cassettes of exposed film are returned to earth by cosmonauts in their Soyus space vehicles. Several Soviet and international crews have so far undertaken programmes of gathering remote sensing imagery of the Soviet Union and the countries of the international cosmonauts.

For processing of imagery and colour additive viewing, the Multi-Spectral Projector MSP 4 has been developed. This equipment superimposes up to 4 black and white 70 mm transparencies of the same scene in order to create a colour composite using selective colours most suitable to the specific user needs.

Multispectral scanners are used in meteorological satellites of the Meteor-2 series. A four-channel scanner in the visible and near infrared spectral range covers a 1,800 km ground swath. Resolution at nadir is 600 m. A two channel broad band scanner of 2,000 km ground swath provides a resolution of 250 m at nadir. Due to the large ground swath the system offers a temporal resolution of 2-3 days.

The multispectral camera MCF-6 was part of the equipment of the SONYUS 22 space mission in September 1976 and is installed on board the Orbital Station Saljut 6. Since December 10, 1977 this camera has been in operation intermittently whenever the station was manned either by Soviet or international crews.

The MCF-6 M Multispectral Camera includes the following units:

- Camera body
- 6 magazines
- Suspension unit
- Control console with sighting unit
- Electronic package

Main components of the camera body are:

- six lenses
- shutters with their drive mechanisms
- diaphragm setting
- data exposure facilities
- image-motion compensation

The performance of a multiband camera is essentially a function of its lens parameters. For the MCF-6 M a high-performance lens has been developed - the 4/125 Pinatar - being an optimum solution for multiband photography.

In order to achieve high geometrical resolution each lens is adapted to the respective spectral band.

The six lenses incorporated in the camera are adjusted to have equal calibrated focal lengths. That way, all photographs of a multiband set have the same line magnifications.

A precision fiducial plate is adjusted with the optical axis of each lens to print nine fiducial marks onto each single exposure. The cross-lines guarantee a highly precise registration of the single-pictures in the MSP-4 Multispectral Projector.

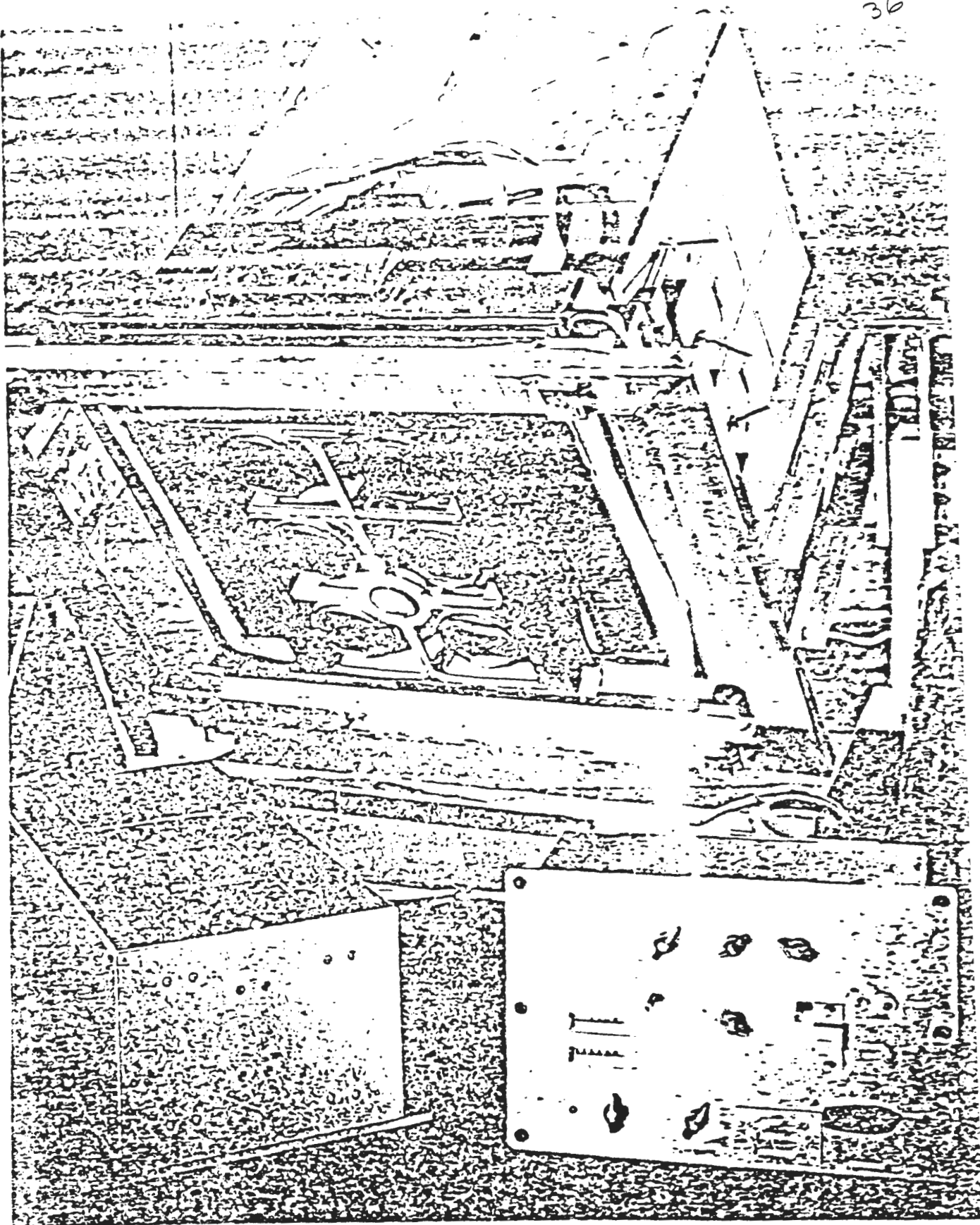
By combination of sharp-cut dielectric interference filters with colour glasses a special type of filters has been developed for the MCF-6 M which distinguish themselves by high transmission and steep slope. As additional optical element in the photographic light path the filters meet highest demands as to flatness and plane parallelism. Apart from the great number of bandpass filters to be supplied customers' requests can be considered after being checked for their materialization. The MCF-6 M is equipped with electrically driven rotating disc shutters.

