BYEMAN
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WASHINGTON, D.C.

out 12/5

THE NRO STAFF

14 November 1977

MEMORANDUM FOR DIRECTOR, ADVANCE RESEARCH PROJECTS AGENCY

SUBJECT: Lincoln Laboratories Briefing to Dr. Cook, 1 Nov 77, Regarding "High Resolution Imaging from Satellites"

On 1 November 1977, [redacted], Lincoln Laboratories, presented an informational briefing to Dr. Cook, a copy of which is attached. We have learned that this was one of five briefings prepared for the Advance Research Projects Agency (ARPA) regarding suggested areas for new R&D initiatives.

Since the NRO is responsible for studies regarding high resolution imaging from satellites, it appears inappropriate for Lincoln Laboratories to submit this to ARPA. We will have all copies protected at ESD Special Security Office and will provide the information to our program offices for their evaluation.

Frederick L. Hofmann

FREDERICK L. HOFMANN
Colonel, USAF
Deputy Director for DOD
and Interagency Policy

1 Atch
Briefing (U)

Atch 3 to Bye-13514-77

HANDLE VIA
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HANDLE VIA TALENT - KEYHOLE CHANNELS ONLY

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WASHINGTON, D.C.

THE NRO STAFF

6 December 1977

MEMORANDUM FOR PROGRAM A (MR. H. COHEN)

SUBJECT: Lincoln Labs Briefing to Dr. Cook, 1 Nov 77, Regarding "High Resolution Imaging from Satellites"

On 1 November 1977, [redacted] Lincoln Laboratories (SITK cleared), presented an informational briefing to Dr. Cook on High Resolution Imaging from Satellites. A copy is attached for your review and evaluation. [redacted] understood there might be some sensitivities within the NRO on this and as a courtesy provided it to ARPA. We have learned that this briefing was one of five prepared for ARPA regarding suggested areas for new R&D initiatives.

Distribution of the materials has been suppressed until your office reviews and determines security requirements. Your views would be appreciated as soon as possible.

William H. Geiger

WILLIAM H. GEIGER
Major, USAF
Deputy Assistant for Security

3 Attachments
1. Briefing (U)
2. AFSSO Msg, Nov 77 (S-TK)
3. NRO Memo, 14 Nov 77 (BYE-13453-77)

HANDLE VIA TALENT - KEYHOLE CHANNELS ONLY

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HIGH RESOLUTION IMAGING FROM SATELLITES

PRESENTATION TO DR. CHARLES COOK

1 NOVEMBER 1977

atch 1

HIGH RESOLUTION IMAGING FROM SATELLITES

OUTLINE

OBJECTIVE

RATIONALE

POTENTIAL SENSORS

SENSOR PARAMETERS

SIGNAL AND DATA PROCESSING

FUTURE STUDY AREAS

HIGH RESOLUTION IMAGING FROM SATELLITES

OBJECTIVE

Study and recommend a spaceborne method for achieving high resolution imagery (0.3m) that avoids limitations imposed by sensing reflected sunlight.

RATIONALE

INSPECTION FOR TECHNICAL INTELLIGENCE

ELIMINATE PRESUMED DRAWBACKS OF CURRENT SYSTEMS

SURFACE WEATHER
NIGHT OPERATIONS
COVER UP
SEASONAL DARKNESS
DEEP SHADOWS

Approved for Release: 2025/06/16 C05143733

EXAMPLES OF TARGET AREAS

SILO LOADING / UNLOADING

SHIPYARD ACTIVITY

AIRFIELD INSPECTION

CONSTRUCTION SITES

RADOME CONTENTS

POTENTIAL IMAGING SENSORS

Sensor Type	Resolution	All Weather	Active Illumination
Passive Optics μm	Angle-Angle Fractional Meter with Large Optics (40cm at 400Km Range ⇒ 10m Diameter for λ = 10μm)	No	No

EXAMPLE PARAMETERS

HIGHLIGHT CONSTRAINTS

ILLUSTRATE POSSIBLE TRADE-OFFS

SENSITIVITY CALCULATION

STUDY

TARGET/CLUTTER CHARACTERISTICS

Establish Design Numbers

AMPLIFIER AVAILABILITY

Power/Bandwidth

PRF TRADE-OFF

Minimum Aperture for clutter suppression
Aperture for sensitivity
Processing considerations
Peak power and Time-Bandwidth

PROCESSING OPTIONS

On-board integration
Ground imaging
Data volume, rates

SPECIAL PURPOSE PROCESSING ON SATELLITE

SAW for pulse compression
Coherent Integrators

PROGRAM PHASES

COMPLETE STUDY EFFORTS
- Identify Critical Elements
- Plan Target Data Collection

DESIGN PHASE
- Gather and Analyze Target Data
- System Design
- Simulation
- Detail Design

PROTOTYPE DEVELOPMENT
- Construct Low Power System
- Non-orbital Testing
- Construct Full Power Prototype
- Orbital Tests - Shuttle
- Construct and Test Final System

SYSTEM TURNOVER
- User Testing
- Operation