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ATTACHMENT 1

EOI SYSTEM FUNCTIONAL REQUIREMENTS

1.0 INTRODUCTION

The purpose of this document is to provide a definition of the capabilities for an Electro-Optical Imaging System required to satisfy the needs of the intelligence community. It is specifically intended that the contents of this document be used as the required system capabilities on which preliminary system and subsystem designs are developed in the course of studies conducted during Phase I System Definition.

2.0 INTELLIGENCE OBJECTIVES

The primary objective of the EOI System is the collection of imagery in support of intelligence community needs. This imagery is in support of strategic and technical intelligence tasks classified according to the following objectives:

2.1 Target Class Surveillance

The periodic sampling of known targets with similar intelligence characteristics to accumulate knowledge and

detect change in these characteristics. These objectives are long-term and characterized by both a frequency of desired coverage and level of accomplishment for each of numerous target classes containing targets distributed over large geographic areas.

2.2 Facility-Oriented Activity Monitoring

The repetitive coverage of specific facilities to monitor levels of activity. These objectives are task specified, and are characterized by a requirement for continuous and repetitive coverage of multiple targets within a small geographic area containing dense target concentrations.

2.3 Event-Oriented Directed Coverage

The on-demand repetitive coverage of specified targets related to an emerging or on-going event. This requirement category highlights the importance of minimizing the time between generation of a specific target requirement and the acquisition of a cloud free image of acceptable quality.

2.4 Technical Intelligence Coverage

The periodic coverage of specified targets in stereo. This requirement category is characterized by the highest quality imagery for use in mensuration and the extraction

of detailed technical intelligence information.

3.0 SYSTEM FUNCTIONAL REQUIREMENTS

The functional requirements specified in this section shall apply to the overall capability required for the EOI System. These requirements are specified for two system development options. The Configuration A system option provides the capability to achieve both the strategic and the technical intelligence objectives. The Configuration B system option involves the initial capability to achieve only the strategic intelligence objectives.

3.1 General Requirements

3.1.1 Continuous Operation

The EOI System must provide a high probability for obtaining imagery from at least one imaging satellite on an uninterrupted basis once the system has been fully deployed. The system should be designed such that non-catastrophic failures result in only a degradation of quantity, quality, coverage or timeliness of the imagery delivered to the intelligence community in Washington, D. C.

3.1.2 Ground Facilities

The capability is required to process the image data, reconstruct the image data into an interpretable image and perform an initial photo interpretation in a facility located with the [redacted] The capability to provide total system operational control must be contained in a facility that is collocated with the Processing Facility

3.1.3 System Response

The EOI System must be capable of producing a photographic transparency suitable for interpretation within [redacted] of scene acquisition for 20 frames of imagery obtained during a single imaging satellite revolution, or acquired by [redacted] imaging satellite within the equivalent orbital period. All other imagery obtained, including all stereo frames for technical intelligence tasks, shall be available for initial photo interpretation within 24 hours of scene acquisition. Reconstruction of technical intelligence imagery shall not interfere with the availability of

imagery for strategic intelligence purposes.

The majority of the EOI System target coverage requirements can be handled in a routine manner and be available for satellite tasking several hours before target scene acquisition. However, the system must possess the capability to generate and transmit commands to the [redacted] imaging satellite prior to each of its orbital passes and allow the receipt of a requirement for coverage of a specific target up to 30 minutes prior to geometric access to the target.

3.2 Configuration A System Option Requirements

The functional requirements for the EOI System for the Configuration A Option are in support of two distinct intelligence objectives. These objectives are the repetitive coverage and near real-time return of imagery of selected targets for strategic intelligence tasks, and the collection of high quality stereo imagery of specified targets in support of technical intelligence tasks. Requirements for these two objectives are mutually exclusive. Technical intelligence imagery must be obtained in a manner so as to not interfere with strategic intelligence imagery collection to the extent

possible. It is specifically intended that a frame of imagery shall satisfy only one requirement.

3.2.1 Technical Intelligence Imagery

Coverage

The system shall provide at least 10 geometric accesses to all points on the earth's surface at latitudes less than 80 degrees in a 6-month period. Successive geometric accesses shall occur at intervals of not less than 48 hours. The angle between the line of sight from the vehicle to the target and the vehicle nadir line shall not exceed 50 degrees.

Image Quantity

The system shall be capable of acquiring 1500 pairs of stereo frames every 6 months. Each stereo pair shall cover a ground area of at least 1 x 1 nautical miles centered on a defined point. The included stereo convergence angle shall be at least 10 degrees and not more than 30 degrees. Symmetry is not required.

The system must provide the capability to obtain at least 100 pairs of stereo frames from a 50 n. mi. diameter area of dense target concentration every six months.

Image Quality

The system shall provide the capability for producing imagery with a ground sample distance (GSD) at nadir of [redacted] Initial reconstruction of this imagery shall not require additional processing beyond that required for strategic intelligence imagery.

3.2.2 Strategic Intelligence Imagery

Coverage

Daily geometric access must be provided to the Sino-Soviet area defined by the countries of the [redacted]

[redacted]

[redacted] The capability must be provided to [redacted] all image data received from this area. Geometric access to all other points on the earth's surface at latitudes less than 80 degrees must be provided at least every third day. Such geometric accesses shall require the angle between the line of sight from the vehicle to the target and the vehicle nadir line to be no more than 50 degrees.

Image Quantity

The EOI System must provide the capability to produce [redacted] of imagery per day. Each frame of imagery shall contain a ground area of at least 2 by 2 n. mi. centered on a defined point.