Large exposure time range. Exposure time to be set in $\sqrt{2}$ -steps between 7 ns and 56 ns.

Fully electronic control of the set exposure time to $\pm 3\%$.

High synchronism by mechanical coupling of all shutters.

An 8-step diaphragm setting permits to adapt each channel to the type of film used and to compensate different filter factors of the bandpass filters.



To facilitate interpretation of the photographs additional data are exposed onto the film:

Highly precise cross-lines for precise registration of the photographs in the MTF-6 Multispectral Projector.

Channel numbers - located in the lower left corner of each picture. They are slightly displaced from channel to channel, so that they appear side by side in the colour mixing projector.

10-step gradation scale for photometric photointerpretation. Density grading: (4 s/step) 0.3

Exposure number (only in channel 1). Exposure counter to be reset electrically 4-digit display.

Clock with central seconds hand (only in channel 1)

Note plate (only in channel 1)

Exposure time (only in channel 2). It is exposed in 3 digits in binary code. For distinction, the three bits are provided with different symbols.

The excellent lens performance necessitated a facility that would compensate the aircraft's advance relative to the earth surface and thus prevent image blur. This compensation is materialized in the MTF-6 M by a swinging follow-up motion of the whole camera during exposure. The maximum permissible error of this compensation is 0.6 mrad/s.

The MTF-6 M is designed for unperforated 35 mm roll film. The magazine may be loaded with 120 m film of a thickness of 0.16 mm, which corresponds to about 1250 photographs. The capacity is, however, increased, if films with a thinner base are used.

The film supply indicator gives the length of unexposed film left in percent; it is, therefore, independent of the material used.

Film advance is controlled electronically. Film end or film break is indicated on the Control console. All six magazines are of identical design and are, therefore, interchangeable.

Control console and sighting unit incorporate all elements for controlling the MTF-6 M during the photo flight as well as for monitoring the correct operating cycle. This means that the operator is relieved in his work considerably. The necessary information is transmitted via electrical connection cables so that control console, sighting unit and camera can be installed at the place particularly suitable for their application. The sighting unit contains a telescope of high light-gathering power whose field of view covers a frame of the MTF-6 M.

The operating cycle of the MTF-6 M is so that after switching over to "sequential exposures" the first exposure is released immediately. By this, it is possible to start taking serial pictures above a certain point. The aim point is sighted means of a cross in the centre of the visual field. Of course, it is also possible to take single exposures during the regime "sequential exposures". The period of the regime "sequential exposures" is automatically computed from the set values of the overlap degree and the speed of image-motion compensation.

The vital functions of the MTF-6 M are monitored fully electronically. Film advance of all six magazines as well as shutter function and image-motion compensation are checked, and proper operation is indicated by pilot lamps. A failure signalled by permanent lighting of the "failure" lamp.

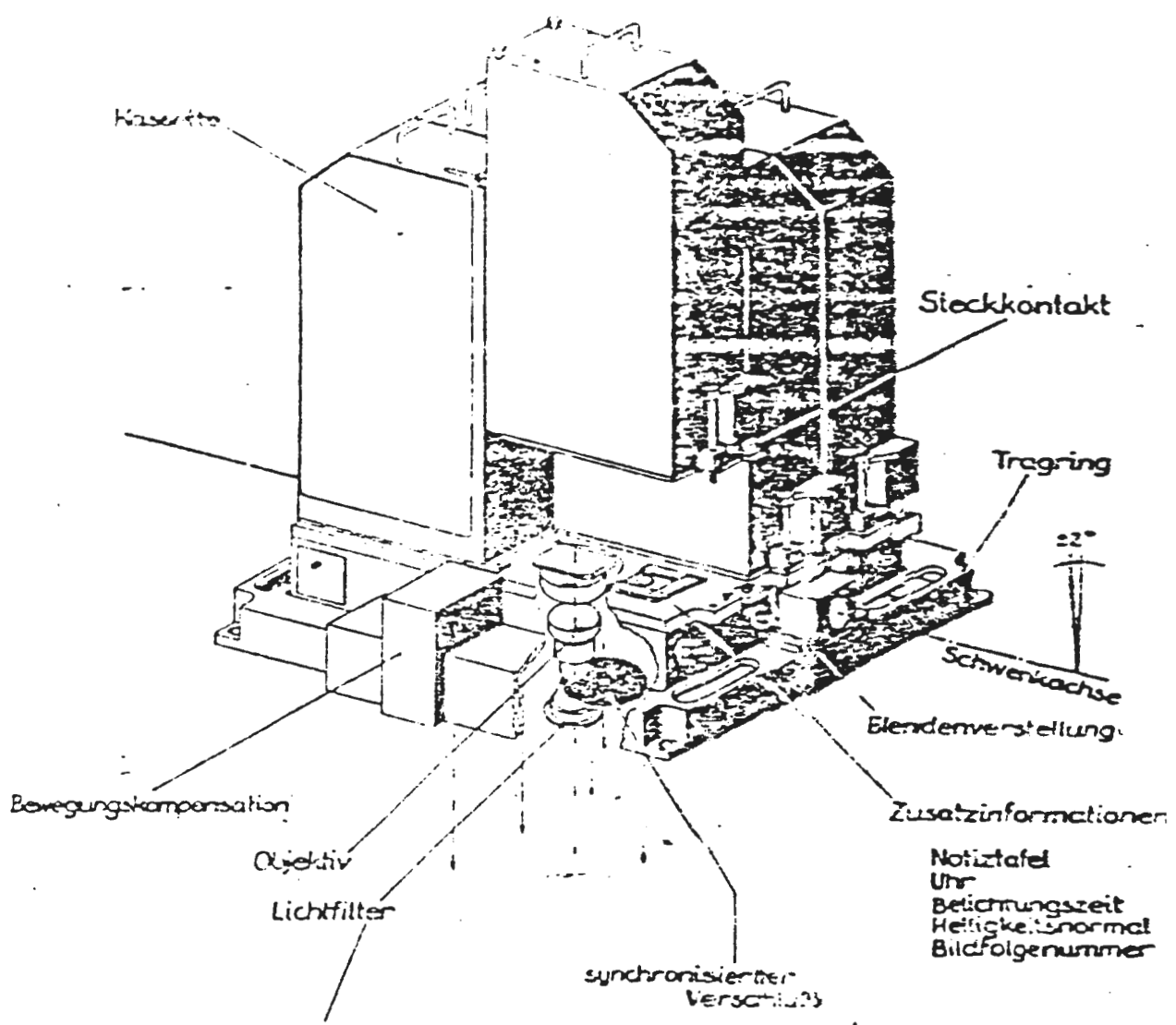
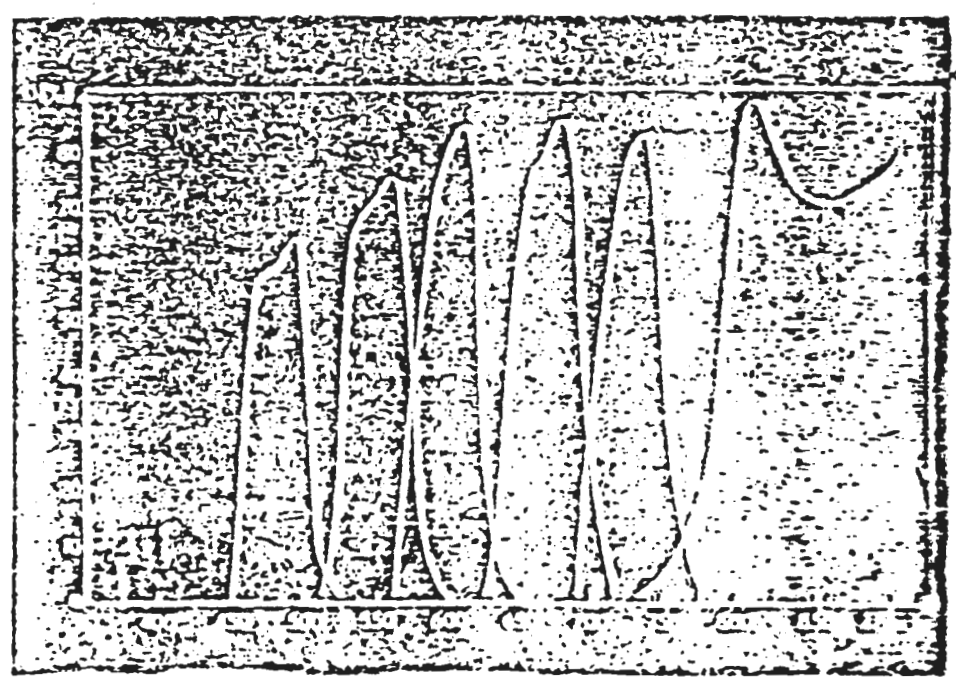


