

# SEFENSE INTELLIGENCE AGENC

WASHINGTON, D.C. 20301

26 JUN 1974



MEMORANDUM FOR THE DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

SUBJECT: SAC Imagery Panel Report

- 1. The SAC Imagery Panel has completed its study of resolution improvement for satellite photographic systems. The final report is being drafted at this time and will be completed in the near future.
- 2. A summary of the Panel's findings has been developed and is hereby forwarded for inclusion in your report for the next EXCOM meeting.
- 3. Although time did not allow a review of this summary by the entire Panel it was read and fully approved by the Chairman. Dr. Eugene Fubini.

FOR THE DIRECTOR:	
1 Enclosure Summary	

Classified by BYEMAN-1

EXEMPT FROM CENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY Para 5.B. (243)
DECLASSIFY ON DEPLET

GAMBIT

( 1881

TOP SECRET



BYEMAN-TALENT-KEYHOLE CONTROL SYSTEMS JOINTLY

COPY 1 of 4 COPES

Approved for Release: 2024/01/12 C05144008

### A. INTRODUCTION

In April 1973, the DIA Scientific Advisory Committee (SAC) established a special panel to review system options and requirements for improved quality satellite imagery. The panel was chaired by Dr. Fubini. A discussion of the panel effort, including Conclusions and Recommendations, is summarized as follows:

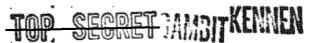
#### B. REQUIREMENTS

1 H	igh resolutio	n requirements	currently x	egistered	for collection
were revi	ewed and the	value of incre	easing resolu	tion on th	ese targets,
in steps,		was considered	l. The Panel	. examined	past reports
and found	little corre	lation (at the	high end of	the resol	ution spectrum)
between r	esolution on	the one side a	ind mensurati	on accurac	y and the
National	Imagery Inter	pretability Ra	iting Scale o	n the othe	*** **

2. The	y were unable to find a significant number	of uniquely important
national st	rategic issues that could justify	resolution instead
of	resolution. National issues considered we	re: Indications and
warning, su	rvivability of our strategic forces, abilit	y of our strategic
forces to po	enetrate, effectiveness of our strategic fo	rces, and verifiability
of SALT. In	all cases, resolutions of appear	to be adequate or
satellite.pl	notography cannot provide the most critical	intelligence.

3. The panel found that most, if not all, presently validated requirements would be satisfied by existing or planned systems. On the other hand, an analysis of the process through which requirements are established or validated revealed that some additional requirements could

HANDLE VIA
BYEMAN-TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY



be justified even if not validated. The reasons are the following:

	Curre	nt sy	stem								
photography	at be	tter	than	l fo	ot re	esolution	1.	A system wif	th		
resolution (	could	provi	.de	of	its	imagery	at	resolutions	of l	foot	or
hottor						,		** ×			

- b. Significantly higher resolution may uncover important programs unknown to us because of our resolution limitation.
- c. Improved resolution may lead to the same assessments of strategic or tactical weapons capability currently achieved, but at an earlier date, allowing greater lead time in the development of countermeasures.
- d. In some international confrontations it may be desirable to
  make a public release of imagery information or at least to make a

  convincing presentation to national leaders. In such cases, the desired

  resolution would have to be much higher than that required by photo interpreters.
- e. Requirements for resolution may increase in order to detect and possibly, read through, camouflage.
- f. A convincing requirement exists for resolution to get detailed information on a few tactical weapons but the intelligence value of this information is uncertain.
- 4. The conclusion that mensuration accuracy is weakly correlated with resolution, at the high resolution end of the spectrum, is due both to the type of systems we fly and the methods used to make measurements. Improvements in mensuration are possible both by changes in collection and exploitation.

## C. CAPABILITIES

1. By 1976, GAMBIT imagery will be available such that 10% of the

BYEMANI-TALENT-KEYHOLE

CONTROL SYSTEMS JOINTLY

pictures will have a GRD of		nd 50% will have
a GRD of	KENNEN Block I imagery wi	ll provide maximum_
		-
2. After projected impr	ovements in GAMBIT are made	e, little improve-
ment is possible with existi	ng optics unless improvemen	its in Smear rate*
	***	
and/or film are achieved. T	The most immediate improvene	ent may be obtained
by the use of film with less	noise or finer grain chara	ecteristics. The
use of free radical film, if	it ever becomes available,	, would give a GRD
3. It is possible to in	crease the diameter of the	optics in GAMBIT,
(now 44") to 70" without a c	complete change in launch pa	ad and vehicle.
The changes would require at	: least \$200 million non-red	curring costs and
would improve resolution up	to a movemen of hid hatter	+how CIT-1/A CAMPITE
would improve resolution up	to a maximum of ook percel	rusu 2 4-40 GWDII:

# D. RECOMMENDED R&D

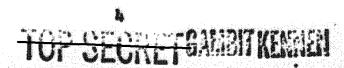
1. As stated above, after considering the currently validated high resolution requirements and the additional anticipated requirements, the

HANDLE VIA
BYEMAN-TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

TOP SECRETS AND MELINA

- panel concluded that there is not sufficient reason at this time to justify the initiation of a major new UHR system. They found however, that significant advances over currently programmed performance could and should be achieved by evolutionary improvements of existing and planned systems. Consequently, continued R&D is recommended in:
- a. Film technology in the areas of finer grain/lower noise conventional film and in non-conventional film technology such as FRF.
- b. Mensuration technology utilizing all a priori information on the shape of shadows and research in the area of edge/point location.
- c. Electronic image processing to improve resolution and increase mensuration accuracy.
- d. Investigation of atmospheric limitations on increased resolution systems.
- e. Improved processing, reproduction and enlargement hardware, techniques and materials.
- f. Effects of various types of imagery storage, retrieval, and
   dissemination especially including electronic transmission and reconstruction.
   E. CONCLUSIONS
- 1. The Imagery Panel has concluded that both film-based and electronic-based systems can evolve in the direction of UHR. The ultimate resolution within the next 10 years, and without very radical changes in technology or major changes in orbit altitudes, is likely to be about the same for both systems. A given resolution however, will be obtained sooner with film-based systems and at a lower cumulative cost. In addition, the required modifications to equipment involved in ground handling the output

BYEMAN-TALENT-KEYHOLE CONTROL SYSTEMS JOINTLY



of improved film-based systems are going to be less expensive than those required by electronic-based systems.

- 2. The Panel issued the caution that at VHR and UHR the meaning of the word resolution and its application to intelligence value is very uncertain (see B.1. above). Additional factors should also influence the comparison between systems:
  - a. Timeliness of the information.
  - b. Number of different target views.
  - c. Signal to noise ratio.

The superiority of KENNEN, when available, over GAMBIT in these three factors is clear.

TOP SECRETE ANNI LEARNING