The system must be capable of obtaining [redacted] of imagery per day within a 50 n. mi. diameter area of dense target concentration at latitudes between 20 and 80 degrees. Pointing agility must also provide for the capability to image contiguous ground areas considerably larger than a single frame.

A single imaging satellite must possess the capability to obtain [redacted] of imagery per orbital revolution.

It is typical for the distribution of targets to exhibit moderately dense concentrations over extensive areas. The capability of the system must therefore allow for obtaining frames of imagery from one region without excessively sacrificing coverage of adjacent areas.

Figure 1 shows the distribution for a portion of the required aiming points for a typical day. The system shall provide the capability to obtain a frame of imagery centered on each of these on a day when one ground track passes over a position of 55°N, 36°E. The ability to obtain additional frames of imagery in the area denoted with an asterisk is desirable. The distance between aiming points within each block shown in Figure 1 shall be assumed to be $\frac{140}{\sqrt{N}}$ nautical miles where N is the number of aiming points in the block.

Image Quality

The system shall provide the capability for producing imagery with a ground sample dimension (GSD) at nadir of 12 inches.

3.3 Configuration B System Option Requirements

The requirements for the Configuration B System Option shall be as specified in Section 3.2.2, Strategic Intelligence Imagery, with the exception that the ground sample distance (GSD) shall be 18 inches. This shall apply to the initial full deployment capability of the Configuration B System.

It is intended that Configuration B provide the capability to achieve the Configuration A requirements by a secondary development subsequent to initial deployment.

TYPICAL FRAME POSITION DISTRIBUTION

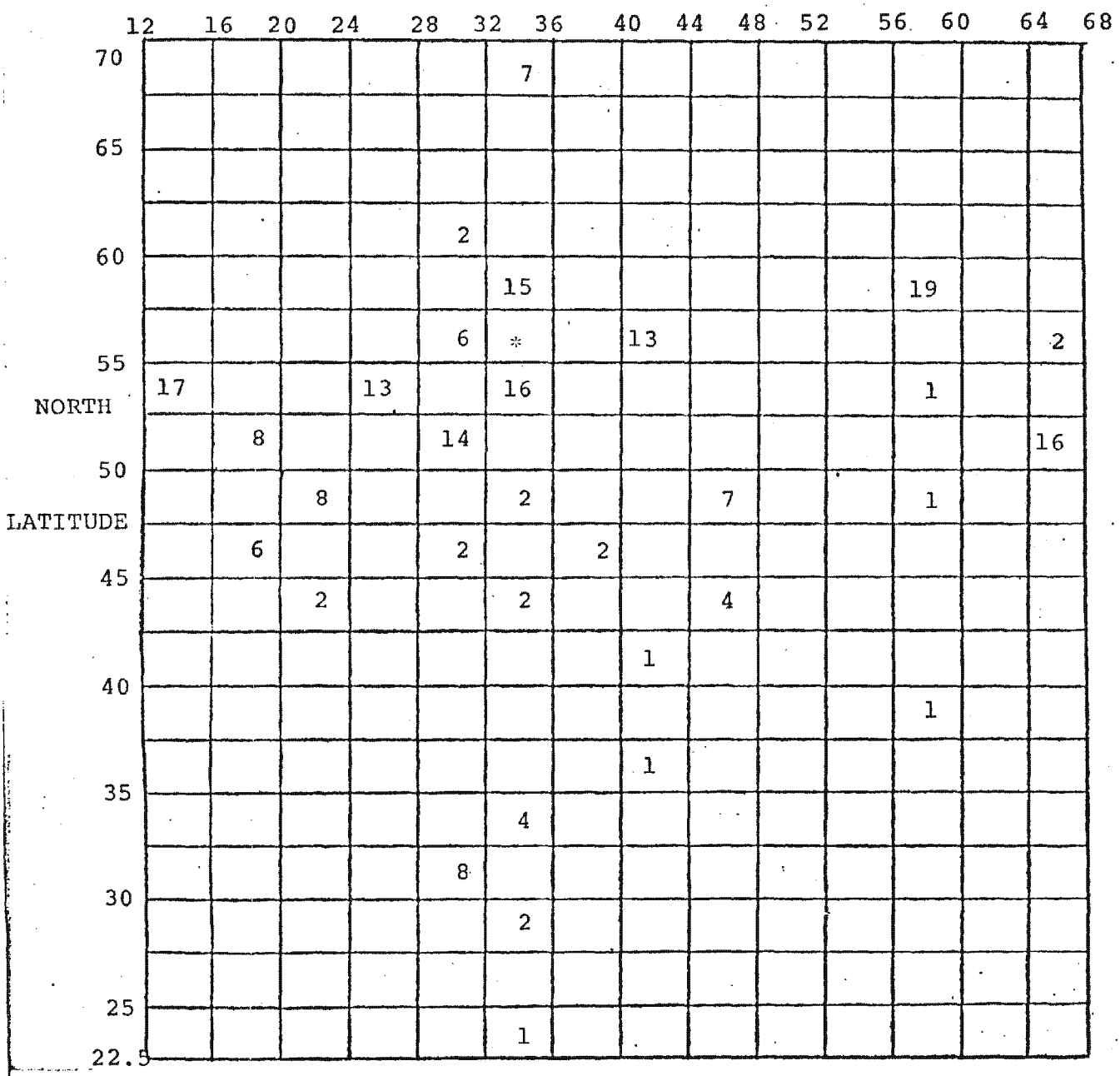

FIGURE 1