Fig. 1: Fine curves, % transmission, λ = wavelength



CARL ZEISS
JENA

Optical system

Number of lenses	6
Calibrated focal length (CFL)	$125 \pm 0.5 \text{ mm}$
CFL deviation between the six lenses of a camera	$\pm 0.005 \text{ mm}$
f-numbers	4 to 13.5
Unvignetted coverage	35°
Field angle	$25^\circ \times 36^\circ$
Frame size	$56 \times 80 \text{ mm}$
Film width	70 mm
Radial distortion (in the four visible region channels)	$\pm 0.003 \text{ mm}$
Resolution	(at f/4 in the four visible region channels on T-18 film) 160 line pairs/mm
Parallelism of optical axes of the six lenses	$\pm 10''$

Colour filters

Wavelength bands (nm)	Fil	type	Resolution power (lp/mm)
460 - 500	T-18		160
520 - 560	T-18		160
580 - 620	T-18		160
640 - 680	T-18		160
700 - 740		(IR b/v)	
790 - 890		(IR b/v)	

Transmittance about 70%

Shutters

Design	central rotary disc shutter with two counter rotating sector blades
Speeds	7 to 56 ms, in steps of $\sqrt{2}$
Tolerance	3%
Repeatability	1%
Speed variations between the six channels in one set of exposures	$< 1\%$
Synchronism error	$< 2 \text{ ns}$
Shutter efficiency	$> 75\%$

Simulation of spacecraft motion

Type	rocking mount
Speed range	16.5 to 39.5 mrad/s
Maximum error	0.8 mrad/s

Intervalometer

Repetition rate	1 - 20 s
Overlaps	80 - 20%
Tolerance	+ 3%

Exposure of densitometric grey scale

Shutter speed	700 ms
Number of grey levels	10
Density grading	$D_{i+1} = D_i + 0.3$
Colour filter	same type as for main exposure
Tolerances of radiometric calibration	< 15% absolute < 3% relative (between channels)

Exposure control

grid release

Film length accommodated

6 x 120 m	(0.18 thickness)
6 x 240 m	(0.09 thickness)

magazine

cassette

Power requirements

Voltage	23 to 34 V
Consumption	about 100 W

Dimensions (mm)

Camera	775 x 645 x 620
Electronic package	550 x 275 x 190
Control console	310 x 220 x 150

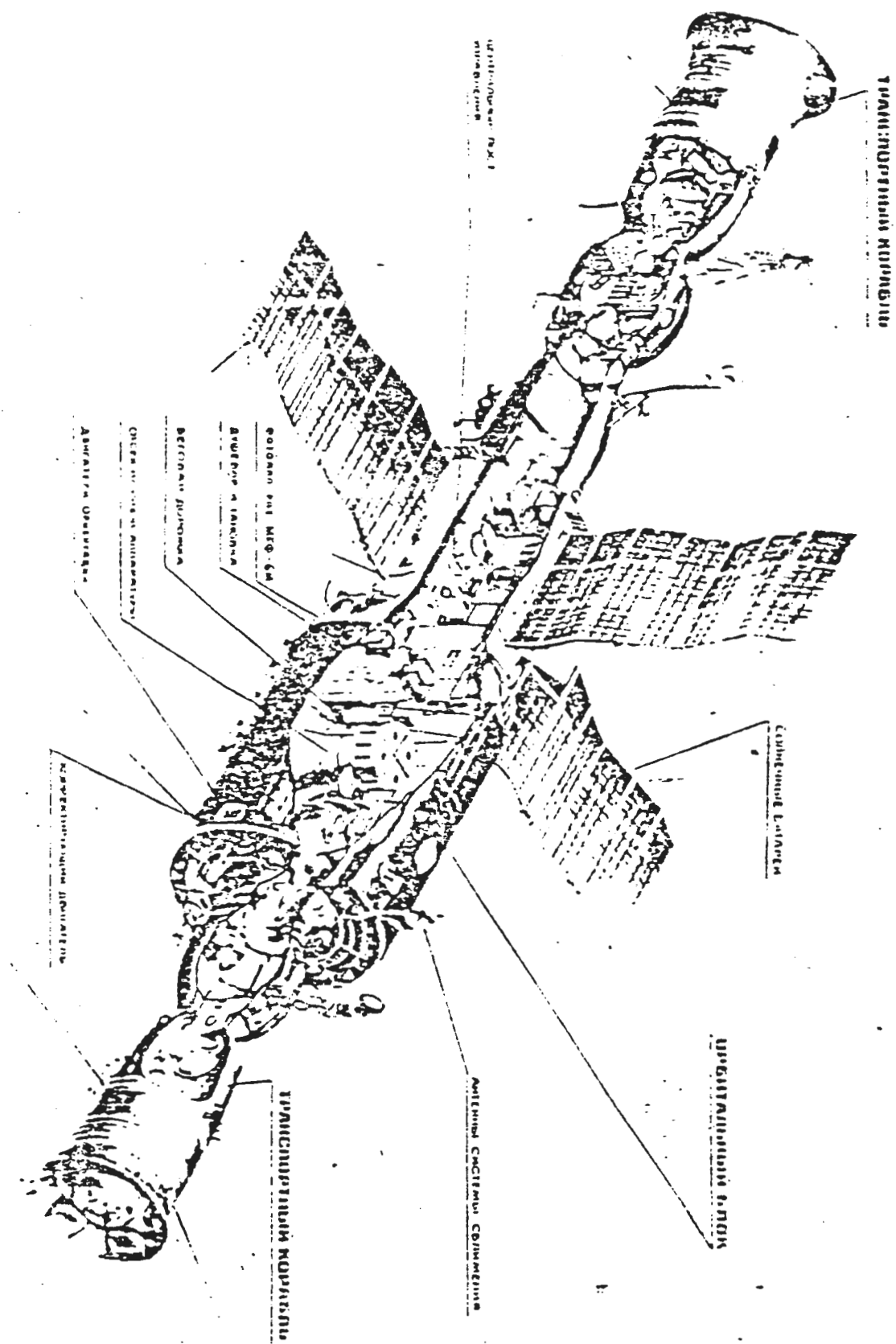
Weight of complete equipment

about 170 kg

Orbital data

Global coverage	Sojus 22	65° N - 65° S
	Saljut 6	52° N - 52° S
Orbital height	Sojus 22	265 km
	Saljut 6	315 km

Two SORMS space vehicles docked at the station



The MSP-4 Multispectral Projector is a four-channel colour synthesis instrument for the evaluation of multispectral or multitemporal aerocosmic black-and-white photographs for remote sensing of the earth; particular features are its high efficiency, universal applications, simple operation and expedient design. The projector transforms the relative density differences between such black-and-white photographs additively into colour differences. The multitude of multispectral or multitemporal image details is simultaneously presented to the interpreter in a colour composite image, which facilitates interpretation in that the pictorial information is more easily perceptible.

The synthesis of several pictures into one single image by the MSP-4 Multispectral Projector permits already an effective evaluation of aerocosmic remote-sensing photographs without using expensive digital image processing equipment.

It is the task of the MKF-6 to transform the relative spectral brightness difference of the objects into as great density differences as possible on the six black/white films. A direct evaluation of these photographs as to their density is ineffective without highly sophisticated automatic scanners and electronic data processing equipment.

The MSP-4 Multispectral Projector developed for this purpose is a relatively simple evaluation unit. It is the objective of this colour-mixing projector to retransform the relative density differences into as great colour differences as possible. To this end, up to four black and white photographs are added together to form a colour composite.

Optical arrangement of the MSP-4.

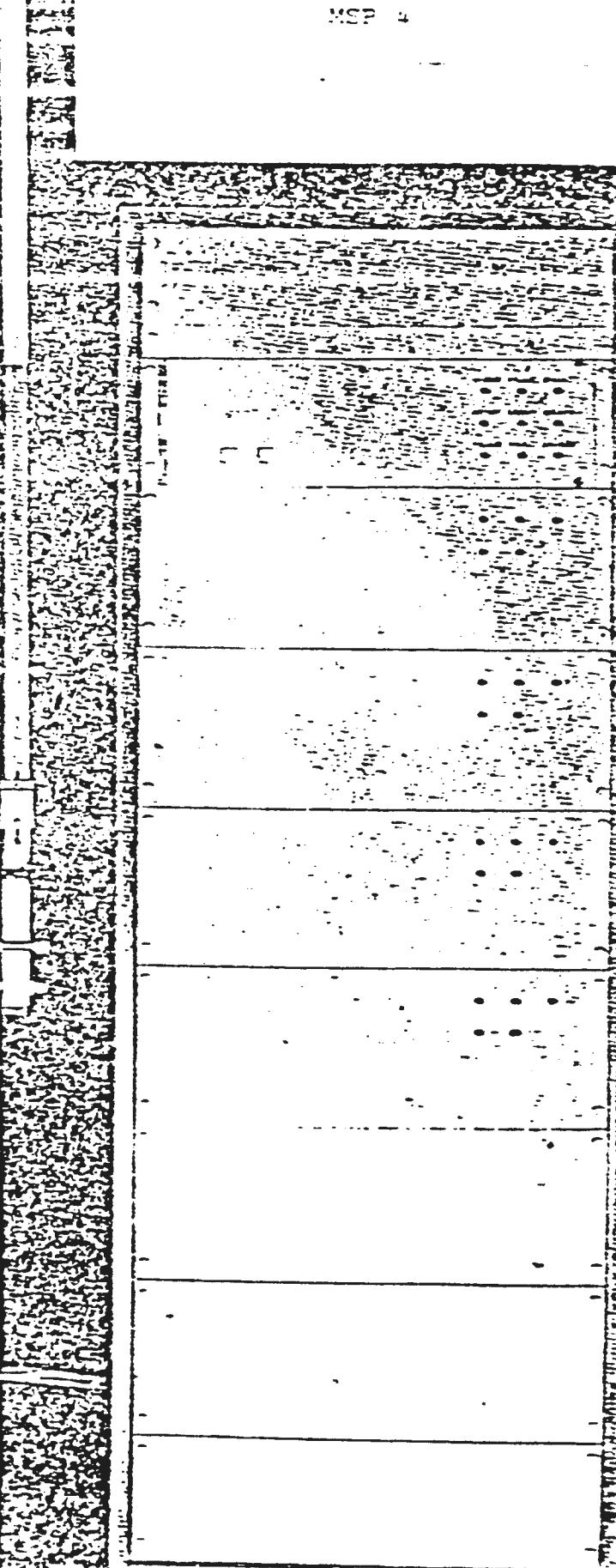
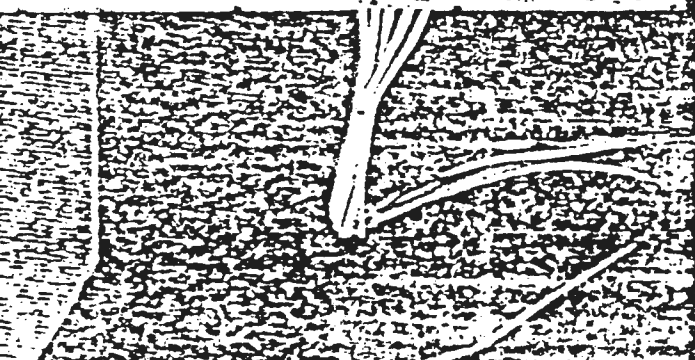
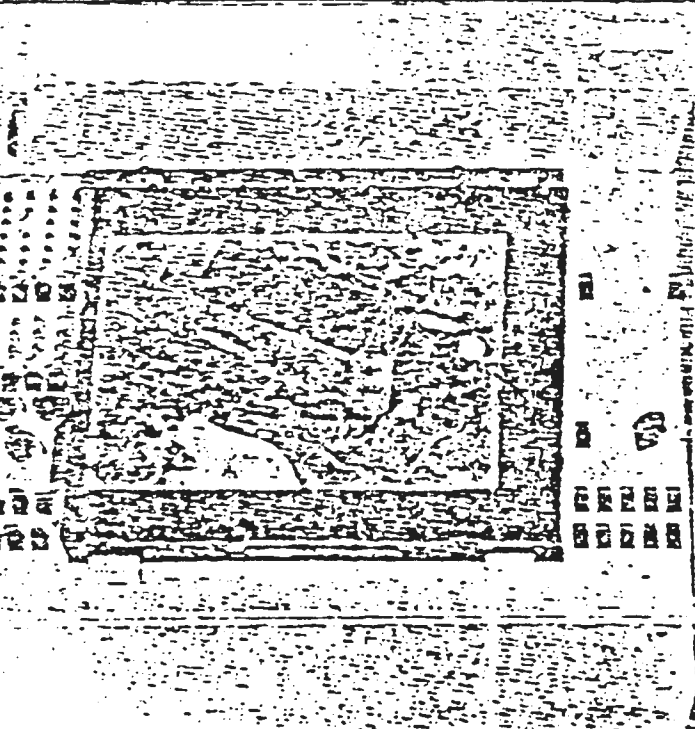
Up to four multispectral black-and-white photographs taken with the MKF-6 with a high geometrical resolving power and minor registration errors can be additively united to form a colour composite where small relative density differences in the photographic material are transformed into as large colour gradations of the colour composite as possible.

The MSP-4 Multispectral Projector has four independent optical projection channels (two shown in slide), so that the arbitrary combination of the individual images becomes possible. Each of these channels contains:

- a specially designed illumination equipment with concave mirror (1), 24 V 250 W halogen projection lamp (2) with fine adjustment of the projection light flux at the ratio 1:25, heat-absorbing filters (3) and condenser lenses (4),
- photo holder (5) for sheet film up to 70 mm x 91 mm format with good flattening properties,
- electromechanical channel shutter (6) for the optional channel blocking without changing the thermal equilibrium in the photo holder,
- electrically driven colour filter wheel (7) for the optional application of 6 high precise colour filters and 1 clear glass for black-and-white projection.

NAVY
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Multispectral 43
Inspector
MSP 4



- a mirror, colour filter wheel, shutter and unvignetted 5.6/175 projection lens (5) with optimal correction for 5X magnification;
- electrically driven neutral filter wheel (12) with 10 highly precise neutral filters and a clear glass for the coarse adjustment of the projection light flux at the ratio 1/10 without colour temperature change and disturbance of the thermal equilibrium in the photo holder;
- electrically driven adjusting units for focussing (on the lens) as well as for image adjustment by image rotation (on the photo holder), image displacement and scaling (on the lens).

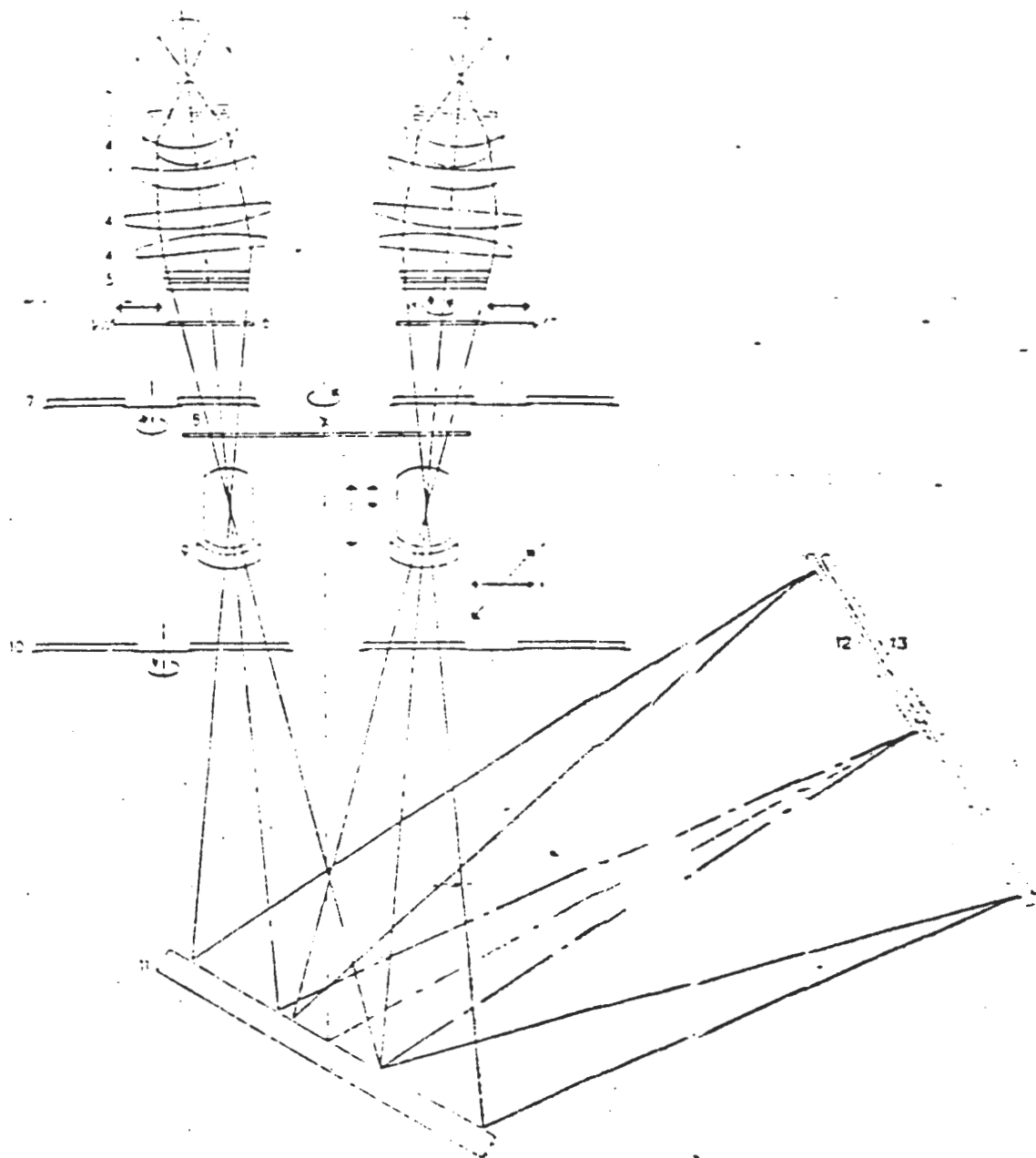
By decentring the four image planes are imaged at a 5 X magnification via mirror (11) onto one common rear-projection screen of the format 350 mm X 455 mm. Immediately in front of the projection screen a Fresnel field lens (13) can be attached. When taking photographs with the photo cassette, shutter (8) is used for exposure. The MSP-4 Multispectral Projector incorporates the following important geometric and photometric characteristics as well as operating and service features:

- Rapid and exact registration of the images of the MCF-6 camera according to precisely positioned cross marks.
- Excellent geometric resolving power and few registration errors thanks to the specially designed projection lens.
- Precise controls for all necessary image manipulations with large adjusting ranges.
- Variations of image scale without affecting the image sharpness of panoramic projection lenses.
- Conversion of slight density differences of the composite image by optimally selected glass interference colour filters and little straylight.
- High and constant brightness of the composite image by stabilized low-voltage high duty halogen lamps and optimally designed illumination optics.
- High uniformity of illumination in the projection plans by specially designed illumination optics with adjustable projection lamps and concave mirrors as well as unvignetted projection lenses.
- High uniformity of luminance of the projection screen due to the excellent scattering capability and optionally usable Fresnel field lens.
- Large range of brightness variation with low colour temperature change by addition neutral filters.
- Arbitrary combination of black-and-white photographs, colour filters and brightness with low losses of image sharpness, image registration and uniformity of illumination.
- Large-format, glare-free projection screen with high resolution.
- Large-format photo cassette for taking enlarged photographs with high resolving power and good photogrammetric quality by replacement of the projection screen.
- Recording camera on a swivelling arm for taking photographically reduced pictures.
- Point-by-point brightness measurement for exposure setting with manually attachable measuring head.
- Convenient operation and interpretation by a seated operator: simple change of photographs and safeguard against incorrect manipulations.
- Easy maintenance by convenient access to all important components and by special dust protection measures.

Principle of colour additive mixing.

Assuming, for example, that photographs of the MCF-6 were placed into two projection channels of the MSP-4 which are projected one upon the other with a green colour filter in the one channel and with a red filter in the other. The result is that those objects on the black/white photographs of the MCF-6 which have produced the same densities on both pictures are imaged in the colour mixed from green and red, i.e. yellow. Those objects which have a lower density e.g. in the green projection channel than in the red channel display a stronger green colour, i.e. they have a green yellowish shade. Here, the colours are produced according to the laws of additive colour mixture.

Fig. 3 Optical arrangement of the MSP-4 C



Optical system of the Multispectral Projector MSP 4

(Two of the four channels shown)

The wealth of multispectral picture information of the black-and-white photographs is thus clearly presented to the operator in the colour composite. This concentration of several photographs in one picture enhances the effectiveness of evaluation as only the interesting relative density differences are transformed into colour differences. With exclusive use of negatives or positives absolute differences do not produce colour gradations, but merely lead to brightness changes between the objects.

The MSP-4 Multispectral Projector ensures many reproduction possibilities of the colour composite contained in conventional photography. In addition to black-and-white reproduction where no colour filters are used, several colour reproductions will be possible. The black-and-white reproduction yields a composite image which depending on the selected colour separations is similar to an exposure made on panchromatic or infrared black-and-white film.

If the colour separations of the MSP-6 from the blue, green and red spectral regions mixed in the MSP-4 using the corresponding filters blue, green and red, the coloured picture of the terrain appears to be approximately true-to-nature. A true reproduction in natural colours is neither necessary nor possible.

With the respective correlation - as in the case of false-colour film - a conventional false-colour picture is obtained. Of by far greater importance for the evaluation of the colour mixing projector however, are those false-colour presentations where the fixed correlation between photographed colour and projected colour is missing. By a suitable choice of brightness and colour filter in the projection channels the mixed colour can be located in those ranges in which the human eye disposes of its maximum colour discrimination capability.

In addition to the evaluation of multispectral photographs, the MSP-4 Projector can be used for the interpretation of temporally variable processes of the Earth's surface. Such changes may be both of a local and spectral nature.

To this end, photographs of the terrain to be observed are taken at the beginning and at the end of the investigation period. The projector will then clearly display variations on the surface of the Earth in the form of colour changes. Further to its application in the exploration and observation of the Earth, the multispectral projector can be employed to advantage in all those areas where the visual evaluation of multispectral, multi temporal, etc. black-and-white photographs is absolutely necessary.

Services and Data Availability

The camera MSP 6 is also part of the equipment on several airplanes used for aerial photography and co-ordinated projects involving space and aerial photography as well as ground observations which have been carried out in several countries.

Projects of data acquisition and dissemination of imagery are mainly carried out on the basis of bilateral agreement with the Soviet Union. The principal agency to be contacted for this purpose is the:

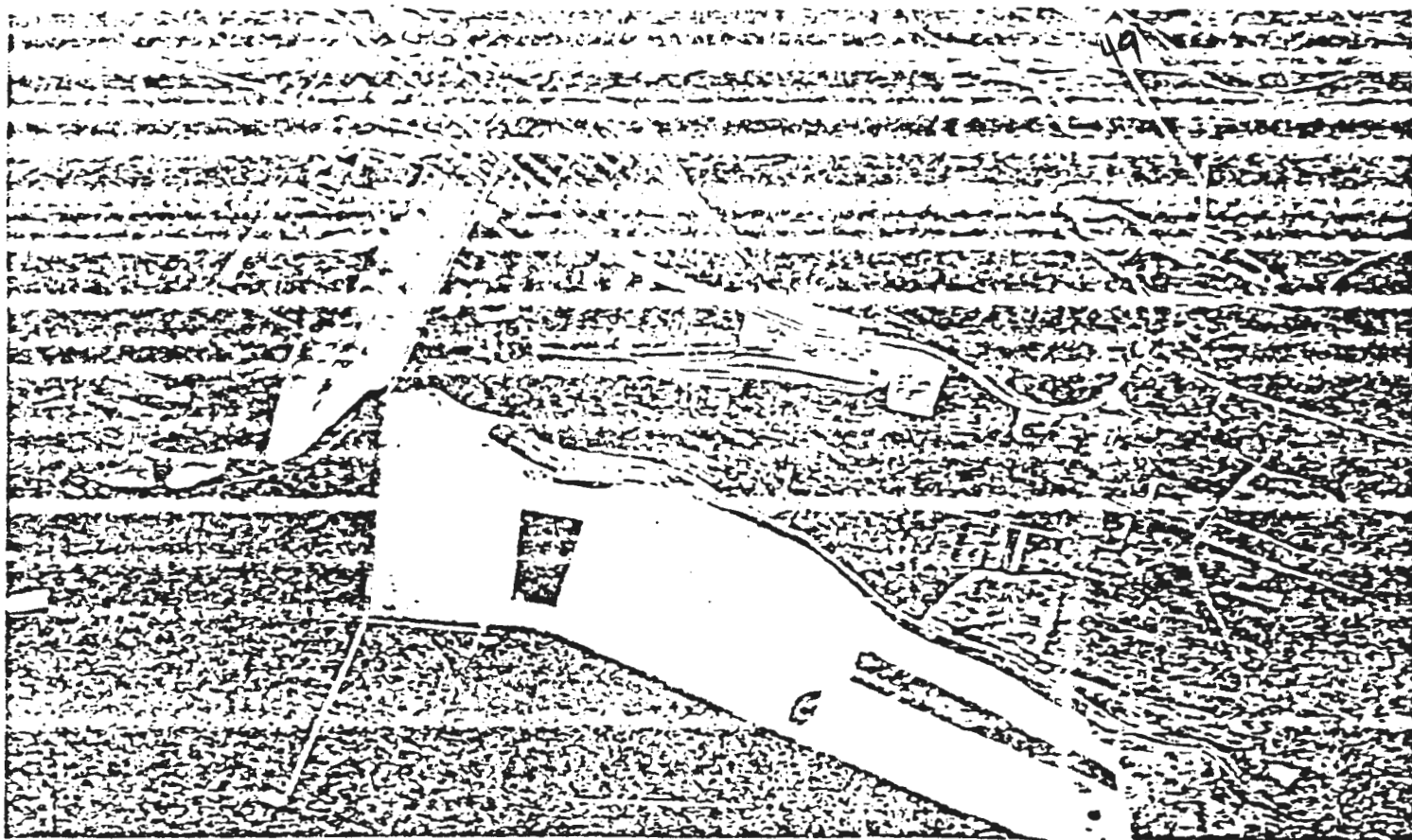
State Committee for Science and Technology
of the USSR Council of Ministers
11 Gorky Street
Moscow, USSR



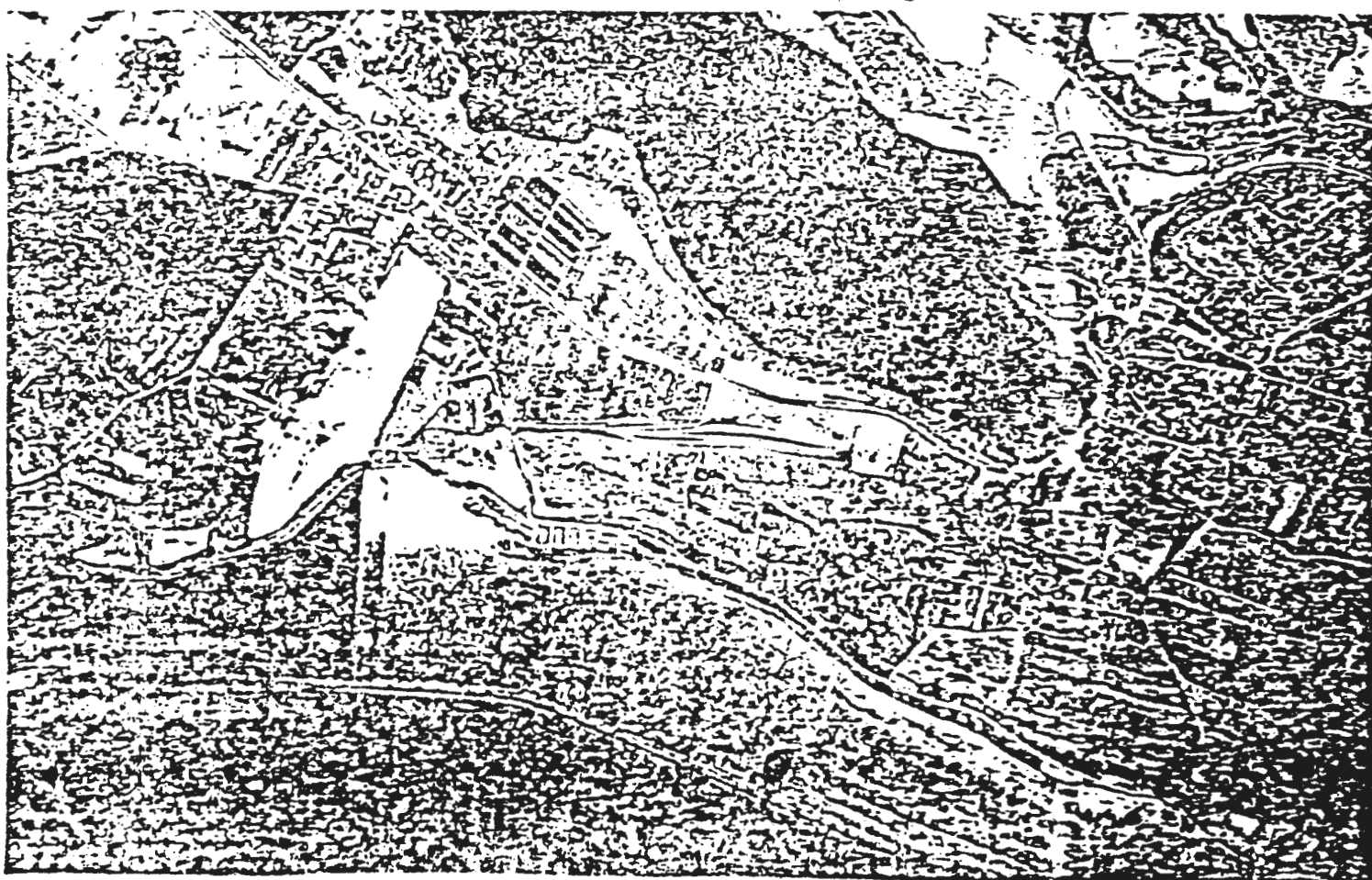
Colour composite of Pamir-Alai Mountains (USSR). Scale 1:400,000. Image covering an area of 120 km * 170 km. Composite of channel 2 in blue, channel 3 in green, channel 6 in red. This composite resembles recordings by conventional false colour film, with vegetation appearing reddish, while rock and sand are pictured in various blue and green hues. Primary purpose of taking photographs of this region was to explore and monitor glaciers. Before, about 30 glaciers had been known in this region; 60 more were located by satellite images. Centre of image - Fedchenko g



Colour composite of Viljui river area (USSR) using channels 1, 4 and 6



MIF-6 aerial photographs
Flight height 6,500 m, scale 1:50,000



DAEDALUS SYSTEM OWNERS (1982)

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COUNTRY	OWNER	AADS1220	AADS1230	AADS1250	AADS1260	AADS1268	AADS1280	AADS1285
Argentina	Argentine Air Force				2			
Belgium	Belfotop/Walphot				1			
Canada	Canada Centre for Remote Sensing		2		1			
Canada	Intera Environmental Consultants, Ltd.		1					
Canada	Intertech Remote Sensing, Ltd.		1					
Canada	Ontario Centre for Remote Sensing		1					
China (PRC)	China National Geological Survey		3		1			
England	Clyde Surveys, Ltd.		1					
France	Centre National d'Etudes Spatiales (CNES)			1				
France	Institute Geographique National (IGN)		1					
Germany	Spacotec Datengewinnung GmbH			1				
Indonesia	Indonesia Space Agency (LAPAN)		1					
Italy	Impresa Luigi Rossi		1					
Japan	Asia Air Survey Company, Ltd.			2				
Japan	Japan Weather Association			1				
Mexico	Direccion General de Geografia del Territorio Nacional						1	
Netherlands	Rikswaterstat	1						
Portugal	Committee for Scientific Research	1						
Sweden	National Land Survey of Sweden		1					
Sweden	Swedish Space Corporation	1	1					
Taiwan	Taiwan Forest Bureau & Mining Research Service Organization of Taiwan				1			
Thailand	Royal Thai Air Force	5		1				
USA	EG&G, Inc.				1			
USA	Environmental Protection Agency				1			
USA	Louisiana State University				1			
USA	NASA Ames Research Center					1		
USA	NASA Kennedy Space Center			1				
USA	NASA National Space Technology Laboratory							1
USA	South Dakota State University		1					
USA	Tennessee Valley Authority		1					
USA	United States Geological Survey		1					
Yugoslavia	Industroprojekt		1					